



Gilad Sperling

PRODUCT, OPERATION AND MARKET
STRATEGIES OF TECHNOLOGY-INTENSIVE
BORN GLOBALS

THE CASE OF ISRAELI TELECOMMUNICATION BORN GLOBALS

HELSINKI SCHOOL OF ECONOMICS

ACTA UNIVERSITATIS OECONOMICAE HELSINGIENSIS

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ISSN 1237-556X
ISBN 951-791-953-0
ISBN 951-791-954-9 (Electronic dissertation)

Helsinki School of Economics -
HeSE print 2005

David and Goliath

1 Samuel Chapter 17

“And there went out a champion out of the camp of the Philistines, named Goliath of Gath, whose height was six cubits and a span. And he had a helmet of brass upon his head, and he was armed with a coat of mail; and the weight of the coat was five thousand shekels of brass. And he had greaves of brass upon his legs, and a target of brass between his shoulders. And the staff of his spear was like a weaver’s beam; and his spear’s head weighted six hundred shekels of iron; and one bearing a shield went before him.”

“And when the Philistine looked about, and saw David, he disdained him, for he was but a youth, and ruddy, and of fair countenance.”

“And it came to pass, when the Philistine arose, and came and drew nigh to meet David, that David hasted, and ran toward the army to meet the Philistine. And David put his hand in his bag, and took thence a stone, and slang it, and smote the Philistine in his forehead, that the stone sunk into his forehead; and he fell upon his face to the earth. So David prevailed over the Philistine with a sling and with a stone”

Acknowledgments

This research and doctoral thesis are the result of five years of research combined with full time work as an entrepreneur in my own businesses. During this research, I have had the privilege of co-operating with a number of persons to whom I would like to express my warmest gratitude.

My warmest thanks go to my supervisor, Professor Reijo Luostarinen of the Helsinki School of Economics. His constant support beginning with in my admission to the International Business Doctorate Program and throughout the research processes was vital. My inclusion in the Born Global research project and providing me with a place to conduct my research in the Centre for International Business Research, away from my own business, were of great value to the completion of this project. His continuous encouragement, insightful advice, and profound knowledge of the globalization of Finnish companies have been very important indeed.

In addition, I would like to warmly thank Professor Mika Gabrielsson of the Helsinki School of Economics for his continuous advice and support throughout the research process. His insightful comments and intelligent suggestions have greatly assisted me in improving this study.

I also wish to thank Professor Zuhair Al-Obaidi and Professor Hannu Seristö for their invaluable comments and advice, as well as the entire International Business Faculty at the Helsinki School of Economics and my research colleagues at the Centre of International Business Research for their support.

I am fortunate to have as examiners of this thesis people who are both skilful and knowledgeable in my research area. Therefore, I sincerely thank Dr. Tamar Almor of the School of Business Administration, College of Management, Rishon LeZion, in Israel, and Professor Olavi Uusitalo from the Tampere University of Technology in Finland. I would like to thank them for their valuable comments during the examination process.

I would also like to thank all the participating companies and managers who gave their valuable time for interviews. Without them and the valuable information and insights which they provided this research could not have been completed.

This study is part of the Born Global project in the LIIKE research program. LIIKE is the first national research program in the field of business studies funded by the Academy of Finland and the National Technology Agency Tekes. I am grateful for the financial assistance received from the project.

To David Miller I would like to express my gratitude for improving the English of my thesis.

Finally, I would like to thank my wife Sari, my children Ella and Jonathan, and my business partner Gil Mishael. They were an important source of support during this period of research combined with fulltime work. Especially, I would like to thank Sari for her patience and support during this period.

Helsinki, July 2005

Gilad Sperling

Abstract

The study analyses the product, operation, and market strategies of technology-intensive Born Global companies from small open economies (SMOPECs) and explains their rapid globalization process.

Conceptual holistic frameworks have been developed to explain 1) the factors behind the early rapid globalization of technology-intensive Born Globals, and 2) their globalization strategies in terms of products, operations and markets (POM). The frameworks consist of four groups of factors that are meso (industry) factors, macro (country) factors, micro (company) factors, and milli-micro (founders) factors. The frameworks are built upon and develop Luostarinen's push-pull, POM, and POM SICA (products, operations, markets, price, intermediates, customers, and advertising) frameworks.

In the empirical part, the globalization process and POM strategies of five Israeli telecommunication Born Globals were analyzed with the multiple case research method. Born global research has mainly sought to explain the recent emergence of Born Global firms, identify the characteristics of Born Globals, test whether traditional internationalization theories were able to explain the Born Global phenomenon, and suggest new theoretical frameworks or adjustments to the traditional theories. The holistic approach and the use of POM strategies and patterns in the study of Israeli technology-intensive Born Globals yielded the development of the PCOM (products, customers, operations, and markets) framework, the identification of PCOM patterns, and the identification of the factors influencing the globalization of technology-intensive Born Globals.

It was found that Israeli technology-intensive Born Globals chose a global strategy from inception because of a) the global orientation of the founders, b) the global nature of the product and industry, c) the small domestic market, d) the short product life cycle and rapidly changing technology, and e) the peripheral location of Israel.

