

Faisal Muhammad

ICT Sector Development in the Kainuu Region

Thesis
Kajaani University of Applied Sciences
School of Business
International Business
Summer 2012



School of Business	Degree Programme International Business
Author(s) Faisal Muhammad	
Title ICT Sector Development in the Kainuu Region	
Optional Professional Studies	Supervisor(s) Anas al Natsheh, Perttu Huusko
	Commissioned by The Centre for Measurement and Information Systems (CEMIS)
Date 01.10.2012 Summer 2012	Total Number of Pages and Appendices 40+22
<p>This bachelor thesis was commissioned by the CEMIS that is a contract based joint research and training centre of the University of Oulu, Kajaani University of Applied Sciences, the Centre for Metrology and Accrediation (MIKES), the University of Jyväskylä and Technical Research Centre (VTI), Finland. The purpose of the thesis was to investigate the current situation, trends and opportunities of the ICT sector in the Kainuu region. Furthermore, to validate, how the CEMIS' actions (Research and Development projects) are supporting the environment of business development with cooperation to other institutions and ICT companies in the region.</p> <p>The research was implemented as a business intelligence tool to investigate the above mentioned issues. The research issues were divided into three parts 1) analysis of the current situation of the ICT sector, 2) possible future trends and changes in the sector and 3) CEMIS' implementation of its research and development projects with regard to regional business development activities. The first question was conducted with the help of existing data (secondary data) and the rest with the Delphi technique method, gathering the experts to get their opinions, views and suggestions to forecast the future trends in the ICT sector.</p> <p>The outcome and findings of the thesis research achieved the set objectives. In terms of the current situation, the ICT sector in the region is quite stable and steady towards the growth. The growth of the sector will enhance the process of innovation and development creating the new employment opportunities and cooperation. To relate the CEMIS cooperation in the region and with other institutions is improving and expanding rapidly.</p>	
Language of Thesis	English
Keywords	ICT sector development in Kainuu, Business development in Kainuu, Trend in the ICT sector,
Deposited at	<input checked="" type="checkbox"/> Electronic library Theseus <input checked="" type="checkbox"/> Kajaani University of Applied Sciences Library

PREFACE

This thesis was commissioned by The Centre for Measurement and Information Systems (CEMIS), where I have completed my practical training. I wish to offer my gratitude to the Institution for providing me the opportunity to work on such challenging research project and I am privileged to be the part of the business development process of the Kainuu region. The training provides me the opportunity to prove my learned theoretical skills into a real-time practical task.

I would like to thank Risto Oikari (Director, CEMIS), Anas Al Natsheh (Senior Business Advisor, CEMIS) and Perttu Huusko (Business Advisor, CEMIS) for their support and guidance throughout the research project and offering me such an excellent learning platform. Once again, Special thanks credited to Anas Al Natsheh for his support and guidance not only during the research project but also during my academic activities at Kajaani University of Applied Sciences.

Finally, my deepest gratitude belongs to Younas Khan (KBI7I), who played a vital role during my stay at Kajaani University to encourage me to improve my interest in studies.

LIST OF FIGURES AND TABLES

Figure 1.1	Finland – GDP and Employment 2000-2012	Page 2
Figure 1.2	Finland – Output by Industrial Sectors 2006-2011	Page 3
Table 1.3	Development of Turnover.....	Page 4
Table 1.4	Number of Employees.....	Page 5
Figure 2.1	Generic Foresight Process.....	Page 11
Figure 2.2	Research Design	Page 14
Figure 5.1	Steps in Questionnaire Development Process	Page 32
Table 1	Comparison of Traditional Survey with.....	Appendix

Contents

1 INTRODUCTION.....	1
1.1 Background.....	1
1.2 ICT SECTOR IN KAINUU REGION.....	3
1.2.1 Current Situation of ICT Sector in Kainuu Region.....	4
1.2.2 Trends in ICT Sector.....	5
1.3 Objective and Research Questions.....	6
1.3.1 Objectives.....	6
1.3.2 Research Questions.....	6
2 THEORETICAL BACKGROUND.....	8
2.1 Key Definitions.....	8
2.2 Research Framework.....	13
2.3 Research Design.....	13
2.3.1 Research Plan.....	13
2.3.2 Role of Delphi Technique in the Research.....	15
2.3.3 Importance of Delphi technique for the Research.....	15
3 PROFILE OF CEMIS.....	16
3.1 About CEMIS.....	16
3.2 History.....	16
3.3 CEMIS' Structure.....	17
3.4 CEMIS' Objectives.....	17
3.5 CEMIS' Areas of Expertise.....	18
4 RESEARCH METHODOLOGY.....	19
4.1 The Delphi Technique.....	19
4.2 Historical Profile.....	20
4.3 Forms of Delphi Technique.....	21
4.4 The Process of Delphi.....	21
4.5 Main Characteristics of Delphi Technique.....	22
4.5.1 Strengths.....	23
4.5.2 Reliability of Delphi Technique.....	24
4.5.3 Limitations and Criticism.....	25
4.6 Secondary Data – Quantitative Approach.....	26

4.6.1 Main Characteristics	27
4.6.2 Advantages of Secondary Data.....	27
4.6.3 Limitations of Secondary Data	28
5 RESEARCH CRITERIA	30
5.1 Expert Panel	30
5.1.1 Selection of Expert Panel	30
5.1.2 Expert Participation	31
5.1.3 Forming the Interview Questionnaire	31
5.1.4 Analysis of Expert Panel Results.....	33
6 FINDING AND OUTCOMES.....	34
6.1 Expert Panel Results	34
6.1.1 Future Trends in the ICT Sector.....	34
6.1.2 Future Trends in the Employment	35
6.1.3 CEMIS' Cooperation	36
6.1.4 Funds Availability	36
6.1.5 CEMIS's Regional Cooperation	37
6.2 Own Reflection	38
7 CONCLUSION.....	40

APPENDICES

1 INTRODUCTION

1.1 Background

According to Ministry of Finance Economics Department, Finland (Economic Bulletin, 02/2011), Economic growth slows sharply, Finnish economy set to face significant challenges in the years ahead.

The overall trend caused by slow global economic situations and financial crisis in several European countries along with the USA. The crisis has great impact on the Finnish Industrial sector, service sector, primary production and construction (See Figure 1.2). The GDP growth forecast for the 2012 will slow to 0.4% (See Figure 1.1) which will lead to the possibility of recession. In 2013, the GDP growth will touch 1.7% level which will be a positive sign of recovery yet not enough. Unemployment will begin to rise up in 2012 with the demand for labor on the decline.

The major element during this period will be the domestic demand in Finland. Without better than average performance of the economy in Russia, Sweden and Germany, Finland's major trade partners, the export prospect for the next year would be poor. So, to project these figures for coming years, a lot of studies are undergone and still going on to understand the ongoing trend of economic crisis.

The aim of the academic thesis is to study the ICT sector in the Kainuu region and to forecast the future trends of the domestic and foreign demand, employment rate and turnover of the ICT sector. To accomplish this task, Delphi technique was being used to interview the selected expert panel based on Delphi's guidelines. The main objective of this study is to validate the CEMIS' cooperation towards the ICT sector growth and its active participation in the regional business development activities by its ongoing and future research and development projects.

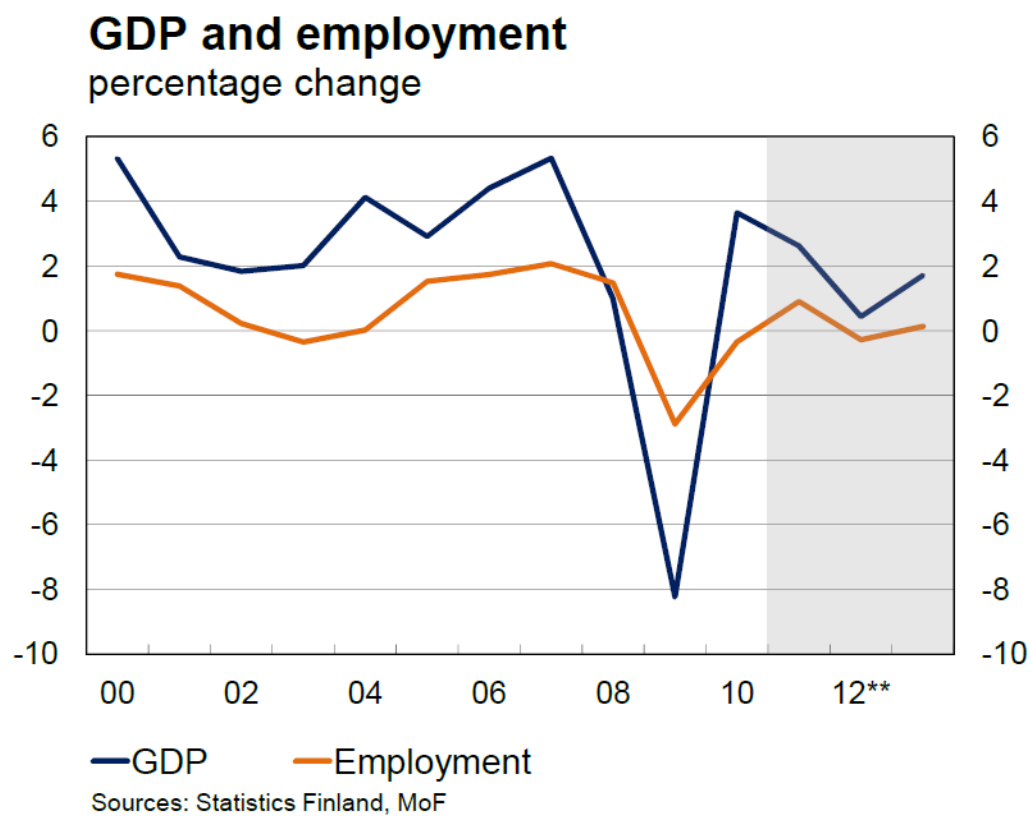


Figure 1.1: Finland – GDP and employment 2000-2012 (Economic Bulletin 02/2011, Ministry of Finance Economics Department, Finland)

Volume index of industrial output by industrial sector

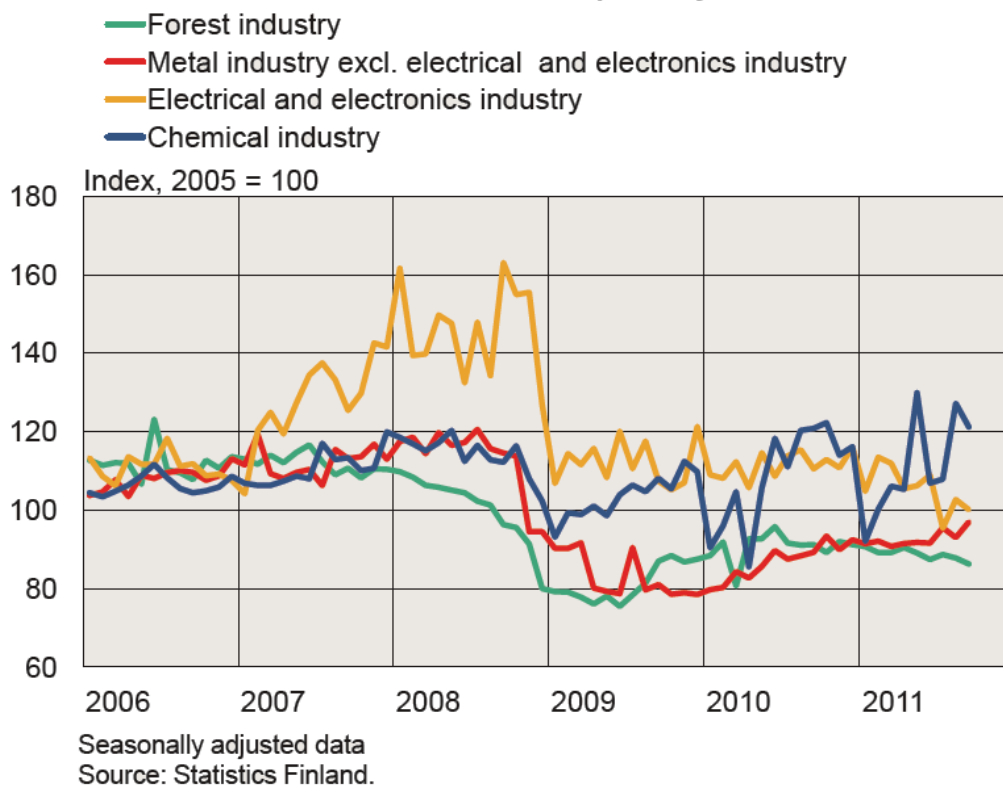


Figure 1.2: Finland – Output by Industrial Sector in 2006 – 2011 (Economic Outlook 05/2011, the Bank of Finland)

1.2 ICT SECTOR IN KAINUU REGION

It would be necessary to describe the ICT sector in the Kainuu region and the operating environment for the research purpose. Delphi technique requires the knowledge of the present situation to analyze the interviews of experts to better describe the future foresight of market development (ICT sector) and its trends. The interview questionnaire reflects the same aspects which are based on the market situation and ongoing trends.