The study found that the characteristics of the founders' home country and the available financing options and choices thereof play an important role in the

globalization strategies and process of the Israeli technology-intensive Born Globals. A new PCOM framework was developed. The study identified a product pattern starting with goods consisting of no or low service, followed by systems which includes a higher degree of service, and ending with high-systems consisting of a high degree of service. The customer pattern started with the consumer / SOHO (small offices & home offices) customers segment, followed by the enterprise customer segment, and ending in the high-end customer segment. The operations pattern started with non-investment marketing operations which consist of export of R&D services and export of products. This was followed by the direct-investment marketing operations of establishing foreign subsidiaries. Finally co-operative operations consisting of international strategic alliances and joint ventures, and other investment operations as acquisitions were used. The market pattern started with the US and Europe, followed by Asia, and finally all other markets. The study suggests that this market pattern can change over time and that it is determined by the business potential of each market.

The managerial contributions stem mainly from the understanding of 1) the product and customer strategies which can lead to a more sufficient use of the firms limited resources while avoiding products and customer segments which are not suitable for technology-intensive Born Globals, and 2) the IPO as a possible financing source. For policy makers in SMOPECs the main contributions are the issues of 1) creating an entrepreneurship enabling environment, and 2) the possibility of identifying founders with suitable characteristics for the creation of successful technology-intensive Born Globals.

Keywords: Born Global, globalization, strategy, technology-intensive, product strategy, customer strategy, operations strategy, markets strategy.

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1 Introduction

1.1 Background

Geo Interactive Ltd. (later renamed Emblaze Systems Ltd.) was established in 1994. From inception, the founders decided to focus on international markets. The company started its operations by developing multimedia software for large global MNEs such as McGraw-Hill and Saban Entertainment. In 1996, Geo introduced the Emblaze technology for streaming audio and video over the Internet and creating interactive multimedia content over the Internet. In October 1996, Geo raised \$19 million on the AIM (Alternative Investment Market) stock exchange in London, which gave them a market value of \$158 million. During 1997, Geo's products were sold in the US, Europe and Asia. In 2000, Geo's revenues reached \$30.7 million. In 2001, Emblaze Systems Ltd. (formerly Geo Interactive Media Group Ltd) had 400 employees and offices in Los Angeles, London, Seoul and Tokyo.

Emblaze Systems Ltd represents a new growing phenomenon of technology-intensive start-ups that think and act global from their inception. As noted by Luostarinen and Gabrielsson (2004), such companies have been termed Born Globals (Gabrielsson & Al-Obaidi, 2004; Knight & Cavusgil, 1996; Luostarinen & Gabrielsson, 2001; Luostarinen & Gabrielsson, 2002, 2004; Madsen, Rasmussen, & Servais, 1999; Madsen & Servais, 1997; Rasmussen, Madsen, & Evengelista, 2001; Rennie, 1993; Sasi, Gabrielsson, & Myllyrinne, 2000), Global Start-ups (Oviatt & McDougall, 1995), High technology Start-ups (Jolly, Alahuhta, & Jeannet, 1992), and International New Ventures (McDougall, Shane, & Oviatt, 1994). Born Global firms aim at the global market right from inception (Rasmussen, Madsen, & Evengelista, 2001) and start their globalization immediately without any preceding domestic operations, or simultaneously with domestic business, or exceptionally soon after domestic operations (Luostarinen & Gabrielsson, 2001).

Both popular business press and academic research carried out independently around the world believe that the phenomenon of Born Global firms is important (Oviatt & McDougall, 1994). The formation of Born Global firms has been identified in more than 10 countries in all parts of the world (McDougall, Shane, & Oviatt, 1994; Oviatt

& McDougall, 1994). The fact the Born Global firms seem to be a worldwide phenomenon suggests that the process is not unique to a firm or country (Oviatt & McDougall, 1997). Empirical research carried out in many countries around the world clearly shows that many newly established firms are Born Global or Born International. In Canada, an empirical study of 75 early stage, technology-based firms found that 93 percent of the companies had foreign sales shortly after establishment (Preece, Miles, & Baetz, 1999). In Norway and France, an empirical study of small firms found that more than half of the exporting firms established since 1990 could be classified as Born Globals (Moen, 2002). In Australia, a McKinsey study found that 20 percent of new trade growth comes from Born Global SMEs (Rennie, 1993).

This study chose to focus on technology-intensive Born Globals. Although Born Global firms are primarily in technology-intensive businesses, they can be found in a variety of industries (Luostarinen & Gabrielsson, 2004; McDougall, Shane, & Oviatt, 1994). The importance of new technology-based firms is evident as can be seen through the cases of Finland and Israel. During the economic recession of the early 1990s, new technology-based firms in Finland increased in number faster than firms in low-technology industrial sectors (Autio & Yli-Renko, 1998a). New technology-based firms also had a role in technology transfer between the research sphere and industry, between and within different industry clusters, and in adapting advance technology to the needs of traditional firms (Autio & Yli-Renko, 1998a). Given the importance of the Born Global phenomenon in Finland, an extensive three-year Born Globals project was initiated in the Center of International Business Research (CIBR) at the Helsinki School of Economics in autumn 2001. The project, which this thesis is a part of, was the largest subproject under the “Finnish Companies and Challenges of Globalization” (LIIKE) research program financed by the Academy of Finland and the National Technology Agency (TEKES). In Israel, technology-intensive start-ups play a key role in national economic growth. In 2000, Israeli start-ups contributed around 2.3 percent to the GNP according to the Israeli Central Bureau of Statistics.