1.2.1 Current Situation of ICT Sector in Kainuu Region

At the end of 2010, there were 54 companies in the region. Most of these companies were software developing companies (ICT-Alan Tarvekartoitus 2011). Due to 2008-2009 recessions, the number of employees and turnover decreased in the recent years that lead to slow growth in the ICT sector. In 2009, net sales dropped to 24.0% and employment rate by 9.2%

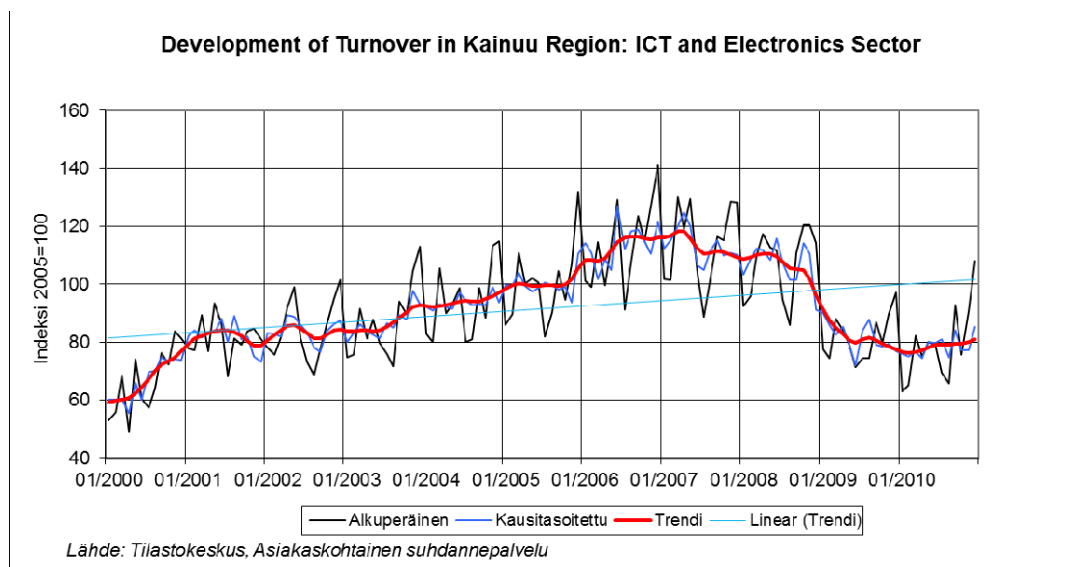


Table 1.3 Development of Turnover - ICT Sector in Kainuu Region 2000-2010

However, the year 2010 was recovery year and sales start growing. The employment rate remains stable during the course (ICT-Alan Tarvekartoitus 2011). The most significant effect occurred during 2010, when Electronics manufacturer Incap, Sotkamo shut down leading to a loss of 120 employees in the region. Table 1.4, illustrates the whole employment situation in the Kainuu region during 2000 to 2011.

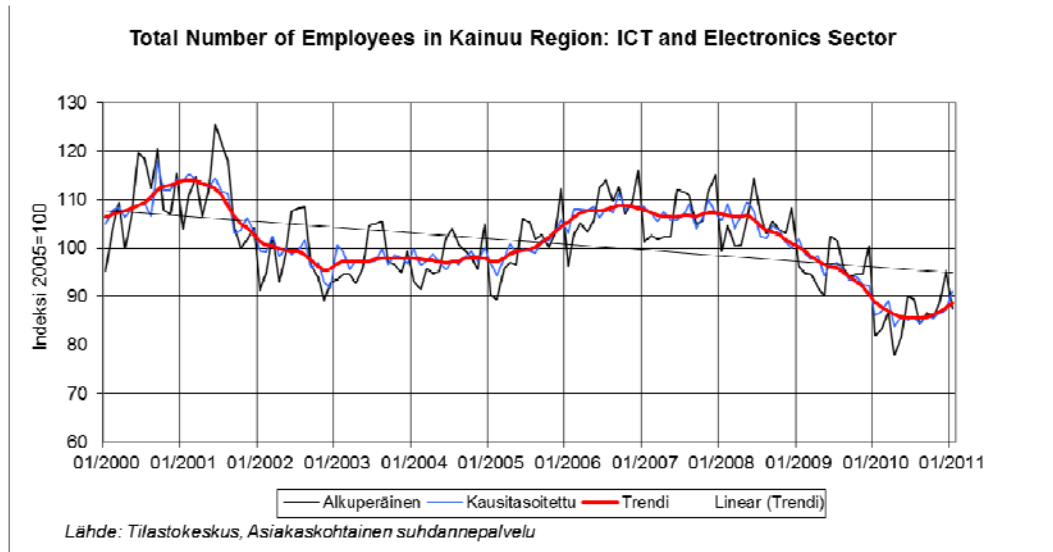


Table 1.4 Numbers of Employees - ICT Sector in Kainuu Region 2000-2010

1.2.2 Trends in ICT Sector

The ICT sector in the Kainuu region developed smoothly as mentioned in the table 1.3 and 1.4 in sense of turnover and employment rate until 2007. The most favorable development in 2006 was the number of employees rises by almost 8 percent a year earlier, the weakest part of development fell in 2010.

At the beginning of 2011, the ICT sector has seen signs of recovery and employment start rising despite huge decrease previously. Due to the influence of research and development institutions in the region e.g. CEMIS, MIKES, TEKES, VTT, Kainuun ETU, the sector started to grow. These institutions are mainly focusing on the sub segments of the ICT sector technologies e.g. gaming and simulation industry, sensory equipments, measurement technology for mining, software development, vehicle information system. The role of CEMIS is vital by offering a unique platform for existing and new companies and institutions by facilitating them in the process of innovation and research and development. So, all these factors together creating a full business supported environment in the region.

1.3 Objective and Research Questions

1.3.1 Objectives

The study objective can be divided into long term and short term objectives. The long term objective of the study is to provide valuable information to CEMIS with regards to the future market trends of the ICT industry in Kainuu region. This information would enable CEMIS to overcome the needs of expertise and training facilities offered to the students and companies in the sector of ICT. Through this information, CEMIS would be able to overlook the ongoing trends in the technological environment and its outcomes.

The short term objective is to forecast the future market opportunities in ICT sector based on the interviews with industry experts using the Delphi technique. Through the information provided by the Industry experts, it will be easier to proceed to make suggestions and to overlook possible upcoming trends.

1.3.2 Research Questions

As the client of the study, CEMIS has been always interested in business development activities by offering expertise and financial support to both small and large sized companies to encourage the business development in the Kainuu region. CEMIS has great interest in the ICT sector and has achieved remarkable success e.g. vehicle information system and measurement technology in the mining sector, computer games and simulators, process and environmental measurement, sports and exercise measurement system.

Since 2008, ICT & Electronic sector has seen some dramatic changes both in turnover and trends. These changes were so rapid and have great impact on the business development in the region. This negative trend leads the industry to decrease the new entrant opportunities and entrepreneurs' confidence. To address this situation, CEMIS conducted a research to know the possible reasons and also to forecast the future trends in this specific area of business.

The research can be divided into three sections as below:

1. What is the current situation of ICT sector?
 - What are the current trends in the sector?
 - What kind of competition is ongoing?
 - How the operating environment supports the business activities?

2. What are the future trends and possible changes in the sector?

What will be the market situation in the ICT sector?

What are the possible changes in the future?

3. How CEMIS actions (R & D projects) are supporting business development in the region?

How to deal with a decreasing trend in the ICT sector?

How to support the business activities in the region with its cooperation?

The first research question will be answered through the existing information (secondary data) from previous researches, statistics, reports, economic bulletins and articles. The purpose of the first question is to get a deeper understanding of the ICT sector in the Kainuu region. The second research question will be done by using the Delphi technique through conducting the interviews with industry experts. The outcomes of this part will be used to somewhat direction giving and forecasting. The final research question will be related to CEMIS actions towards the response to the second and first question and possibly creating some suggestions.

2 THEORETICAL BACKGROUND

In this chapter, key research approaches will be discussed and their role in the Delphi technique for future studies.

2.1 Key Definitions

- *Research Methods*

The science of future studies has a very large variety of research methods. Many of these methods are aim to investigate the possible futures and some deals with social designing and engineering in order to achieve and improve social conditions. Among these methods, some are quite sophisticated, highly mathematical and statistical. Others are easy to process, analyzed and understandable. One of them is, Delphi Technique which mainly used for predicting the future of a given research problem. There is one thing common among all these research methods of future research are; scenario building. Whether it is being used to plan a military operation or in creating a sustainable economy, scenarios are always there (Bell, 2000, 240-242). The following list of future study science in different shape of research methods;

- Pragmatic prediction of variables
- Extrapolation of trends using time series analysis
- Cohort-component methods
- Surveys research techniques
- The Delphi technique
- Simulation and computer modeling
- Gaming
- Monitoring
- Content analysis

- Participatory future Praxis
- Social experimentation
- Ethnographic future research
- Construction of scenarios (Bell 2000, 239)
- *Forecast*

According to the Cambridge dictionary online, a statement of what is judged likely to happen in the future, especially in connection with a particular situation, or the expected economic or weather conditions. Forecasting is quite useful if it provides better answers and understanding than its alternative approach “guessing” about the future.

- *Foresight*

The ability of foresight is to predict something that will happen in the near future. It also aims to identify the needs in the future. The foresight can be developed through current knowledge and past experiences. The foresight comprises, how a particular market will act in the future in certain aspects like technological developments, turnover, employment, investments, export etc. Foresight planning has a vital role in business development and cannot be ignored while making strategic decisions.

- *Futures Research*

The future research is a systematic way of gathering information and critically analyzing for the alternative future. Futures research aims to describe what kind of possible scenarios to occur in the future. Future research cannot be mixed up with forecasting because it has always its own basis of the situation and present information. The futures studied are based on the following principles (David T Wilson, Kristian Möller 1995, 517)

- The future is not predictable
- The future is not predetermined
- The future can be influenced by human actions and choices

In order to make these choices correctly, it is important to know what is possible, what is probable and what is preferable. (Bell, 2000)

- *Foresight in Business*

Forecasting the future has been never easy in business management. The biggest gain goes to the companies and organizations that identify the potential trends which yet to be discovered. Thus, forecasting and researching the future can serve for several purposes;

- A good road map to explore and discover the potential areas;
- An imaginary simulator that provides the insights about the future;
- Fact generator to lead the future research
- A set of guided actions towards the preferable future
- Alarming about the signs about future problems and threats
- A routine detector to demonstrate whether the operations are too routine-like (Lampikoski & Lampikoski 2000, 18)

Now, it's the question to figure out what one wants to accomplish, then taking steps to make it a reality. It is important to learn from each step and transforming acquired knowledge into something valuable. The following figure 2.1, illustrate the foresight process;

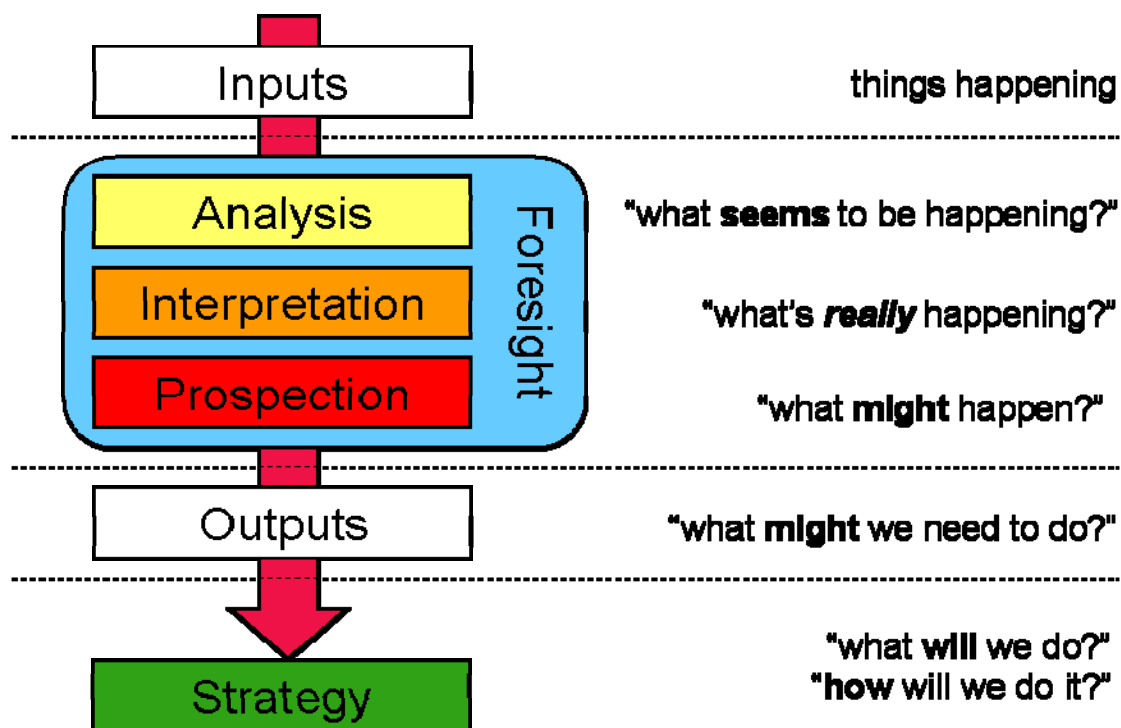


Figure 2.1 Generic Foresight Process. (Joseph Voros, 2001)

- *Competitive Advantage through Strategic Foresight*

It has been already described that foresight plays a crucial role in the survival of the companies and organizations. It leads to the creativity and strategic thinking. According to Conway (2007), strategic foresight is something that emerges in an organization when individuals having a foresight capacity work together to build strategic processes on a long term basis. But this process is ignored and gets buried by busy work. He also mentions that strategy without people is strategy without a future. It is only sustainable through people, and the people only have a foresight capacity. He further explains that people in the organization value, and what they think about the future of the organization.

- *ICT Sector*

ICT (information and communications technology) is a multipurpose term which includes any communication device or application, encompassing: radio, television, cellular phones,

computer and network hardware and software. ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries.

The ICT sector in the EU represents 5.6% of EU GDP (670 Billion Euro) and 5.3% of total employment in 2007. Half of the EU productivity growth (1.1% between 2000 and 2004) comes from ICT and 25% of research expenditure (2002-2003).

According to E.U policy for Information and Communication Technologies, the following purposes are aimed to describe the ICT sector:

- Impacts the competitiveness as an enabling technology;
- Enables process and product innovations;
- Improves business processes along the whole value chain

- *Questionnaire*

A questionnaire is a set of questions designed to generate the primary data to accomplish the objectives of the research. Burns & Bush, (2008, 264) stated that questionnaire design directly affects the quality of the data collected. Thus, a questionnaire provides standardization and uniformity in the process of the primary data collection process.

- *Expert*

According to the business dictionary, an expert is a professional who has acquired knowledge and skills through study or studies and practice over the years, in a precise field or subject, to the extent that his or her opinion or suggestion may be useful in fact finding, solving or understanding of a situation.

2.2 Research Framework

The framework of the research depends on foresight as a basis for the business and strategy formulation. Richard (2010) describes that foresight in planning has become more vital and important due to growing and changes in the market. A decade ago, future foresight was planned for 5 to 10 years but nowadays due to rapid change in trends and technology, it is limited to 2 to 3 years. Richard (2010) also mentions that each company has to think about the future and future directions of the market they are participating. So, the future challenge for companies will be to identify the opportunities based on trends and their customer in specific sector.

The framework should be designed for the future planning because research questions relate to the future market trends demand.

2.3 Research Design

2.3.1 Research Plan

The research has been divided into three parts as described in section, research questions; 1) Investigation of the current market situation in the ICT & Electronic sector, 2) Investigation of the future business development in the ICT sector, 3) CEMIS role in regard to business development in the region based on the analysis and results, 4) to provide possible suggestions based on the results of interviews with experts and CEMIS's actions (R & D projects) in the region. The research plan can be found in the following research design model demonstrated in figure 2.2



Figure 2.2 Research Design

The background research on the ICT sector is region based which only covers Kainuun companies. The secondary data were gathered by Kainuu ETU Oy, VTT (Technical Research Centre of Finland) counsel in Kainuu region, CEMIS (Centre for Measurement and Information System) and Kainuun ELY-Keskus. It contains reports, statistics, industry articles and literature. The purpose of studying and analyzing all this existing data is to get the better understanding of the ICT sector in the region to draw the best suitable theoretical framework of foresight in business planning. It also aims to determine, how the Delphi technique would be best to serve to client's (CEMIS) interests and objectives of this research work.

The second part of this research is to identify the future business opportunities and trends of the ICT sector in the region with the help Interviews with industry experts using the Delphi technique.

2.3.2 Role of Delphi Technique in the Research

The role of the Delphi technique in area of research is prominent, not only as a research technique but also a way to gather the industry experts together to get the valuable opinions and feedback for the future business (Rowe, Wright, 2001). The experts who took part in this research are those people whom the client of the study wants to engage the future co-operation and avail the business opportunities in the area of the ICT sector. These people are closely related to the said business sector and have a strong background for making strategic decisions and implementing the business strategies. Therefore, collecting expert knowledge is quite important for the research as it provides the insight into the sector development and an excellent basis for planning. Thus, the Delphi technique is closely linked to each part of this study.

2.3.3 Importance of Delphi technique for the Research

The Delphi technique is a multipurpose research tool that one researcher can utilize at various points in the research. Attempting to predict the future trends has been the ambition of many researchers. In the business world, forecasting the future demands, trends, cash flows, and other factors are very important and crucial for development and success. While forecasting these business issues; quantitative forecasting methods are not a good option because historical data is typically not available. In such cases, a reliable forecast method must be obtained through qualitative means. Thus, the Delphi technique is most reliable and unique methodology for above mentioned issues. Appendix 3, illustrates the comparison of traditional survey with Delphi Technique.

3 PROFILE OF CEMIS

This chapter will briefly introduce the profile of CEMIS as the research and training center in the Kainuu region. The following information will help to understand the history of CEMIS, its structure, objectives and area of expertise.

3.1 About CEMIS

CEMIS is a contract based joint research and training center of the University of Oulu, Kajaani University of Applied Sciences, The Centre for Metrology and Accreditation (MIKES), the University of Jyväskylä and VTT Technical Research Centre of Finland.

3.2 History

CEMIS was founded in 2010. Its operations are based on over 40 years' experience in the Metrology (i.e. Measurement science and technology) business and over 20 years' experience in Metrology related research activities. Kajaani Oy, a pioneer in the Finnish papermaking industry, founded the Finnish paper industry's first unit specializing in measurement technology in 1970, which later became an independent company incorporated as Kajaani Elektronikka Oy. Halfway through the 1980s, Kajaani Oy relinquished its company specializing in measurement technology and the remaining competence base led to the birth of several different companies specializing in metrology in the Kajaani.

Metrology research activities in the Kajaani region began in 1991 when Oulu University established the Metrology Unit's predecessor, the Measurement and Sensor Laboratory. Today, Oulu University's Metrology Unit- CEMIS OULU also includes the Biotechnology Laboratory (established 1996), the Kajaani Unit of Information Processing Science (established 2004), and the Centre for Wireless Communications (CWC), Kainuu office (established 2007). Jyväskylä University established the Sports Technology Unit, and started a Physical Exercise Sciences Masters and Doctoral degree program specializing in sports technology and physical exercise and well-being measurement research and development activities in

2006. VTT Technical research Centre of Finland established a unit in Kajaani in 2006. MIKES Centre for Metrology and Accreditation began its operations in Kajaani in 2010.

3.3 CEMIS' Structure

The center employs about 120 measurements and information systems experts. The annual funding for CEMIS is almost EUR 11 million. The activities of CEMIS are directed by the CEMIS strategy group, which consists of the director of the University of Oulu, the director of Kajaani University, the President and the director of administration and finance of Kajaani University of Applied Sciences, the vice-head of the department of biology of the University of Jyväskylä, the director general of MIKES, the vice president of R & D of VTT Technical Research Centre of Finland, the mayor of the Kajaani and the municipal manager of Sotkamo.

3.4 CEMIS' Objectives

CEMIS' vision is to be Finland's leading research and training center specializing in measurement and information systems by the year 2015. CEMIS is also aiming to achieve a significant position in the international arena. Such a position will be achieved through cooperation between those involved in CEMIS: two respected universities, two leading research institutes in their own field and the Kajaani University of Applied Sciences, currently evaluated as Finland's best.

CEMIS' aim is to strengthen and reinforce the attraction, competitiveness and impact of research and training activities.

The interest generated by CEMIS amongst students, employees and R&D customers is the result of the wide and multidisciplinary opportunities created by a cooperation structure involving five leading operators in their own field as well as clear and attractive fields of focus in training and research.

CEMIS' competitiveness in the highly competitive national and international R&D finance markets is guaranteed by the credibility and networks of leading operators in the field, by

concentrating on the strongest competence areas, using shared resources efficiently and by implementing effective operational processes.

The CEMIS' impact is assessed according to outcomes achieved for the host organizations involved, by the business generated based on new technologies developed in the center and the amount of new companies and jobs created as a result of its activities. CEMIS responds to these challenges by focusing its operations on the most promising applied fields of the future, implementing an enterprise oriented and effective working processes as well as through creating active interaction and presence at a national and international level.

CEMIS has already benefited from using an operational model that is also nationally sought after as an optimal cooperation structure in sector research and higher education.

3.5 CEMIS' Areas of Expertise

The CEMIS has focused on three crucial future technologies:

- Metrology;
- Vehicle information systems; and
- Game and simulation solutions.

The center will emphasize the development of new technology and training experts in applied areas that are crucial to the future such as the process industry (specifically renewable chemical forestry and the mining industry), environmental measurements, well-being applications (particularly sports technology), the work machine and vehicle industry and game applications.

The above technologies and application areas and the high-level expertise of CEMIS' units are combined through five spearhead competence areas.

- On-line analysis of the physical and chemical properties of liquid flows
- Work machine and vehicle sensor networks and information solutions
- Reliable measuring devices for demanding conditions
- Sports and well-being technology measurement
- Game-oriented solutions

4 RESEARCH METHODOLOGY

Although, it was possible to conduct a traditional survey to obtain the information concerning the development of ICT sector in the region but due to the proven and popular tool in information system research, the Delphi technique seemed to be a more suitable approach as a research strategy. To differentiate the traditional survey approach and Delphi technique, appendix 3 compares and contrasts the strengths and weakness of both research methods.

4.1 The Delphi Technique

The Delphi technique is a proven research method aimed specifically at exploring the expected future possibilities. The technique obtains a group of experts' most reliable consensus of opinion by allowing them to express their own views on a topic (Dalkey & Helmer, 1963). It was first used in future studies by US military in the 1950's on technology research. Linstone and Turrof (1975) provided a basic definition of the Delphi technique: "Delphi technique may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem".

The Delphi technique, by definition, is a group process involving collaboration between the researcher and a well arranged group of acknowledged experts on a stated topic, usually through a sequence of planned questionnaires. Delphi has been used to gain a consensus regarding the future trends and projections using a systematic approach to gather information on a specific topic of interest. This technique is quite useful where the opinions and judgments of expert and practitioners are needed. Skutsch and Hall (1973) identified the Delphi as a technique for obtaining judgments on complex matters where precise information is unavailable.

Helmer (1967), presented the rationale that the social sciences and education should use the Delphi technique as a research tool in making decision and investigating future trends. Based on an earlier paper by Helmer and Rescher (1959), Helmer stated the social sciences and education as "inexact sciences" and contended that these inexact sciences could utilize a scientific methodology in research work similarly to the exact sciences by adopting the Delphi

technique to predict future events for better understanding of the present circumstances and factors.

Weaver (1971) described the use of the Delphi technique for teachers and administrators to plan the curriculum development. Weaver (1971) calls:

“The Delphi technique is a potential device for forcing educational professionals to critically think about the future”.

Thus, the Delphi technique can be a useful research tool in helping institutions to assess the future directions and needs. Prediction of the future trends will not only provide the information but also give insight in planning curriculums and programs.

4.2 Historical Profile

The Delphi technique was named after the ancient Greek oracle at Delphi from which prophecies were given (Koontz & O'Donnell, 1976). An oracle refers to a statement from someone of unquestioned wisdom and knowledge or of infallible authority (Funk & Wagnells, 1966). It was first developed in early 1950's by Olaf Helmer and his associates at the Rand Corporation while working on the defense research project. Rieger (1986) stated Delphi's development in five different stages:

1. Secrecy and Obscurity;
2. Novelty;
3. Popularity;
4. Scrutiny; and
5. Continuity. (Rieger, 1986)

During the first stage of secrecy, the Delphi technique was classified by the military only. Its main purpose of utilization was to gain consensus among the group of military experts regarding a sensitive defense issue. This stage lasted from early 1950s to the early 1960s until it was declassified.

The second stage of novelty was primarily used by corporate planners as a forecasting method for human and industrial services. This stage lasted from the mid-1960s to the late 1960s.

The third stage of popularity lasted from the late 1960s to the mid of 1970s. During this time of course, 389 articles, papers and reports accounted for the said topic. Rieger (1986) described that between the years of 1970 and 1974, 61 dissertations used the technique.

The fourth stage of the technique, scrutiny, began in 1975 to Sackman's unexpected attack on the Delphi technique itself. The "first insertion" of Sackman's criticism described that the technique did not measure up to the psychometric standards of the American Psychological Association.... later challenged and refuted by Goldschmidt.