Although small numbers of Born Global firms have existed for centuries, their increasing occurrence and importance in global markets indicates a need for greater understanding of the phenomenon (McDougall, Shane, & Oviatt, 1994). The first Finnish Born Global Vaisala, a world leader in products and services for

environmental and industrial measurement, was established in Finland in 1936. From the very start, Vaisala was clearly an international business, exporting 95 percent of production (Luostarinen & Gabrielsson, 2004). Many Born Globals have been successfully competing against larger established players, and manage profitable, fast growing business systems in a way that was impossible twenty or even ten years ago (Rennie, 1993). Indeed, all of the case companies included in this study face large established competitors such as Cisco Systems (\$18.9 billion net sales in 2002), and ALCATEL (sales of €16.5 billion in 2002). Just like David, who prevailed against the big, mighty and well-equipped Goliath with only a sling and a stone, these young and small start-ups can prevail against large multinational corporations.

It is expected that the phenomenon of Born Globals will become more widespread in the future (Madsen & Servais, 1997). As Born Globals are increasing in numbers, their importance in terms of innovation, employment and economic growth is also growing (Moen, 2002). The growing importance of the Born Globals phenomenon combined with the challenges facing Born Globals' managers and the limitations of existing theory (see literature review 2.3.3) makes the Born Global research an interesting area of research (Moen, 2002).

1.2 Research gap

While internationalization processes and strategies of firms from SMOPECs and large countries have been the subject of widespread theoretical and empirical research, the research on the globalization processes and strategies has mainly focused on large MNCs from large countries (Baird, Lyles, & Orris, 1994; Coviello & McAuley, 1999; Luostarinen, 1979; Yip, 1989). Since the researchers based their theories on studies of large and mature MNCs, the term globalization has been used to describe the act of an MNC moving from a multinational strategy to a global strategy. Levitt described the ultimate goal of globalization as the adoption of pure global strategies that are based on viewing the world as a one market, for which standardize products are created (Levitt, 1983). Bartlett and Ghoshal on the other hand combined aspects of both local responsiveness and global efficiency (Bartlett & Ghoshal, 1989). Yip has divided the globalization process into three stages: 1) Developing the core strategy, 2)

Internationalizing the core strategy, and finally 3) Globalizing the international strategy (Yip, 1989).

Though small firms can be an engine for growth, innovation, and economic development (Knight & Cavusgil, 1996), traditional literature on internationalization was developed primarily through research on large, mature, multinational manufacturing companies (Coviello & McAuley, 1999; Oviatt & McDougall, 1994; Roberts & Senturia, 1996). These traditional theories from the field of international business fail to explain the globalization process of Born Globals. Monopolistic advantage theory, product cycle theory, stage theories of internationalization, oligopolistic reaction theory and internalization theory assume that firms become international long after they have been formed (McDougall, Shane, & Oviatt, 1994). The dissertation of Alahuhta seems to be the first empirical study addressing the issue of the globalization process in SMEs from SMOPECs (Alahuhta, 1990). The research on the globalization processes of Born Globals from SMOPECs is still in its early stages (Luostarinen & Gabrielsson, 2004).

As the number of Born Globals has increased dramatically since the start of the 90s, more and more researchers have recognized this new phenomenon and its importance and a new stream of Born Global studies has emerged. This was especially the case in Finland where the Born Global mega project was established by the Helsinki School of Economics and the Helsinki University of Technology, as part of the LIIKE program financed by the Academy of Finland and the National Technology Agency (TEKES). Born Global research has been aimed mainly to:

- a) Explain the recent emergence of Born Global firms.
- b) Identify the characteristics of Born Globals.
- c) Test whether traditional internationalization theories were able to explain the Born Global phenomenon.
- d) Explain why traditional internationalization theories were not able to explain the Born Global phenomenon.
- e) Suggest new theoretical frameworks or adjustments to the traditional theories.

Born Global research is still in an early stage and more research is needed as has been recognized by most researchers of the phenomenon:

“However, there is little theory about managing international risk for firms experiencing the accelerated internationalization that has become apparent in recent years. Since it is predicted that the phenomenon will be increasingly prevalent in the new millennium (OECD, 1997), theory development and testing would appear to be valuable for both academics and entrepreneurs. Many issues surrounding accelerated internationalization are worthy of investigation”...(Shrader, Oviatt, & McDougall, 2000)

“Though there is evidence that Born Global firms exist- some theoretical studies and some case descriptions- little is known about the characteristics of these firms, their motives for exporting, their strategies, and the competitive advantages often found among these firms” (Moen, 2002).

Hence a research gap can be clearly identified. It concerns explaining of the globalization process of technology-intensive Born Globals from SMOPECs, their motives for starting international operation from inception or shortly after, their success in globalizing their operation regardless of their relatively limited resources, and their success in competing against large established and global corporations. While the Born Global phenomenon is well documented with around 10 years of research on the subject, there is very limited research on their globalization process especially concerning the product, operation, and market strategies. A theoretical framework or model capable of explaining the phenomenon is also lacking. On top of the need for more research on Born Globals from SMOPECs, there is also a need for more research on small technology-intensive firms. There have been relatively few empirical studies focusing on small technology-intensive firms (Preece, Miles, & Baetz, 1999). This study aims to contribute to the research of the globalization process of Born Globals, in particular Born Globals from SMOPECs, and the research of small technology-intensive firms.

1.3 Research objectives and research questions

Having identified the above research gap the overall objective of this study is to contribute to the understanding of how technology intensive start-ups with limited resources and experience can rapidly become global. The main research question of the study is the following:

Does the globalization process (production, operation, and marketing strategies) of technological-intensive Born Globals deviate from the internationalization process of conventional industrial firms, and if so how?

Therefore the research objectives are:

- a) To find out why Born Globals choose a global strategy from inception.
- b) To explore whether there is a mainstream pattern of globalization of Israeli Technology-Intensive Born Globals.
- c) To compare this pattern, if identified, with the pattern of traditional firms.
- d) To identify the reasons behind the difference in patterns.
- e) To contribute towards a new theoretical framework, for understanding the globalization process and strategies of technology-intensive Born Globals.

In attempting to address the above objectives the following research questions have been formulated:

- a) Why do Born Globals choose a global strategy from inception?
- b) What are the globalization strategies (POM strategies- products, operations, and markets) of Israeli technology-intensive Born Globals and how do these strategies deviate from those of the traditionally manufacturing internationalized companies?
- c) Can product, operation and market strategy patterns be identified in Israeli technology-intensive Born Globals?

1.4 Definitions

Born Globals: Born Global firms aim at the global market right from birth (Rasmussen, Madsen, & Evengelista, 2001) and start their globalization at once, without any preceding domestic operations, simultaneously with domestic business, or exceptionally soon after domestic operations (Luostarinen & Gabrielsson, 2001). Building on the theoretical concept an operational definition for this study has been developed as follows. Born Globals must (1) generate over 75 percent of their revenues from foreign markets; (2) generate over 50 percent of their revenues outside the domestic continent; (3) start exports or international revenue generating within two years of inception; (4) have operations in at least two continents outside their domestic continent; (5) established as an independent new venture, and not as a subsidiary, spin-off, greenfield, or joint venture of another company. All the above should be achieved within 10 years from inception. The definition used in this study is similar to the definition of mature Born Globals presented by Luostarinen and Gabrielsson (2004).

Born Internationals: As above, but 50 percent or more of their revenues are generated in the domestic market.

Globalization: Globalization is used in a geographical sense, as a spatial term, meaning the process whereby the firm extends its operation outside its domestic continent (Luostarinen & Gabrielsson, 2001).

Internationalization: The process of increasing involvement in international operations across borders (Welch & Luostarinen, 1988).

New Ventures: Independent new ventures thus excluding new ventures that have been divested from large multinational enterprises.

Technology- Intensive Firms: Firms investing five percent or more of their total revenues in R&D are classified as technology-intensive. Other studies use terms as knowledge-intensive (Almor, 2000; Almor & Hashai, 2001,

2004a, 2004b), or R&D intensive (Lindell & Karagozoglu, 1997). These terms are used with exactly the same meaning, although the proportion of R&D investment in total sales-turnover can vary from 5 percent of total sales (Almor & Hashai, 2001) to 8 percent of turnover (Lindell & Karagozoglu, 1997).

Israeli firms: Firms that were founded by Israeli founders regardless of where they were registered.

Strategic Alliance: Strategic alliance is a purposeful arrangement between two or more distinct partner organizations. It is generally longer term in nature and a new entity is not formed. Strategic alliances are non-equity partnerships. Traditional contractual agreements (Arm's-length buy/sell contracts, franchising, licensing, cross-licensing) are not considered to be strategic alliances. Non traditional contractual agreements (joint R&D, long-term sourcing agreement, joint manufacturing, joint marketing, shared distribution/service, standards setting/research consortia) are considered to be strategic alliances. Equity arrangements which do not create a new entity (minority equity investments, equity swaps) are considered to be strategic alliances. For the purpose of this study, joint ventures that create a new entity will be termed joint ventures rather than strategic alliances.

Continent: In business context the world is often divided to the following regions: (1) North America; (2) Latin America; (3) Europe; (4) Asia Pacific; (5) Middle East; and (6) Africa. This Study views each of these regions as a continent.

Risk-seeking: attracted to risk

1.5 Limitations

This study examines the globalization of Israeli telecommunication Born Globals. Given that industry characteristics might influence the globalization process (see 1.3), the globalization process of other industries might differ from the findings of this study.

The study mainly focuses on POM (Product, Operations, Markets) strategies but also touches other issues as the role of the founders and the financing strategy. During the interviews and data collection, the importance of the founders' role and financing strategy became evident. These issues are sufficiently covered in this study to facilitate an understanding of the POM strategies of the Born Global firms. However, these issues are outside the scope of this study and thus require additional research.

The classification of companies into manufacturing and service companies has been examined critically in this study. However, the observations made in this study were only aimed to illustrate the special characteristics of the Israeli case companies. The larger issue of company classification is outside the scope of this study.