The final stage, continuity, is the current stage of Delphi's development. Rieger (1986) identified 599 dissertations using the Delphi technique between 1975 and 1984, with 441 of them between 1980 and 1984.

4.3 Forms of Delphi Technique

The original purpose of the Delphi technique was a forecasting method, designed to predict the possible future events. Although, several names have been given to this process. Dailey (1988) described it as an exploratory Delphi. Van Dijk (1990) stated it conventional Delphi. According to Dalkey (1972), "*the Delphi is a procedure that is a rapid and efficient way to "cream the tops of the heads" of a selected group of knowledgeable people*". He further cited that a well-designed and accurately managed Delphi could be the highly motivating environment for respondents.

4.4 The Process of Delphi

The process is typically same for each category of Delphi; however it depends on the type and characteristic of a certain study (research). Delphi is not a procedure which intends to challenge statistical or model based procedures, against which human judgment is shown to be inferior: its purpose is to gain the forecasting. An interactive process is still required between the members of the group called Delphi panel and the researcher, with the researcher act as facilitator.

Brooks (1979) described several steps are involved in using the Delphi technique:

- Identifying the expert panel;
- Determining the willingness of individuals;
- Gathering individual input on the specific issue and then compiling into basic statements;
- Analyzing data from the panel;
- Compiling the information on new questionnaire and sending each panel member for review;
- Processing the new input and returning to the panel the distribution of the responses;
- Asking each panel member to study the data and evaluate their own position based on the responses from the panel members;
- Analyzing the input, and sharing the supporting statements with the panel.

4.5 Main Characteristics of Delphi Technique

The Delphi technique has three main important characteristics described by Dalkey (1967); anonymity, controlled feedback and statistical “group response”. The factor of anonymity separates the Delphi from other expert methods yet it has its own advantages and disadvantages. Turrof and Hiltz (1996) have also described the anonymity as an important factor while performing a Delphi research. The members should preferably know who is participating in the research work in order to enhance motivation. The primary objective is to obtain the genuine opinions and ideas without the experts feeling pressure from their competitors or any other factors. This can be achieved when:

- Experts can freely modify their response or point of view;
- Strong leader types cannot influence the opinions and comments of other experts;
- New ideas can be obtained from experts;

- New ideas are expressed by experts with different orientation and viewpoints (Tur-rof & Hiltz 1996, 61)

Helmer (1967) supported the validity and reliability or the Delphi technique as an acceptable method of data collection by an identified group. Further he stated that Delphi technique is efficient in both group decision making situations and in other areas where order of magnitude estimates are required.

4.5.1 Strengths

The Delphi technique is much more suitable when other research methods are not adequate or appropriate for qualitative data collection. It can be useful when:

- The research problem does not lend itself to precise analytical techniques but can be useful from subjective judgments on a collective basis;
- The individuals have to contribute to an examination of a broad or complex problem due to adequate communication and diverse backgrounds with respect to expertise;
- More individuals are needed in face to face interaction;
- Time and cost make frequent group meetings impossible;
- Disagreements among individuals are so severe or politically unpalatable;
- The heterogeneity of the participants must be preserved to the validity of the results.

There are many other additional advantages which make this technique as a simple to use. For example, advanced mathematical skills are not needed to implement the Delphi research. A major strength of the technique is flexibility, but limited, time prospectus in which individual has to respond the questionnaires (Brooks, 1979). Here flexibility means allowing individuals to set the schedules or location which most suits them.

4.5.2 Reliability of Delphi Technique

For the successful completion of the Delphi research, it is necessary to focus on the following issues mentioned by Kuusi while evaluating the research:

- Successful selection of expert panel;
- Designing and forming the questionnaire;
- Anonymous argumentation which is not only the expression of views but to respond the relevant questions with facts and ideas;
- Conversation where relevant topics are being evaluated according to the desired criteria; importance, probability and desirability;
- Successful decision making based on the relevant research results;
- The ability to systematically collect the future scenarios based on the expert's opinion (Kuusi 2000)

The information obtained from the Delphi study is as good as the experts who participate in the expert panel. Therefore, the structure of the panel relates to the validity of the results of the Delphi research (Spencer-Cooke, 1989). It is the panel's opinion and judgments which are elicited and processed.

Therefore, a good panel of experts can be selected by gathering experts from different sectors of the desired industry or business sector. The panel must represent researchers, decision makers, executive directors and entrepreneurs because they are sources of fresh ideas and opinions. This enables the researchers to perform the research with several background opinions and data provided by the panel. Kuusi mentions the Delphi technique is a tool for making the future, and not so much a tool for predicting the future. (Kuusi, 1993, 139)

4.5.3 Limitations and Criticism

Like many other research tools, Delphi is also not without limitations. It has been gone through heavy criticism. The most notable criticism was done by Harold Sackman in 1975 in his book, *Delphi Critique*. He described three major criticisms of Delphi research as follow:

- Conformity pressures and problematic emphasis on Consensus;
- Mostly rely on something which is basically educated guesswork;
- Absence of the formalized scientific basis for legitimating Delphi outcomes (Harold Sackman, 1975)

Sackman (1975), also stated that researcher turn to Delphi technique when there is no other research option exists to solve the problem, or to provide the needed information.

The consensus developed by Delphi may not be the true consensus; it might be a product of specious or manipulated. Therefore, a specious consensus probably does not contain the best judgement. Instead, it is a just compromise position. (Linstone & Turoff, 1976)

Linstone and Turoff (1976) proposed that there are five most common causes for Delphi technique to fail:

- Imposing monitor views and preconceptions of problem on the respondent group by over specifying the structure of the Delphi and not allowing for contributions of other related perspective to the problem;
- To assume the Delphi that it can be a surrogate for all other human communications in a given situation (research problem);
- Panel response is presented and summarized poorly and ensuring the common interpretations of the evaluation scales utilized in research;
- To ignore and not to explore disagreement so that discouraged dissenters drop out and a simulated result is generated;
- Due to demanding nature of the Delphi technique, the respondents should be recognized as consultants and well compensated for their time if the Delphi is not an integral part of their job. (Linstone & Turoff. 1976)

Delkey (1972) pointed out Delphi technique as not sufficient to a definite source for an uncertain question because the expert's cultural bias can lead to similar answers to some questions, which in fact are poorly known, or in some situation where the expert might not be able to answer the certain questions. According to the Linstone and Turrof (1976), the "virtual" situation does not affect the utilization of the technique, but rather the selection of the respondent expert panel.

Barnes (1987) has stated the additional disadvantages of the Delphi technique:

- Judgments are those of a selected group of people who may not be representative;
- Tendency to eliminate extreme positions and force a middle of the road consensus;
- Much more time intensive than the nominal group process;
- To be not viewed as a complete solution;
- Requires higher skills of written communication;
- Requires sufficient time and participation (30 to 45 days to complete the whole process).

The additional reason could be the Delphi failure as panel members may not be able to see the vision or the "big picture" in which they are involved. This happens when panel members are chosen so close to the problem stated that they cannot see the future.

4.6 Secondary Data – Quantitative Approach

Burns & Bush (2008) defined that secondary data have previously been collected by someone other than the researcher for some other purposes than the research project at hand. This could be done by firms, government agencies, institutions and researchers for the purpose of recording activities or maybe for research purpose. Secondary data can be found in shape of published reports, journals, magazines, internet, books and companies websites.

4.6.1 Main Characteristics

There are so many uses of secondary data nowadays especially for the companies for their ongoing research and development projects, drafting reports, marketing researches e.g. Secondary data play an important role while conducting different kinds of researches and help the researchers to understand the topic more deeply. It has become an essential part of marketing research now days. According to McDaniel & Gates (2001) that there are two types of secondary data; internal secondary data and external secondary data. Internal secondary data consists of information which has been gathered by a company, organization or institution during the normal course of activities. While external secondary data is typically published in shape of reports, journals, magazines, internet, books, newsletters and white papers by companies, organizations and institutions.

In some cases, it might not be used to conduct the primary research but somehow it is useful to understand the problem and get some insights which foster the the main research activities.

4.6.2 Advantages of Secondary Data

The major advantage of secondary data is to provide the brief understanding of the research topic. It helps the researcher to analyze the background available information which can be used to perform the primary research in the proper direction.

There are five main advantages of the secondary data to use in the most research projects;

- Secondary data is easy to obtain and speed up the process of the research;
- It is inexpensive relative to the primary data which takes lots of money to gather and time;
- It is usually available no matter what problem area may be, someone somewhere has dealt with it already. It may not be fully appropriate but somehow provides the information;
- It enhances the process of primary data and provides the understanding of the background information;

- In most cases, secondary data may achieve the research objective. (Burns & Bush, 2008)

4.6.3 Limitations of Secondary Data

Despite the advantages of secondary data, it has some dangers and pitfalls. This limited its use in the research. Its validity and reliability based on various factors. The disadvantages could restrict its use in the research due to the following factors;

- Lack of availability;
- Lack of relevance;
- Inaccuracy and
- Insufficient Data. (McDaniel & Gates, 2001)

Lack of availability; for some specific research question, the availability of secondary data could be the crucial issue to perform the primary research. It might be possible that someone never done that kind or research before or the topic is quite unique to find the available existing data.

Lack of relevance; it is quite common for secondary data to be presented in units or measures that cannot be used by the research in the ongoing research topic. It is also possible that existing data somehow provide the insight but not fully support the research topic.

Inaccuracy; the researcher must ensure that the existing secondary data based on its accuracy. There are a number of potential sources of error that when a researcher gathers, codes, analyzes and presents the data. There are a few guidelines for determining the secondary data accuracy.

- Who has gathered the data?
- What was the purpose of the study (research study)?
- What kind of information was collected (relevant topic)?
- When the information was collected (time perspective)?

- How the information was collected (medium of the information)?
- Is the information consistent with some other information? (McDaniel & Gates, 2001)

Insufficient Data; a researcher might consider that data is available, relevant and somehow accurate, but it's still not sufficient to make a decision or solve the problem.

5 RESEARCH CRITERIA

As described earlier in the section 1.5.1 Research Plan, the research has been divided into two main parts. First part was to conduct the research based on secondary data; the existing data about the ICT sector to get a deeper understanding of business development. The second part is to conduct the research using the Delphi technique to interview the industry expert to address the research questions. Therefore, this chapter will be discussed the execution of the second part of the research study. The interviews were conducted individually rather than in the group due to some limitations and anonymity. Each interview lasted for more than one hour. Mainly, the questions were leading to ensure the quality and reliability of the data and to get the experts' high level opinions.

5.1 Expert Panel

The interview panel members were well expertise and experienced in the area of ICT. The important aspect of Delphi research is the quality of experts not the number of participants. Due to this reason, the industry experts were selected carefully. These experts represent different expertise areas in the ICT sector in the region. To add even more variety to the selection of expertise level of the experts, it was decided to add CEMIS's director Risto Oikari and senior business advisor, Anas Al Natsheh. The purpose was to get the information at its least level from both real business environment and researchers point of view. This objective of this kind of strategy for selection of experts was to get the best results for the research issues.

5.1.1 Selection of Expert Panel

The crucial aspect of conducting as a successful study of the Delphi technique is the selection of the respondents. Linstone and Turoff (1975) list applications where the heterogeneity of the participants must be preserved to assure the results' validity.

There were totally 24 invitations sent through the email but due the limitation of time factor, it was not possible to conduct the entire panel. Only 5 experts were interviewed based

on the nature of their work, expertise and functionality. The panel includes the following experts:

- Risto Oikari – Director – The Centre for Measurement and Information Systems, Kajaani
- Anas Al Natsheh – Senior Business Advisor – The Centre for Measurement and Information Systems, Kajaani
- Marko Kanninen – Director ICT, Electronics & Metals– Kainuun ETU Oy, Kajaani
- Jukka Jurvansuu – Entrepreneur – Citius Oy, Kajaani
- Pentti Malinen – Director Regional Development – Kainuun Municipality, Kajaani

5.1.2 Expert Participation

As mentioned earlier, there were 24 experts selected based on their expertise, knowledge and area of functionality but it was not possible to arrange all the interviews. Some of them didn't respond to the invitation and rest were withdrawn due to time factor. According to Osmo Kuusi (2012), the motivating phase is the single most challenging tasks in the research execution. He also mentioned that the experts need to feel that they are participating and contributing to something important for their own work and in their field of expertise. To contact the selected experts, an invitation email (Appendix 1) was sent on the behalf of CEMIS's director, mentor and the researcher. The email provides the detailed description of the research work and its importance for the regional business development. But only few of them provided the response to participate in the research work.