1.6 Structure of the study

The study is divided into six chapters. The introductory chapter provides the background for the study, identifies the research gap, presents the research objectives and questions, and defines some of the main terms used in the study. The chapter covers issues such as technology-intensive firms, the telecommunication industry, Small and Open Economies (SMOPEC), and Israel. These topics lay the basis on which the conceptual framework will be later developed. Chapter two presents the literature review by synthesizing and linking literature on Born Globals, internationalization, international entrepreneurship, and technology-intensive SMEs. Chapter three outlines the research methodology. The chapter describes the ontological and epistemology assumptions on which the study is based, and outlines the research approach, research design and methods used. Chapter four presents the conceptual framework of the study. The conceptual framework is constructed on the basis of the literature review and the empirical work. Chapter five presents the

empirical data gathered on each case company and initiates the first steps of analysis. Chapter six goes deeper into the cross-case analysis, conclusions, comparing of findings to existing Finnish research, theoretical contributions, managerial implications, and suggestions for further research.

1.7 Industry Characteristics

1.7.1 Technology-intensive

The choice of technology-intensive Born Globals for this study seems to be appropriate as many Born Global firms, though not all, are in high-technology industries where the opportunities for international trade and investment may be most obvious (McDougall, Shane, & Oviatt, 1994; Oviatt & McDougall, 1997). According to Knight and Cavusgil Born Globals are small, technology-oriented companies (Knight & Cavusgil, 1996). The Born Global project in the Helsinki School of Economics (Luostarinen & Gabrielsson, 2004) found Finnish Born Globals in five business areas: high-tech, high-design, high service, high know-how, and high systems (appendix 5). Hi-tech Born Globals were the largest group (40 percent) and high-systems Born Globals were the second largest (22 percent).

Technology-intensive firms seem to differ in their internationalization patterns from low-technology firms. Small technology-intensive firms tend to internationalize more rapidly than others (Jones, 1999). In many cases, the products developed by these companies are global in nature and the companies are forced to compete globally from inception in order to survive. Technology-intensive firms tend to be operating in international or global markets that are changing rapidly (Jones, 1999).

The choice of technology-intensive firms in this study is also supported by the raising importance of small technology-intensive firms to national economies. A study of US international new ventures found that 88.5 percent of them were high-technology firms (Shrader, Oviatt, & McDougall, 2000). In Israel, the real national GDP between 1990 to 1996 grew by 5.8 percent pa, compared to a GNP growth rate of 1.4 percent pa in the EU15 and 1.8 percent in the OECD. The rapid expansion of the high-tech

industry played a major role in this growth (Roper & Frenkel, 2000). According to the Israeli Central Bureau of Statistics, Israel high-tech industries exports grew from \$2,278 million in 1990 to \$10,064 million in 2001 (51 percent of Israel industrial exports in 2001). During the same period the low-technology industries in Israel grew from \$1,492 million in 1990 to \$1,707 million in 2001.

1.7.2 The Telecommunication Industry

Patterns of international competition differ noticeably from industry to industry (Porter, 1986). As industry characteristics clearly influence the firms' strategy and globalization process, this study chose to focus on the telecommunication industry, which is one of the leading Israeli high-tech industries. Thus all the Israeli Born Global firms included in this research are from the telecommunication industry. In order to better understand the globalization process of these companies it is important to understand the industry in which they operate. The following industry review is based on all the materials collected for this research including annual reports, interviews, articles in the press, internet data bases, and articles and Internet sites dedicated to the telecommunication industry (Eberle, 2001; Gurney, 2001; International Telecommunication Union, 2003; Marsan, 2003; Pierce, 2002; Plunkett Research, 2003; Steinbock, 2003; Uglow, 2002; Wieland, 2000, 2003).

The telecommunication industry includes local and long-distance telephone services, wireless communication including cellular phones, the Internet, fiber optics, and satellites. It has taken around 120 years to get from the telegraph to the telephone, then to the fax and up to mobile communication. Up to that point, voice and data have been transmitted over separate networks using different technologies. Since the second half of the 1990s, the telecommunication industry has been moving towards next-generation networks that will enable delivery of converged voice and data over the same network. During this period e-mail, SMS, and later MMS (Multimedia messaging) have been added and are currently widely used around the globe.

Next-generation networks, based on IP (Internet Protocol) technology, should bring substantial savings in operation and maintenance cost. Traditional voice carriers have typically built telephone networks based on circuit switching. Once a circuit is

dedicated, it is unavailable to transmit any other information, even when the users of that circuit are not speaking or transmitting information. IP technologies divide signals into packets that are simultaneously routed over different channels to a final destination where they are reassembled in their original order. As IP networks do not establish dedicated circuits, which waste unused capacity, they are more efficient and can transmit substantially more traffic than circuit-switched networks. In addition to the cost savings the convergence of voice and data enables carriers to create new revenue-generating services.

In the past twenty years and especially since the middle of the 1990s, the cellular phones technology has also been developing towards unified communication. The development of the cellular phones technology can be divided to four generations:

- 1) 1G Era: analog cellular (AMPS supremacy), 1983-1992
- 2) 2G Era: digital cellular (GSM triumph), 1992-2004?
- 3) 2.5G Era: an intermediate stage before the implementation of the more advanced 3G which requires considerably higher investments in infrastructure, 2004-2007?
- 4) 3G Era: multimedia cellular (W-CDMA, single flexible standard), 2007?-2010?
- 5) 4G Era: broadband cellular, 2010 ?- ?

Adapted from: (Steinbock, 2003)

Deregulation of the communication industry since the 1990s has been breaking down barriers that restricted providers to specific geographies, services, and rates. The first significant move towards deregulation of the telecommunication industry seems to be the US Telecommunication Act of 1996. This was followed in 1997 by an agreement on basic telecommunication by 69 members of the World Trade Organization (WTO). As of January 1998, the EU requires all member countries to legislate full telecom liberalization. Global competition, deregulation and privatization have encouraged new entrants to the telecommunication market and existing carriers to expand to new international markets. The intense global competition has been pushing down the service prices. Profit margins on domestic fixed-line businesses have been contracting fast. Lower barriers to market entry and the unprecedented growth of the public Internet created opportunities that had not existed previously. A rush of new

investment flooded the industry and telecom providers took massive debt loads in order to finance these investments. The telecommunication investments led to an excessive amount of available network capacity. The need to generate a return on these investments by selling the capacity to a limited set of buyers led to price wars and profits fell quite suddenly.

During the second half of the 1990s many telecommunications start-ups identified the move towards unified messaging, IP networks, and 3G wireless technologies. Realizing that this is the future of telecommunication these young innovative companies developed new technologies for next-generation communication networks. Unfortunately for these companies the move towards IP communication networks and 3G wireless technology was slower than expected (see table 1).

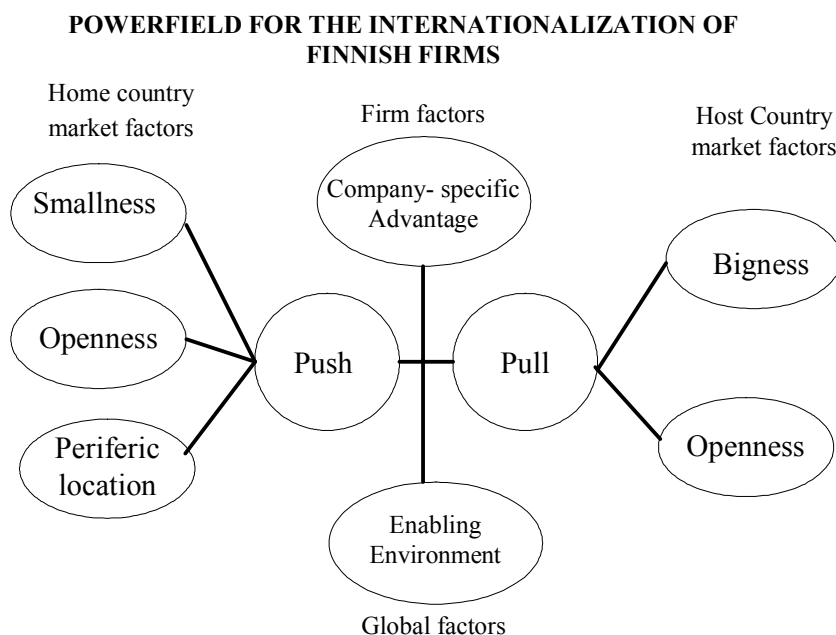
In the summer of 2000, when investors realized that the majority of Internet companies were still years from profitability and that their business models were based on wishful thinking, valuations crashed and the dotcom bubble burst. On top of that, US economic growth in 2000 showed signs of slowing down and economic activity in the EU was generally sluggish. Millions of jobs were slashed around the world as companies cut costs. This was followed in 2001 with the September 11 terror attack in the US and the collapse of Enron. The telecommunication industry was particularly hard-hit by these successive waves of bad news. Investments in new next-generation equipment have been delayed. 3G wireless technology originally planned for 2001 is now forecasted for 2007. Instead cellular operators chose to move to 2.5G and EDGE technologies. These technologies, while certainly less advanced than 3G, are a big improvement on the current 2G technologies and do not require extensive investments. Instead of having to replace the whole network, operators can simply upgrade their existing networks at a fraction of the cost necessary for the move to 3G. The change of existing switch based communication networks to IP technology has also been delayed and will be much slower than originally predicted.

Table 1 - Main factors slowing the move to IP and 3G technologies	
IP	3G
Carriers have a large installed base of systems build to handle voice-only traffic and the majority of their revenues still come from voice	To facilitate the move to the next-generation communication a substantial investment in new infrastructure networks and terminals is required.
To facilitate the move to the next-generation communication a substantial investment in new infrastructure networks, and terminals is required.	WAP and 2.5G technologies, though less advanced than 3G, have provided a much less expensive route towards unified messaging.
The economic downturn, which started in 2000.	Uncertainty concerning the revenues that can be generated from the 3G technology.
	The economy downturn, which started in 2000.
Sources: based on case companies' annual reports, articles in the press concerning case companies, and internet data bases.	

1.8 Small and Open Economies (SMOPEC)

The WIDER report (Luostarinen, 1994) identified three important domestic market factors acting as push forces for the internationalization of Finnish firms: (1) the small size of the domestic market; (2) the openness of the domestic market; and (3) the peripheric location of the domestic market (Finland). On the pull forces side Luostarinen identified two important host market factors: (1) the size (largeness) of the host country, and (2) The openness of the host country. In addition to these Macro push and pull forces, Luostarinen also identified micro-based pull forces: company specific advantages gained by internationalization. Enabling global environment (Meso) factors were also found to facilitate the internationalization process (see figure 1).