5.1.3 Forming the Interview Questionnaire

Every form of research relies on the proper use of a questionnaire. It is the common thread for almost all data collection methods while conducting the primary research. Clifford stated that lawyers and market researchers both ask leading questions, and both do it for the same

two reasons. First, leading questions are easier and can cut right to the point. Secondly, leading questions bolster your research process of collecting primary data. McDaniel & Gates defined the pivotal role of a questionnaire in the research illustrated in the figure 5.1;

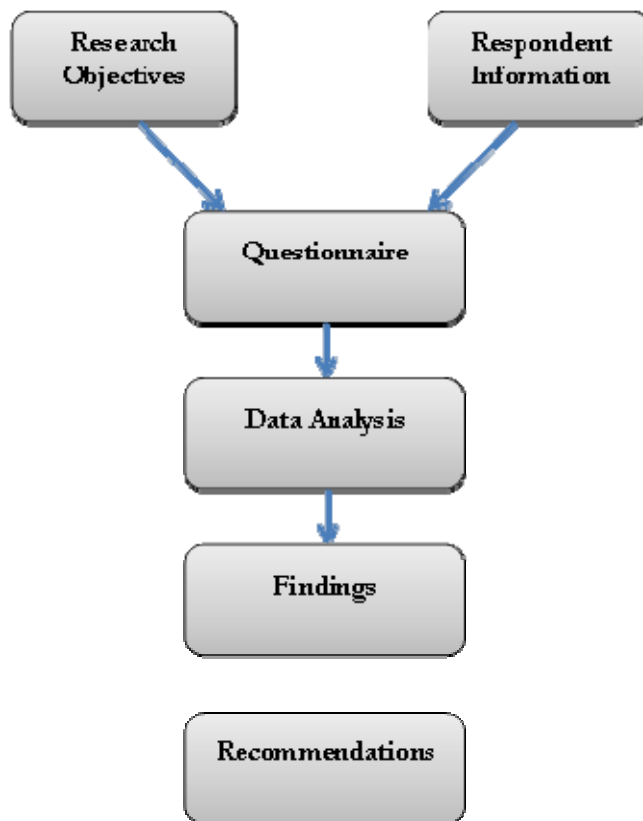


Figure 5.1: Steps in the Questionnaire Development Process

The interview questions were formed according to Kuusi's (1993, 133) theory of optional future strategies:

- *Observers point of view* in which one's own opinions remains separate from the evaluation for the most probable future development.
- *Action point of view* where the most required future development possibilities are stated.
- *Preparing to face the possible threat to point of view* was the future possibilities are mostly adverse but it's definite to change them into positive future opportunities.

- *Possibility point of view* where technology and other development offer infinite possibilities that can become reality if anyone eager to explore the opportunities.

The primary objectives of the questionnaire were to address the issue related to the ongoing trends of the ICT sector in the region and cooperation of the research and development institution (CEMIS) with the industry. These questions were designed in such a way to let the experts to enter into the discussion and get their point of view to these certain changes in the sector. Most of the time, these questions were leading and expert provided with the most valuable information for the purpose of research which helped to understand the trends and economic factors related to the ICT sector. The main themes of the questionnaire were following:

- Industry changes
- Ongoing & Future market trends
- Employment Opportunities
- Cooperation with Research and Development Institutes e.g. CEMIS, Kainuun ETU
- Role of CEMIS's in business development (Research & Development Opportunities)

All these topics were the important to uncover the issues related to the ICT sector in the region. There were already few studies done which covers the most common problems. That secondary data was also useful to understand the background for the research work.

5.1.4 Analysis of Expert Panel Results

According to Hirsjärvi et al (2001, 209) the analysis of research results is best to perform soon after conducting the research and gathering the data. Therefore the results of the expert panel were analyzed after the interviews were completed(Appendix II). The necessary and primary information was extracted from digital voice data to text. Hirsjärvi et al (2001, 208) also stated that in qualitative research, organizing and processing the research data is very demanding and depends upon the research strategy and method.

6 FINDING AND OUTCOMES

In this chapter, finding and outcomes will be discussed mostly based on the expert interviews. Michael Lotti describes that:

“Even the best research will not drive the appropriate action unless the audience understands the outcomes and implications. Researchers must create a clear, concise presentation of the results.”

6.1 Expert Panel Results

For the clarity and flow of reporting, the research problems discussed in the chapter 1 under the heading research question will be the base to reflect the expert’s opinion, ideas, discussion and suggestions. For better approach to address the said research issues, this part of studies are subdivided into the following main headings:

6.1.1 Future Trends in the ICT Sector

The first question posed in the questionnaire was to investigate the current and future trends in the ICT sector in the region. Based on the findings of the expert interviews and existing secondary data, now ICT sector is quite stabilized and there is a positive trend in sense of turnover and employment. Overall economy in the Finland is improving which has an impact on the regional based business activities as well. Although, there is not yet significant changes seen but this trend has restored the confidence of businesses, institutions and major clients. The demand for services and ICT products are gradually improving.

Furthermore, the ongoing projects at the CEMIS will have a definite effect on the ICT sector in the long run but this all depends on the resources allocated to it. Less funding means, limiting the future opportunities for the innovation and research processes at the CEMIS. Of course, it takes time for any institution to progress and show outcomes what they are aiming to achieve. The director CEMIS mentioned that they have budgeted for this year and coming year, after that they have no idea what will be the new policies for the projects at the CEMIS because in Finland, overall there is trend of cut short in the spendings with regards to employees, budgeting and other primary resources. The CEMIS itself as a research insti-

tution is determined to improve the regional business activities through its innovation and research process currently and in the future.

6.1.2 Future Trends in the Employment

The trend in employment is growing stage now. The previous downfall of employment was due shutdown of electronics manufacture Incap in Sotkamo. Secondly; during the recession time most companies fired their employees to cut short their costs, but now the situation is different. Many ICT related companies are creating new job opportunities for coming years. While interviewing with the senior business advisor, Anas Al Natsheh, he mentioned that in coming years, Finland needs to create 150,000 jobs in order to recover the system. Most of the portion is to replace to the retiring employees and rest to cover the labor market demands. He also explained that previously Nokia was leading ICT research and development company but now it's not the case. This all software development portion of the company is moving to USA. That is crucial in the sense of the employment and the Finnish economy. There were lots of medium sized companies who had been getting subcontracts from Nokia are now disappearing due to less demand. All these medium sized companies accounted for 10 percent of Finnish GDP.

Now, this trend is shifting to SMEs which are positive signs for the Finnish economy. To support such a trend, we have to encourage them and support them to establish their business activities in the field of ICT. This will improve the situation of employment in the Finland.

Furthermore, ICT cluster in the growing stage in the region which is quite crucial that demands to establish new connections nationally and internationally. Risto Oikari, director CEMIS mentioned that we have employed foreign expertise in different areas of CEMIS which was quite successful experiment. At the early stage of any business sector, it needs more and more environmental support to boost the activities which we have successfully implemented through our policies and strategic decisions.

6.1.3 CEMIS' Cooperation

Based on the interviews with industry experts, it is quite straightforward that there is a lack of cooperation among the institutions and ICT companies even if there is cooperation existed that is not enough. If we talk about regional business development, then this must be improved.

Jukka mentioned that: *there is cooperation with CEMIS but, it's not enough to fulfill the industrial demands in the sector of ICT research and development. This cooperation with such institution must be improved for better outputs which obviously will benefit both companies and the region.*

On the other hand while interviewing with Director CEMIS, he mentioned that their institution is always out there to assist and provide research and development facilities to these SME's and organization in the sector of ICT. Now the only object left is how to improve the cooperation and communication channels between the CEMIS and the regional ICT companies to enhance the process of development.

6.1.4 Funds Availability

The other biggest issue found during the research was utilization of funds. There are existing institutions in the region which can support startup business and existing business to invest more money in the area of research and development but due to lack of entrepreneurial skills, there are not so many people with good business ideas and products to benefit from it.

The Director of Kainuun business development mentioned that *their organization is following the EU policies. The EU is promoting that every region must make their strategies based on smart specialization. This theory explains that we must have to explore the existing business sectors e.g. tourism, mining and ICT.* That means, there are regional development policies but the shortage of people with good business ideas and unique products to explore the national and international markets.

The Director Kainuun ETU has also explained the same situation that during the year they haven't seen any potential cases except only one, which is the data center project. So, its so simple, no new projects, no fund allocation and no development in the region.

The other indirect factor is the decrease of the EU funding each year which will harm the ongoing research and development projects at the CEMIS and in the region. Not only it will affect the projects at the CEMIS but also slow down the process of innovation and development of the ICT sector in the region. This factor will surely put great influence on the business development in the region in the long run.

6.1.5 CEMIS's Regional Cooperation

CEMIS is providing quite unique concept in the region with some sort of geographical cluster of measurement technology. The three pillars mentioned by Anas are *research, business and education*. This will support the companies who are working in the region in the ICT sector and other sectors as well. Kajaani university of applied sciences is also playing a vital role in the education sector because education is the key factor which supports all the economic activities in the region. He further explains that the business students of Kajaani university are cooperating with the CEMIS to study the market needs, technological trends and business environment.

CEMIS is offering a platform to the big companies to come to this region to invest in the measurement technology. For the development in the region, it needs the element of research and development which is totally based on human intelligence, for human, research and development is based on education and quality education. So, there is a circle of development in the region. Now, in the region there is the best university of the Finland to support the educational base. To support the research activities, there is the CEMIS who is always on the front line to offer training facilities, platform for research and development to the companies, source of innovation and to offer expertise in business development in the region.

Moreover, the director Kainuun regional business development stated that *our primary objective is to support business activities in the region. Some of these industries are our priority to improve them e.g. tourism, ICT and well being of the people in the region*. While answering to the question that is there any alliance or cooperation with CEMIS in areas of business development. He mentioned that each year we make a yearly plan for business development based on EU funding. The allocation of a fixed amount of funds for measurement technology which is addressed to the CEMIS.

Furthermore, the director Kainuun ETU described that we have strong cooperation in mining sector with the CEMIS but for the ICT sector, we have time to time discussions and surely in the future, there will be positive cooperation to develop the opportunities for ICT companies.

6.2 Own Reflection

The developmental benefits of promoting the ICT sector in the region can lead to economic development, social development, education and employment opportunities. It is witnessed that those countries who experienced the significant potential of the ICT industry have seen the economic growth e.g. India, USA, Japan and Sweden. For instance, India exported more than US\$ 57 billion worth of IT services and software in 2010, which accounted for 23% of its total export. For economic growth, the ICT sector is crucial for any country. The following factors of the ICT sector can enhance the business development process in the region:

- *Increase in investments*

The development of the ICT sector can play a vital role to increase the new investment opportunities in the region. Countries with a strong national industry usually score higher in attracting the foreign investment. In fact, promoting the ICT sector helps increase the attractiveness of a country or region by improving its technical business climate and its skills-base.

- *Employment opportunities*

An important economic benefit of the ICT sector is new job opportunities. The ICT sector is labor intensive and skill intensive which mean hiring more people. In terms of employment, it has two positive effects: a quantitative approach by increasing the number of jobs and a qualitative by generating employment for highly skilled people.

- *Competitiveness*

Another important economic benefit of the ICT sector is its positive impact on efficiency and productivity of other industries through spill-over effects. With the usage of modern software application can improve the manufacturing industries or forestry sector on an international basis.

By adapting modern software applications, the local ICT industries are able to support the integration of SMEs into international markets and supply chains. Through these software applications, one company can track its order, improve supply chain management, inventory systems and a lot more developed locally by ICT companies. Thus, ICT industries can induce the growth effects in related industries through multiplier effects.

7 CONCLUSION

Based on the finding and the outcomes of the expert's interview analysis, it is observed that impact on the ICT sector development can boost the regional business environment which links the potential outputs to other sectors as well. The availability of the existing leading research and educational institution (CEMIS, Kajaani University of Applied Sciences) in the region which provides the unique platform for innovation and research and development. The only object is left to utilize them in such a way that these institutions run the whole mechanism of the development circle in the region.

There are existing potential business segments in the region of the ICT sector e.g. gaming industry, sensory equipments, measurement technology for mining, software development, vehicle information system and many others. With help of effective strategic business planning, these segments can be turned into a profitable industry. Furthermore, the completion of the data center project by Kainuun ETU will provide the base for the innovation process to attract the new investment opportunities in the region. To conclude all these aspects, there is positive chances of the ICT sector development in the future.

A suggested continuation of the research would involve more experts especially from TEKES, Kainuun ELY-Keskus, VTT Kajaanin Toimipiste, MIKES and ICT related companies for deeper understanding of the sector and its development process in the region. More secondary data and the latest information related to the sector would also enrich the outcomes and results.

SOURCES

Books:

Alvin C. Burns, Ronald F. Bush. 2008. Basic marketing research, Using Microsoft excel data analysis. Second edition. Pearson International Edition. pp. 137, 144, 264

Bell, Wendell. 2000. Foundations of future studies: History, purposes and knowledge. Human science for new era. Volume I. New Brunswick: Transaction Publishers.

Brooks, K. W. 1979. Delphi technique: Expanding applications. North central association quarterly. pp. 12, 21-26

David T Wilson, Kristian Möller, 1995, Business Marketing: An Interaction and Network Perspective, Kluwer academic publishers.