Figure 1 – Forces influencing the internationalization of Finnish firms



Source: (Luostarinen, 1994)

It is reasonable to assume that newly established technology-intensive firms from SMOPECs will differ in their internationalization/globalization patterns and strategies from similar companies founded in large open economies (e.g. US). Using the push and pull factors of the internationalization model (Luostarinen, 2000), we can see that the push factor clearly differ in SMOPECs from large open economies. In a large developed country, the big size of the home country market makes the push forces weaker than in SMOPEC countries. In Israel and Finland, we can also add their periferic location as an additional push factor, which might not be relevant in a large and open economy regardless of its location. The pull factors, while still relevant in large open economies, are not as strong as in SMOPECs. Thus it can be assumed that newly founded technology-intensive firms in large developed countries can have a longer domestic period due to the large size of their domestic market. It can then be expected that technology-intensive start-ups in large open economies will be slower in their internationalization /globalization than similar firms in SMOPECs.

The SMOPEC research group was established in 1994, mainly by Christian Bellak, from Austria; Zeev Hirsch, from Israel; and Reijo Luostarinen, from Finland. It has now become a group of twenty members from twelve countries. The term SMOPEC was developed and initiated by Luostarinen and Bellak. The SMOPEC research group studies whether the internationalization/globalization patterns and strategies of firms, industries, and economies of small and medium sized open economies differ from those of large economies, and whether different explanatory theories are needed for them.

1.8.1 Israel

Some Born Global firms are located in subnational geographic clusters or networks that enable economics and internationalization for all participants (Dunning, 1993; Johanson & Vahlne, 1990). Silicon Valley in California is perhaps the most well known such cluster (Oviatt & McDougall, 1997) and Israel has clearly become one. According to Michael Moritz, a Sequoia Capital General Partner in March 2001, *“Israel is the second Silicon Valley, and it is therefore the only other place we have chosen to expand our activities.”* (Ministry of Industry, 2003).

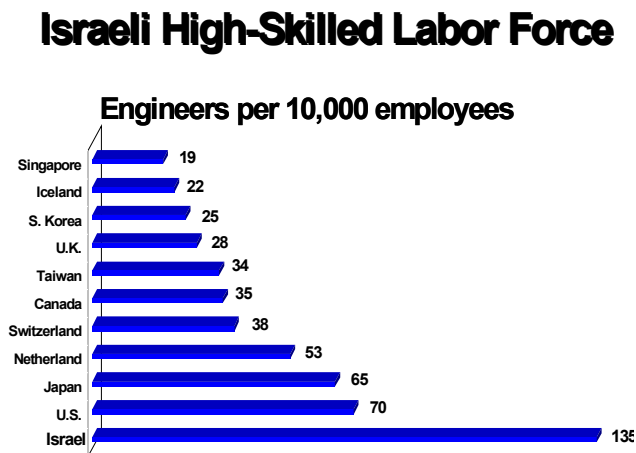
Israel, a SMOPEC (Small and Medium sized Open Economies) country with a population of around 6 m, has produced 145 companies listed on foreign stock exchanges in 2003. In addition, 23 Israeli technology-intensive Born Globals traded in foreign stock exchanges during 1990 to 2002 have been acquired (see appendix 4). Other Israeli technology-intensive Born Globals not traded in a foreign stock exchange were acquired as well (e.g. in 1998 Mirabilis was sold to AOL for \$407 million). As early as 1995, the number of Israeli firms listed on the NASDAQ nearly equaled the number of all other foreign firms combined excluding Canadian companies. Israel is one of the largest centers in the world for start-up enterprise, with more than 2500 start-ups in 2003.

“In technology-intensive industries where global start-ups thrive, unskilled and semi-skilled labor are very small portion of the cost. Unique skills, as well as strong educational and communication infrastructures, are key factors in making a

particular location attractive to a global entrepreneur. Certain locations in the world are known for unique workforce skills.” (Oviatt & McDougall, 1995). Israel has one of the highest educated workforces in the world with first class education institutions. 77 percent of the population are high school graduates and 20 percent have academic degrees (Ministry of Industry, 2003). The national expenditure on education in 1998 was 9.2 percent of GDP, compared with the OECD’s 5.7 percent (Ministry of Industry, 2003). Israel, with its highly skilled labor force (see figure 2), has certainly become known for its unique workforce skills.

The high number of Israeli technology-intensive start-ups and Israeli firms traded in foreign stock exchanges, the significant contribution of the high-tech industries and high-tech start-ups to the growth of the Israeli economy combined with its small population and open and developed economy makes Israel a natural choice in studying the Born Global phenomenon.

Figure 2 - Israeli skilled labor force, 2002



Source: Ministry of Finance

1.8.2 Financing of Israeli Born Globals

Financial resources are critical for the success of a new Born Global firms (Oviatt & McDougall, 1995). Israel is commonly referred to in the global press as the second most active venture capital market in the world behind Silicon Valley. Venture capital is an equity investment made for the launch, early development, or expansion of a business. Due to the nature of investment in young companies, vs. investment in older more established companies, venture capitalists have to be ready to take higher risks. The Israeli venture capital industry, starting with only a couple of venture capital firms in 1991, with less than \$50 million in assets under management, has expanded to \$3,216 million in 2000. 513 private Israeli high-tech firms raised \$3.1 billion in 2000.

To get a better perspective on this phenomenon we can compare the Israeli venture capital investment to the Finnish investments. In 1997, Finnish venture capitalists invested only 13 percent as much in high-technology industries as their Israeli counterparts (\$51 million compared to \$377 million). According to the Finnish Venture Capital Association (FVCA) a total of FIM 1.7 billion (~ €285 million) was invested in 325 companies in Finland in 1999. During 1999 the investment of technology VC funds in Israel was \$1,659 million, roughly five times the Finnish investment.