Diley, A.L. 1988. Faculty consensus at a multi-campus college through Delphi. Community/Junio college quarterly. pp. 12, 21-26

Dalkey, N.C, & Helmer, O. 1962. An experimental application of the Delphi method to the use of experts. Report no. RM-727-PR. Abridged. Santa Monica, CA: the rand corporation.

Dalkey, N.C. 1972. An Impossibility Theorem for Group Probability Functions. Document no. p-4862. Santa monica, CA. the rand corporation.

Dalkey, N.C. 1967. Delphi. Document no. p-3704. Santa monica, CA. the rand corporation. pp. 3

Helmer, O. & N. Rescher. 1959. On the epistemology of the inexact sciences. Document no. p-353. Santa monica, Ca. the rand corporation.

Helmer, O. 1966. The use of the Delphi technique in problems of educational innovations. Document no. p-3499. Santa monica. CA. the rand corporation.

Helmer, O. 1967. Analysis of the future. The Delphi method. Document no. p-3558. Santa monica, CA. the rand corporation.

Helmer. O. 1983. Looking Forward: A Guide to Futures Research. Sage Publications, Beverly Hills

- Hirsjärvi, S., Remes, P. & Sajavaara, P. 2001. Tutki ja kirjoita. Helsinki: Tammi.
- Koontz, H. & O'Donnell, C. 1976. Management. A system and contingency analysis of managerial functions. 6th Ed. New York. McGraw-Hill.
- Kristian Möller, David Wilson, 1995. Business marketing: An interaction and network perspective. Kluwer Academic Publishers.
- Kuusi, O. 2000. Delfoi-menetelmä. In Outi. M. B. 2012. Future market opportunities in the finnish alcohol industry. HAMK university applied sciences. pp. 39
- Kuusi, O. 1993. Delfoi-tekniikka tulevaisuuden tekemisen välineenä. In Vapaavuori, M. (ed.) Miten tutkimme tulevaisuutta? Acta Futura Fennica.No. 5. Tulevaisuuden tutkimuksen seura ry. Helsinki: Painatuskeskus, 132-140.
- Lampikoski, K & Lampikoski, T. 2000. Kuluttajavisiot – näköaloja kuluttajakäyttäytymisen tulevaisuuteen.
- Linstone, H.A. & Turoff, M. 1976. The Delphi method: Techniques and applications. Addison Wesley publishing co. pp. 6, 17-35
- McDaniel, C. & Gates, R. 2001. Marketing research essentials. 3rd edition. South-western college publishing. USA, pp. 83, 85-87, 290
- Rieger, W.G. 1986. Directions in Delphi developments: dissertations and their quality. Technological forecasting and social change. pp. 29, 195-204.
- Rowe G. Wright. 2001. Principles of forecasting. A handbook for researchers and practitioners. Springer + Business Media Ic. 2001.
- Sackman, H. 1975. Delphi critique. Lexington, MA. Lexington books.
- Skutsch, M., & Hall, D. 1973. Delphi. Potential uses in education planning. Project simu-school. Chicago component. Chicago board of education. Illinois department of facility planning.
- Spencer, B. 1989. Conditions of participation in rural, non-formal education programmers: A Delphi study. Educational media international. pp. 26

Thueson, Neil Cooper. 1985. Predicting future trends in sport psychology using the Delphi technique. University microfilms international publishers. pp 45-46

Turoff, M. & Hiltz, S.T. 1996. Computer based Delphi processes. In Adler, M. & Ziglio, E. Gazing into the oracle. The Delphi method and its application to social policy and public health. London: Jessica Kingsley Publishers. pp 56-85

Van Dijk, J.A.G.M. 1990. Delphi questionnaires versus individual and group interviews: a comparison case. Technological forecasting and social change. pp. 37, 293-304

Weaver, Timothy W. 1971. The Delphi forecasting method. Phi delta kappan. Pp 267-271

Websites:

Cambridge Dictionaries Online. Accessed 28.05.2012

<http://dictionary.cambridge.org/dictionary/british/foresight?q=foresight>

Conway, Maree. 2007. Building strategic foresight capacity. Presentation. AAIR Forum, Nov 2007. Accessed 03.06.2012 <http://www.slideshare.net/mkconway/building-a-strategic-foresight-capacity-presentation>

Expert Definition. Accessed 12.06.2012

<http://www.businessdictionary.com/definition/expert.html#ixzz284zzYV9Y>

ICT Definition. Accessed 12.06.2012 <http://searchcio-midmarket.techtarget.com/definition/ICT>

Imran. Y. 2006. The Delphi technique. Accessed 09.06.2012. Web document available at: www.usca.edu/essays/vol202007/yousef.pdf

Information and communication technologies. ICT policy in brief. Accessed 25.05.2012 http://ec.europa.eu/enterprise/sectors/ict/competitiveness/ict-brief/index_en.htm

Richard, N. 2010. Foresight in Business and Society. Video. Mendoza College of Business. University of Notre Dame. Accessed 23.07.2012.

http://business.nd.edu/management/multimedia_gallery/video.aspx?id=7059

The centre for measurement and Information systems (CEMIS). Accessed 15.05.2012. 20.05.2012. 03.06.2012. 21.06.2012. <http://www.cemis.fi/in-english/background/history>

The centre for measurement and Information systems (CEMIS). Material Bank. Accessed 05.07.2012. 17.07.2012 <http://www.cemis.fi/in-english/material-bank>

The Delphi. JRC European Commission. For Learn. Accessed on 19.05.2012. Viewed on http://forlearn.jrc.ec.europa.eu/guide/2_scoping/meth_delphi.htm

The Rand Corporation. Reports and Bookstore. Accessed 07.06.2012, 15.06.2012. 03.07.2012. 28.07.2012 http://www.rand.org/pubs/authors/h/helmer-hirschberg_olaf.html

Building a Strategic Foresight Capacity. Nov, 2007. Viewed on 12.06.2012. Web presentation available on <http://www.slideshare.net/mkconway/building-a-strategic-foresight-capacity-presentation>

Reports, Articles and Journals:

Barnes, J.L. 1987. An international study of curricular organizers for the study of technology. Unpublished doctoral dissertation, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Economic Bulletin 02.2011. Ministry of Finance Economics Department, Finland. Report, accessed 12.02.2012. web document downloaded from.

<http://www.vm.fi/vm/en/hakutulos.jsp?query=economic+bulletin+2%2F2011&perushaku=1&hae=Search>

ICT needs assessment 2011. Perch Lake, Hannu. Report, accessed 29.05.2012, web document downloaded from. <http://www.doria.fi/handle/10024/74502>

IT Sector Promotion in Developing and Emerging Countries. Federal Ministry of Economic Cooperation and Development, Germany. Accessed 05.09.2012, web report downloaded from <http://www.ict.ez-blogs.de>

The Delphi method for graduate research. Journal of Information Technology Education. Vol 6, 2007. Journal downloaded, 20.05.2012 from.

<http://www.eric.ed.gov/ERICWebPortal/recordDetail?accno=EJ807652>

The Delphi technique as a forecasting tool: issues and analysis. Gene Rowe. George Wright. International Journal of Forecasting 15 (1999) 353-375. Accessed on 04.09.2012. Journal downloaded from <http://www.sciencedirect.com/science/article/pii/S0169207099000187>

The Delphi technique. Nic Underhill, March 2004. The United Kingdom's international organisation for educational opportunities and cultural relations. Accessed on 13.06.2012, article downloaded from http://www.britishcouncil.org/eltons-delphi_technique.pdf

Practical assessment, research and evaluation. Using experts' opinions through Delphi technique. Muhammad Imran Yousaf. University of Arid Agriculture, Rawalpindi, Pakistan. Volume 12, No. 4. May 2007. Accessed on 02.07.2012. journal downloaded from <http://www.pareonline.net/getvn.asp?v=12&n=4>

The Delphi method as a research tool: an example, design considerations and applications. Chitu Okoli, Suzanne D. Pawlowski. *Information & Management* 42 (2004) 15–29. Accessed on 03.09.2012. Journal downloaded from <http://www.sciencedirect.com/science/article/pii/S0378720603001794>

LIST OF APPENDICES

1. INVITATION EMAIL TO EXPERTS
2. EXPERTS INTERVIEWS
3. COMPARISON OF TRADITIONAL SURVEY

Invitation Email to Experts

Arvoisat vastaanottajat,

Mittaus- ja tietojärjestelmien tutkimus- ja koulutuskeskus CEMISin tehtävänä on tuottaa uutta osaamista ja kaupallisesti hyödynnettävää teknologiaa mittaus- ja tietojärjestelmien alalla. CEMIS on nyt toiminut reilun vuoden ja saavutetut tulokset ovat hyvin rohkaisevia. Viime vuonna CEMISin tulosten pohjalta perustettiin ennätysmäärä uusia yrityksiä ja kehitettyjen teknologioiden kaupallistaminen kasvoi merkittävästi. Toimintaan saatiin myös ennätysmäärä kansallisesti kilpailtua tutkimusrahoitusta ja kansainvälisiä rahoitushakemuksia laadittiin enemmän kuin koskaan ennen. Yritysrahoituksen ja suorien yritysten toimeksiantojen osuus kasvoi merkittävästi. Näiden lisäksi koulutukselliset ja tieteelliset saavutuksetkin olivat tavoitteiden mukaisia.

CEMIS haluaa jatkaa toiminnan kehittämistä ylläpitääksemme hyvän vauhdin tulevinakin vuosina. Tämän takia osana CEMISin toimintaa on alusta alkaen ollut t&k-tulosten kaupallisen hyödyntämisen edistäminen. Tätä toimintaa toteutetaan pääasiallisesti hyödyntäen Kajaanin ammattikorkeakoulun liiketalouden koulutusohjelman asiantuntijoita ja opiskelijoita. Osana tätä toimintaa CEMISissä on vuoden alusta käynnistetty selvitystyö *mittaus- ja tietojärjestelmälän yritystoiminnasta ja sen kehitysnäkymistä Kainuussa*. Selvitystyötä toteuttaa kansainvälisen liiketalouden opiskelija Faisal Muhammad yhdessä ohjaajiansa markkinoinnin opettaja Perttu Huuskon ja t&k-yliopettaja Anas Al Natshehin kanssa.

Lähestymme nyt Teitä, arvoisa kainuulainen päättäjä ja asiantuntija pyynnöllä, että voisimme haastatella Teitä mittaus- ja tietojärjestelmälän tilasta ja tulevaisuuden näkymistä Kainuussa. Haastattelu toteutetaan englanninkielellä. Pyydämme ystävällisesti, että ilmoittaisitte selvitystyöstä vastaavalle Perttu Huuskolle (perttu.huusko@kajak.fi, 040-5253985) Teille sopivimpia ajankohtia seuraavien neljän viikon sisältä (20.2.- 16.3.).

Etukäteen vaivannäöstänne yhteisen asian eteen kiittäen,

Risto Oikari
Johtaja, CEMIS

Mittaustekniikan ja tietojärjestelmien tutkimus- ja koulutuskeskus CEMIS (Centre for Measurement and Information Systems) on Kajaaniin vuonna 2010 perustettu kahden yliopiston (Oulun yliopisto ja Jyväskylän yliopisto), kahden tutkimuslaitoksen (MIKES ja

VTT) ja Kajaanin ammattikorkeakoulun yhteinen sopimus pohjainen tutkimus- ja koulutuskeskus. CEMISin toiminnassa mukana olevissa tutkimus- ja koulutusyksiköissä työskentelee noin 120 mittaus- ja tietojärjestelmäalan asiantuntijaa. CEMISin toiminnan painopisteet ovat mittaustekniikka, ajoneuvotietojärjestelmät sekä peliteknologia ja -liiketoiminta.

Jakelulista:

- maakuntajohtaja Alpo Jokelainen, Kainuun maakunta-kuntayhtymä
- kansanedustaja Eero Suutari, Sunit Oy
- toimitusjohtaja Antti Toivanen, Kainuun Etu Oy
- toimialapäällikkö Marko Kanninen, Kainuun Etu Oy
- toimitusjohtaja Outi Laatikainen, Measurepolis Development Oy
- rehtori Turo Kilpeläinen, Kajaanin ammattikorkeakoulu
- johtaja Vesa Virtanen, Kajaanin yliopistokeskus
- toimipisteen päällikkö Timo Lehikoinen, VTT Kajaanin toimipiste
- professori Vesa Linnamo, Jyväskylän yliopiston Vuokatin liikuntateknologian yksikkö
- ryhmäpäällikkö Petri Koponen, MIKES Kajaani
- ylijohdaja Timo Hirvi, MIKES
- t&k-yliopettaja Anas Al Natsheh, Kajaanin ammattikorkeakoulu
- johtaja Risto Oikari, CEMIS
- yliopettaja Arto Karjalainen, Kajaanin ammattikorkeakoulu
- Jukka Kohonen, Kainuun ELY-keskus
- Juhani Pietikäinen, Kainuun ELY-keskus
- projektipäällikkö Kimmo Nikkanen, Kajaanin ammattikorkeakoulu
- Jukka Jurvansuu, Citius Oy
- Esko Suomalainen, Kaisanet Oy
- toimitusjohtaja Eero Hagrén, Exéns Development Oy
- toimitusjohtaja Jukka Suutari, Sunit Oy
- Jussi Heikkinen, Elektrobit Oyj. Kajaani
- projektipäällikkö Pekka Palin, CSC-tieteellisen laskennan keskus Oy

- kansliapäällikkö Risto Hämäläinen, Kajaanin kaupunki

Dear Sir

Under CEMIS development program also Business development activities are made. As one part of CEMIS business development future projections of ICT – cluster (especially measurement) will be made.

Faisal Muhammad is a degree student at Kajaani University of Applied Sciences. Now days, he is doing his practical training with CEMIS and his research area is “Business Development in Kainuu Region”. The objective of this research is to explore the opportunities and trends regarding business development in the region. Mainly; CEMIS business development is dealing “ICT-Electronics” sector. Now we are planning a new kind of approach to research development, and Faisal Muhammad is responsible for doing this study. As an industry expert, your valuable reviews, opinions and suggestion will not only help CEMIS to provide concrete information for the research work but also will be helpful to forecast the trends and opportunities.

As we all know that the European economy is going through a recession even it will be wise to say the global economy is suffering from it. Each country is trying its best to address this crucial situation and to figure out some strategic decision to handle this situation on a long term basis.

So, we here at CEMIS business development request your valuable time for this small effort to sort out things based on your knowledge and expertise. We hope you will consider this request and provide us an appointment for the above mentioned purpose. On behalf of CEMIS, we assure you that the information provided by you will be used solely for the purpose of academic writing and research work.

BR

Risto Oikari

Perttu Huusko

Faisal Muhammad

Expert Interviews

Interview 1

Anas Al Natsheh, Senior Business Advisor at CEMIS

Other Participant: Huusko Perttu, Senior Lecturer Marketing at Kajaani University of Applied Sciences.

Dated: 27.02.2012

Q What do you think the overall economic situation in Finland?

Ans: Most of the business Industry in Finland is Business to Business, attached to Europe and some parts of the USA. Finnish economy is too small to have an impact on ongoing recession. In order to recover the system, Finland needs to create 150,000 jobs.

Q The employment rate is decreasing in different industries like ICT and forestry in Kainuu region, how do think they can create new jobs while the employment rate is decreasing...?

Ans: High labor costs are the one of the main reason, although Finnish companies are reducing their employees in Finland, but they are increasing their employees in some other countries. Now; we are switching from labor intense country to knowledge based economy. Beside this, we have one big issue, Nokia was leading ICT research and Development Company in the past in the Finland but now it's not the case now. Those mediums sized companies who had been getting subcontracts from Nokia for supplies are gone. This all software development portion of the company is moving to Microsoft, USA. In principal, these medium sized ICT companies accounted for 10 percent of Finnish GDP have badly suffered and many of them even does not exist now. So, the only way left is to go more and more internationalized

Q While talking about the Kainuu region overall, its economic situation is satisfactory, not so good and not so bad. Turnover of the companies improved but employment decreased tremendously. In a recent study by some vocational students, with the cooperation of ELY, many companies agreed on this that they are creating new jobs in the coming year. But if the economic situation didn't recover then how it is possible?

Ans: Well, I have seen in time of recession, companies reduced their employees. There are two types of companies, one who is connected to Nokia. Now they are trying to find new markets and customers, if they succeed then the situation will be much better and there is opportunity that these companies will grow.

The other type of companies dealing globally, they have their own products e.g. Elektrobit. It's a Finnish company manufacturing in many countries. It's Kainuu based unit is working so well and now its growing. Now, CEMIS is trying to specialize in measurement technology education.

There is problem that qualified labor is not enough even in basic level. So, if there is a lack of qualified labor then there is no way for industries to grow.

This kind of ICT companies is trying to attract former Nokia's employees. But bringing them to Kainuu region is not an easy task. For small and medium sized companies to go for outsourcing are not so easy. It needs good investment, developing such a culture to adopt it is not easy. Most companies have very limited geographic products which prevent them to go international.

We have done some research already to penetrate into the UK and Swedish markets but it didn't work due to their products.

Q The biggest issue in such region is mobilization of people, going to bigger cities for better opportunities and jobs. What actions needed on region base to reduce it...?

Ans: Kainuu is a small place with limited possibilities; it's quite natural that people flows where they have better chances. If there are better opportunities in the region, we can stop this trend.

Q How to create new business possibilities in this region especially SME's? Does CEMIS contribute to region's business development...?

Ans: Of course, CEMIS is providing quite unique concept here. It's some sort of geographical cluster of measurement technology. It has three pillars of that, research, business and education. So this thing is very supportive of those companies who are working in this kind of field. For example, Metso and UPM are existing here due to the measurement technology. We are supporting new companies with technological information, measurement technology, and research and development opportunities. We are providing an infrastructure

for the development. So, CEMIS is quite active. We all know that these changes have long term impact not short term. We will see positive change in coming years. So, CEMIS is offering a platform to the big companies to come to this region to invest in measurement technology. In long term, CEMIS is very crucial for Kainuu region.

Q What is the life cycle stage of the ICT cluster in Kainuu Region?

Ans: ICT cluster is in a growing stage. This stage is quite critical. If we keep consideration of these factors and try more to improve our brand. WE have established our connections nationally and internationally that is a clear indication of growth. We have employed foreign expertise in different areas of CEMIS which was quite successful experiment. As you know we are in very early stage of growth and we need more and more environmental support to boost our activities.

Q What kind of achievement CEMIS has already and what milestone it has set on?

Ans: We have achieved remarkable success in developing technologies in measurement and vehicle information system. We have established cooperation with regional ICT companies in the sense of providing expertise and training. For milestone, definitely it's just beginning and yet we have to discover a lot. We have been actively a part of mining industry especially in Talvivarva offering them measurement technology. Measurement technology is a niche market based technology but also a multi segment at the same time. Now days, it's everywhere. Its use is demanding and involving more and more people around the globe. As the economy gets tighter, companies need equipment to cut down their cost and make the production process more efficient.

Q What kind of financing issues currently CEMIS is facing or having?

Ans: Of course, financing has been always an issue but when you have companies around you, who are benefiting from you. Usually, financing is no more a big issue.

Q Are all these activities supporting employment because previously we have seen a huge decline in ICT Sector?

Ans: Actually, the reason behind this employment decline is due to Nokia. Due to decrease in demand at Nokia which directly affected the subcontractors and its supplier. Nokia itself has fired many employees to cut short its fixed costs. Now we are in a transition period of ICT cluster, going from Nokia to something else.

Q Does the CEMIS' activities support new development and trends in the ICT cluster? How?

Ans: As I mentioned in the beginning that we need the elements of R & D. R & D are based on human intelligence, for human R & D is based on education and good education. If you don't have good education then the whole process will collapse. Quality education is very critical and also possibilities of research projects and so on is important.

Interview 2

Pentti Malinen

Director, Kainuun Development

Dated: 03.05.2012

Q *Would you please provide us with highlights on Kainuu region ICT business development?*

Ans: We are looking forward to the regional business development, making all the long term plans which are common for the region e.g. regional physical plan and physical development plans. We have deep cooperation with CEMIS and Kajaani University of applied sciences in this regard.

Q *What is the reason behind this factor that new ICT companies hesitate to establish their activities in this region?*

Ans: I have noticed that in the past we were not in such a level of business activities we have today. Now, we have Elektrobit from Oulu which has its investment in the region and very strong player in the sector of ICT. It is true that we have a declining trend in the ICT sector in this region but other hand we have seen remarkable business activities in the sector of mining.

Q *What are the main driving forces behind the declining rate of employment?*

Ans: Yes, this is quite problematic situation throughout the Finland due to the age structure of the population. More and more people are retiring every year. On one hand it is covering the issue of unemployment. But still there is lack of younger people in the long run. The other factor during the previous decade is shutting down of the UPM Kymmene unit in the Kajaani. A lot of people lost their jobs which strengthen the trend of unemployment. We also know that creating new jobs and establishing new business in the region is quite a promising challenge but we are ready to face this challenge ahead and making new policies to cover this issue.

The mobilization of people is also a very critical issue in this sense. More and more young people are travelling towards big cities to explore new opportunities that cause decrease in population at regional base.

Q Do the other industries have an impact on the ICT cluster in the region with regard to growth?

Ans: Obviously; it has great impact on the ICT if other industries grow in this region. For example, due to the successful experiment of Talvivarva bio mining, it has increased the opportunities in measurement technologies for ICT companies to develop a new sensory device because they have already platform to test it.

Q Does the Kainuu municipality have any special policies for new companies at micro and macro level to support them or attract them here?

Ans: Yes, our organization is working on macro level strategic decisions. Our task is to think about the financing, how to utilize the EU funding for regional business development. It is our primary objective to support the business activities, especially the SME's. So, financing these SME's is included in our regional development strategies. Some of these industries are our priority to improve them e.g. Tourism, ICT and well-being of people. Our regional development policies are much dependent on EU funding because Finnish regional development funding has gone down in the previous few years. At project level and national level funding, it is always from EU. We also use public funding which is mainly allocated to the private business sector and SME's.

Q In your opinion, how long do you think the economic situation in Finland will recover?

Ans: As you now, the Kainuu is a small region and we don't have direct influence on the economy. We have to rely on the sectors we got inside the region and make strategic plans for them to improve or stabilized them. The EU is promoting that every region must make their strategies based on smart specialization. This theory explains that we must have to explore the existing business sectors e.g. tourism, mining and ICT especially with context to CEMIS for measurement technology. We have to fill the gap between these clusters (field of knowledge) where they touch each other is a good base for innovation. This is what smart specialization explains with regard to our business development strategies. But if we go for new clusters then it might not be possible to invest such money. So, we have to be bound according to EU's smart specialization strategy.

He mentions about the Kajaani University's gaming sector which is developing so rapidly during the past few years that we don't have such existing business sector in the region to support it by EU funding. So, they might have to look for other opportunities in the sense of financial support.

Q Does your institution had or have any alliance with CEMIS in areas of R & D?

Ans: Yes, we have cooperation with CEMIS in areas of measurement technology. Each year we make yearly and for 5 year plan for business development based on EU funding. We allocate a fixed amount of funding for measurement technology for CEMIS. EU funding is declining each year, that's why CEMIS is getting each year low financing. So, this year and next year we have funding for CEMIS and after that there is a new EU programme which we don't know yet. I assume that cutting the resources (financing) means reducing the innovation and development process when we talk about CEMIS. The question of funding is interesting now, because we have to figure out how to allocate the EU funding and then about National funding. We also got regional funding as well. So, we have lots of criticism of this kind of the allocation system.

He also mentions that if this situation goes like this then CEMIS can apply for national funding to get bigger amount or get zero. Overall, we have already secured some savings for the regional development which in worse case we can offer to CEMIS for measurement technology. We have already prepared ourselves for the next EU program and mention all these institutions e.g. CEMIS, gaming sector and University of applied science. So, the coming next years could be critical because they have made some agreements with university to cut short their costs by reducing the employees and so on.

So, the EU's and national decisions and of course our regional based decisions if we still trust on ICT or what CEMIS is doing here in the region, we have to have a discussion with stakeholders and our organization to make strategical programs. We are not making our programs based on guessing or some political voting but we are making it from partnership based on results. Our organization's objective is to support and enhance the trends which are good for the region's economic activities.

Interview 3

Marko Kanninen

Director, Kainuun ETU

Dated: 23.04.2012

Q Description of Kainuu ETU

Ans: In general, we are dealing with Kainuun business sectors:

Group 1: ICT, Electronics and Metal industries

Group 2: Food and Forest Industry

Group3: Tourism and well being

Group4: Mining and minerals

Group5: Direct EU projects

At the start we provided with in house services, like start up business plans but not anymore. We only deal with projects; we combine some specific companies to develop some project to address a development issue e.g. eCommerce or related to the mining industry. These companies are involved in the project and are beneficiaries and interested in outcomes. For example; CEMIS and KAMK involved and other institution from elsewhere. Mainly we deal with project management and funding. We are recognized organization by the financier e.g. EU, Ely-Keskus and Kainuu regional government. We as a company fund the project with 10% as an average, other companies and organizations like CEMIS funds 20 – 30 % and the rest of the money comes from the financiers mainly Ely-Keskus or Kainuu region which is 60 – 80 %. We are a public funded company so we cannot support directly to any individual companies.

Q How many ICT projects are currently ongoing by Kainuun ETU?

Ans: For the time being, we have only one ICT project which is “Ecological Data Center” project funded by three companies. Then we have ETU project which deals with electronics

E-Business web based solution. Its web page development, web based shopping possibilities and invoicing. We are not providing any particular software for that but to organize the open competition and requests for the competition rounds to the companies. Then we will select the most suitable company for this project. Of course the whole activity is related to the ICT. So far, one hundred companies have used our services for almost 160 cases or projects. Kainuun ETU is owned by Kainuu region. Kajaani city owns 42% and rest other municipalities.

There is another ICT related project which is not new but we are currently working on it. There are 50 ICT companies involved in the project. The project is to provide training and education to the company's employees but more precisely to focus on younger people for their early training and education. AMK and other training institutions are involved in this project. The training lasts for almost ten days. The training is about the company's needs in future while hiring these younger students after completing their education. It is a kind of educational workshops.

Q What are the main reasons behind the decline in ICT turnover and employment?

Ans: The main reason behind this declining factor is a global recession and demand of ICT both nationally and internationally. It has not only affected the ICT sector but other industries suffer as well. In the Kainuu region we have a small amount of companies accounted for almost 66 companies which do their business internationally and nationally. It is the lowest figure in the whole Finland.

Of course, for these companies the global economic situation is worse condition. The other reason is that in this region, the ICT sector is so small in sense of customers and service areas which they offer. So, the main customers for these companies became careful due to the recession and cut their demands which affect the business for these ICT companies in the region. There are few big companies e.g. Metso and Elektrobit but on a broader view they don't see any potential in this region. Metso has some business in the mining sector but still they are careful. So, this is the downfall which we are missing in this region. I am hoping that in the future that might do more cooperation with ICT to develop new solutions for the mining industry. But yet now, Talvivarva has some environmental issues which might stay them out for the time being until the situation is not clear well.

When we look at the purely ICT platform in the region, there are not so many activities here except the data center I have mentioned earlier. There are now big companies involved and sooner or later this trend will bring more interest in the region. So, it's challenging because we can't say beforehand what the situation will be. Now we have focus areas in the project e.g. sustainable technology, cloud computing. But I will say again these areas are unknown yet. Our company is always relying on mutual cooperation and discussion with companies. We are open to fund the projects but only those which are potentially good and strong enough to support the economic activities in the region.

The main issue with ICT companies in the region is that they are so inactive in the sense of innovation or research and development. The important reason is that Kainuu based companies are not willing to expand their network outside. They never want to be part of any project when matters come to cooperation from other companies inside the Finland. The biggest reason is that they are afraid of competition.

In the region, there are less or more 10 companies which really have good products or unique ideas which are potentially good for the growth. These companies are the main source of revenue in the region. The amount of good companies in the region is not enough. Secondly new companies are not willing to come in the region. The reason is that they find more opportunities and resources in bigger cities. So, all these facts make the situation unclear. By keeping these facts in mind, it's really tough situation for my company as well to think in which direction we shall go or which trend we should follow.

Q What kind of cooperation Kainuun ETU and CEMIS has developed so far?

Ans: So far, we have cooperation in mining sector with CEMIS. For ICT sector, we have time to time discussions with Anas Al Natsheh and Risto Oikari on the projects which CEMIS has ongoing now. Now, we are at initial stage and we are developing the cooperation with both CEMIS and Kajaani university to explore the further opportunities in areas of ICT.

Q In your opinion, in coming years, trends in the ICT sector will change or not?

Ans: I think, there will be positive changes in coming years and the situation will be much better than current. There will opportunities for ICT companies to develop and grow their business but this will take time. This is not going to happen all at once. It might take 2 or 3

years for this situation to recover. The project (Ecological Data Center) we have now can bring some positive results in the ICT sector but again it will take time like 3 to 4 years.

He also mentions that during the year, I haven't seen any potential case where we can allocate the fund. So, it's so simple, no projects, no funding and no development in the region.

Interview 4

Risto Oikari

Director, CEMIS

Other Participant: Anas Al Natsheh, Huusko Perttu

Dated: 27.02.2012

Q In your opinion, what is the current situation of the Finnish economy?

Ans: In my opinion the public economy is going down but at the overall economic situation is good compared to other countries. On the government level, to have the saving they are going to raise the taxation. At CEMIS, we are using public funding and some external funding.

Q How many projects are going on at CEMIS?

Ans: There are 20 separate projects are ongoing and last year budget was around 12 million Euros. Mostly those projects were funded by public and rest from the companies.

Q So far, what are the CEMIS's achievements in regards to regional business development?

Ans: As you know CEMIS has recently started its operations and last year was the full year. We got a combined budget because CEMIS is a contract based joint (5 institutions) research and training center. We have achieved success in areas of measurement technology and vehicle information system. Now, we are more focusing on the bio fuel and mining sector. Currently; CEMIS has not so much influence on the local industry, it's about 10 % but in coming years we will get more and more cooperation from the companies and actually they are willing to participate in training programs, R & D projects and so on. Overall, we have 300 partner institutions at CEMIS. As I said, each year we have an average of 15 to 20 R & D projects which mean we are creating almost 15 new projects each year.

Q How does the CEMIS is cooperating with companies and institutions?

Ans: We have three kinds of expert groups, 1) Measurement technology, 2) Vehicle information system and 3) Computer games and stimulator. We are discussing with these

companies experts, what we need to develop for the future technological demands and where we have to focus more. This is a systematical approach with the partner companies. So far technology, it is not going to change in future but the demands of the market might vary. Now we have much more focus on measurement technology in the mining sector.

Q What kind of cooperation CEMIS has with Kajaani University in areas of ICT?

Ans: Of course we are utilizing the expertise of top level students to help us to study market needs, technological trends and business environment. In gaming and stimulator sector, we have cooperated with students. Then we have this vehicle information system which we have developed with the cooperation of Kajaani university students.

There is another issue which I want to mention that when these researchers got unique idea, they are not discussing with other people like these leading institutions to develop it. The point is that we have lack of cooperation among these people and companies. But if we work together, we can develop better products and businesses as well.

Q What will be the CEMIS role in the Kainuu region in the sense of economic or business development?

Ans: As I have mentioned earlier that we are the key partners in regional development but these projects might take time for outcomes or results. Last year's projects help us to understand the situation and help us to get the better results in future. I would like to talk about one of our key partners "Metso" which is going to launch 3 new products during this year and we have been part of that story. The R & D department of Metso is quite small in the Kainuu region and employees almost 100 researchers. Approximately half of those researchers were part of CEMIS but now they are working with Metso. So, in this way we are cooperating with our key partners in areas of research and development. Not only we provide these partners with training and education but also offer them technological development opportunities by providing them good researchers. As I mentioned earlier that public funding is reducing that means we have to prepare more project proposals with limited resources which is going to be quite challenging for CEMIS. We are looking for permanent strategic partners to run this business development cycle like we have with Talvivaara and Metso.

Interview 5

Jukka Jurvansuu

Entrepreneur, Citius Oy

Other Participant: Huusko Perttu, Senior Lecturer Marketing at Kajaani University of Applied Sciences.

Dated: 02.03.2012

Q Would you describe the functions of your company?

Ans: Citius Oy. is a software development and I.T solution provider. We have been doing business since 1987. Our clients are companies and public administration units throughout the Finland. Citius group is a big company but now we have developed our own business solution software in house during past two years. We separated in 2011 and now I am running this company. Currently, there are 4 employees at the moment and still in developing stage. So, you can say we are a startup company.

Q Does the poor economic situation have any influence on your company's business activities?

Ans: Well, our business is depending on the major customers and during this period their business and our business were good. Our business remains steady during the past years and we are growing indeed. Other companies had seen the difficulties during that period and some started outsourcing but the economic recession had no effect on our business. Actually we are not depending nor have link with the Finnish economy because our business is much more depending on our clients.

Q Do you think SME's can play a vital role in the region's development?

Ans: It is true that these small companies play an important role in the Kainuu region. There are a few reasons behind it. First of all no big companies will come here in such a small region, secondly; they need bigger infrastructure and communication facilities, thirdly they need to be located in such area where they can access internationally and finally big cities provide them with better human resources e.g. employees and so on. What we need to do is find capital investors to promote these SME's and business activities in the region. In the Kainuu region we have lots of people with enough capital but they are not willing to in-

vest it. Maybe they are careful due to these crises or available infrastructure here. So, in my opinion the key development player in this region is SME's.

Q What is the source of funding for your company?

Ans: I have invested some of my own money and rest we get from the TEKIS. Of course, when my company needs more investment to grow, we can get the funding by Kainuun ETU or ELY-Keskus because if we have good ideas and the product on which we are working now.

Q How to stop the mobilization of people inside the region?

Ans: If this region has good businesses here, I think no one will move to the big cities. The real problem is that there are not enough people here with good business ideas. I bet if you have a good business idea, capital then people will come here even companies. Now, the people here have much more interest in the mining sector and data centers. So, we can't stop this trend of joining big companies and on the other hand they have their businesses in big cities. It's obvious that they will travel to explore these opportunities. Even if I don't have connections here then I might have already moved to Oulu long before.

Q How to attract more companies to Kainuun region?

Ans: We can get some companies in the region. If we want more companies to come here, then we have to provide them resources and funds. Investors look more about the potential to invest in the Finland and even around the world. For example, if I want investment for my company, I must have a good business plan, good team, a good product and good business strategy. But if we want to create something new in the region, we have to persuade the people in Kajaani who have the capital to invest.

Q Do you have any direct or indirect cooperation with CEMIS?

Ans: The only cooperation we have is that we get students in the ICT sector to work with us. Right now one student from Kajaani University is working with us and in future when demands increase, we will hire more. We have a track of our business and we are progressing very fast on it. To have cooperation with these research institutes in developing stage mean slowing down the whole process. That's why we prefer to work alone as a company. The process at such kind of research institutes is very slow and we can't work together. Because

our clients need quick response to their problem or services we offered them. So, there are only two scenarios for us, either work fast or die.

Q What do you think about the future of ICT sector in the region?

Ans: I see it quite profitable and bright in coming years. We have human resources in the region and resources. Kajaani municipality got enough capital to invest. The thing we need is good business ideas and products to work on. In Oulu, I have seen that people are collecting the public funds together to form the company but I haven't seen such practice here yet. I hope in future, people of Kajaani will be willing to invest their money in small companies to promote the regional business activities.

Table 1. Comparison of Traditional Survey with Delphi Technique

<i>Evaluation Criteria</i>	<i>Traditional Survey</i>	<i>Delphi Technique</i>
Summary of Procedure	<p>In traditional survey, the researchers design the questionnaire according to the issue of the research (study). It involves numerous issues to be recovered while developing the survey questionnaire. It includes the questions that solicit quantitative or qualitative data or in some situations, both. It also required for researchers to decide on the population that the researcher wants to apply the hypothesis and selects sample size and type e.g. random, geographic based sample or cluster. The biggest issues is for distribution of the questionnaire and then collection of it to further investigate the usable responses. In this case, more often values are missing or not appropriate for the respondent to answer it.</p>	<p>The first part, designing the questionnaire also involves in Delphi technique. After the researchers design the questionnaire, they select an appropriate group of experts based on their knowledge and relevance to the study. The respondents are kept anonymous to each other during the process</p>
Representativeness of sample	<p>In traditional survey, the researcher randomly selects the sample that is representative of the interested population</p>	<p>A Delphi study is a virtual panel of experts gathered to provide their opinion, suggestions and remarks answer the research problem. The Delphi study can be considered a virtual meeting or a group discussion technique.</p>
Sample size	<p>The goal of traditional survey is to generalize the results to a larger population, the researcher needs to select a sample size large enough to detect statistically significant effects in the population.</p>	<p>The Delphi group size does not depend on sample size, but depends on group expert's knowledge and expertise. The group size varies on a research issue. Normally the Delphi group panel comprises of 5 to 15 experts is enough.</p>

<i>Evaluation Criteria</i>	<i>Traditional Survey</i>	<i>Delphi Technique</i>
Individual vs group response	The individual s are averaged out by the researcher to determine the average response for the sample which is relevant to the population.	Many studies have shown that for questions requiring expert judgement, the average of individual responses is inferior to the averages produced by group decision processes. In this case, Delphi technique bears this out.
Reliability and response revision	An import criterion for evaluation surveys is the reliability of the measures. The researcher needs to assure this by protesting and by retesting to assure the reliability.	In the Delphi method, the primary data gathered during the discussion is reliable and doesn't need to be retested.
Construct validity	Construct validity is assured by careful survey desing and by pretesting.	The Delphi method can employ further construct validation by asking experts to validate the interpretation and categorization of the variables.
Anonymity	In the traditional survey, respondents are anonymous to each other as well to the researcher.	Respondents are always anonymous to each other but not to the researcher. This provides the opportunity for clarification and further qualitative data.
Non response issues	Researchers need to to investigate the possibility of non response bias to ensure that sample is still representative or not.	Non response in the Delphi technique is very low.
Richness of data	The richness of the data depends on the form and questions and how the respondent follows it.	Delphi studies provide richer data the expert tend to follow up the whole interview.
Face to face interaction	In the surveys, mostly there is no face to face interaction. The researcher can't follow the expression of the respondent.	There is face to face interaction which translates the behavior of expert about questions or some expressions.