Technology VC Funds	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Private funds	49	27	162	112	145	264	609	468	1,575	3,155
Public & Other Funds	0	54	42	0	0	0	27	8	44	35
Other Private Equity Funds	0	45	128	242	6	110	66	74	40	26
All Funds	49	126	332	354	151	374	702	550	1,659	3,216
Investment Companies	9	34	40	20	5	23	25	125	93	72
All Capital Sources	58	160	372	374	156	397	727	675	1,752	3,288

Source: Israel Venture Capital Research Center (IVC Research Center, 2001)

There are more Israeli firms listed in New York than firms from any other foreign country, excluding Canada. A study by the Bank of Israel research department found that Israeli firms making their IPO in New York are young, innovative, high-tech, and export-oriented (Blass & Yafeh, 1998). According to this research, the motivation behind these IPOs are that (1) the US capital markets are better able to evaluate firms with few tangible assets and (2) Israeli firms signal, through the IPO in New York, that they are of high quality. It is interesting to note that in local Israeli IPO's only about 20 percent of the equity is offered at the IPO while in New York a much higher percent of the equity is offered. The research suggests that promising Israeli firms are willing to pay the cost of having to sell a large fraction of their equity in order to access NASDAQ and thus attain investors and customers recognition (Blass & Yafeh, 1998).

Table 3 - Israeli IPOs in the US	
Year	IPO's
1990	0
1991	2
1992	9
1993	10
1994	9
1995	8
1996	14
1997	19
1998	16
1999	16
2000	21
2001	8
2002	4
Sources: 1990-96 (Blass & Yafeh, 1998) 1997-2002 Globes and Ha'aretz newspapers, Internet data bases and Tel- Aviv University's data bases (see appendix 3)	

2 Literature Review

2.1 Born Globals

Knight and Cavusgil define a Born Global as a small-sized firm which “*relies on cutting edge technology in the development of relatively new product or process innovations*” and is managed by “*entrepreneurial visionaries who view the world as a single, borderless marketplace from the time of the firm’s founding*” (Knight & Cavusgil, 1996). Born Globals start their globalization from inception without any preceding domestic operations, simultaneously with domestic business, or exceptionally soon after domestic operations (Luostarinen & Gabrielsson, 2001). The term Born Globals has been widely used to describe this phenomenon (Harveston, Kedia, & Davis, 2000; Knight & Cavusgil, 1996; Luostarinen & Gabrielsson, 2001; Luostarinen & Gabrielsson, 2002, 2004; Madsen, Rasmussen, & Servais, 1999; Madsen & Servais, 1997; Moen, 2002; Moen & Servais, 2002; Rasmussen, Madsen, & Evengelista, 2001; Rennie, 1993). The same phenomenon more or less was named differently by various authors in different countries (Luostarinen & Gabrielsson, 2004) :

- ✓ Global start-ups (Oviatt & McDougall, 1995)
- ✓ International new ventures (McDougall, Shane, & Oviatt, 1994; Oviatt & McDougall, 1994)
- ✓ Born Internationals (Majkgård & Sharma, 1999)
- ✓ High technology Start-ups (Alahuhta, 1990; Jolly, Alahuhta, & Jeannet, 1992)
- ✓ Technology-based new firms (Autio, 1999)
- ✓ Instant internationals (Preece, Miles, & Baetz, 1999)
- ✓ Global Pioneers (Almor, 1999)

Traditionally firms started their business operations in their domestic market, and then entered into international markets, first to neighboring countries and later to other countries with longer business distance (physical, cultural and economic distance) within the domestic continent. Finally they might enter into markets in other continents and become global (Luostarinen, 1994). The FIBO research program established by Luostarinen at the Helsinki School of Economics has been studying the internationalization process of Finnish firms since 1976. The first study, conducted in

1976, found that 91 percent of the 1006 industrial firms included in the study started their business activities in the domestic market prior to entering foreign markets (Luostarinen, 1979). Data from the FIBO research conducted in 1976, 1983, 1990, and in 1997 shows that the average length of the domestic period has all the time become shorter. An increasing number of these companies started operations outside the domestic continent before, simultaneously or soon after entering European markets (Luostarinen & Gabrielsson, 2004). These firms are Born Globals. Born Global research started in the Helsinki School of Economics since 1998 within the FIBO program and since 2001 it has been financed by TEKES through the LIIKE research program of the Academy of Finland.

Since 1985 and mainly since 1990 there is a clear increasing appearance of Born Globals. Indications can be found in table 4, which is based on a survey of Finnish Born Globals firms. As can be seen in the table the number of Finnish Born Globals has been steadily increasing annually during 1985-2001 (Luostarinen & Gabrielsson, 2004). The increase number of Israeli IPOs in the US, during 1990-2000, as shown in table 3, is also an indication for this trend as most of these IPOs are technology-intensive Born Global firms. While most Born Globals have been established since 1985, some were established much earlier. One such example is the Finnish Vaisala Corporation which was established in 1936 (Luostarinen & Gabrielsson, 2004). The first business of Vaisala, a global market leader in meteorological forecasting systems, was in the US market. Researchers have identified the existence of early Born Globals (before 1985) in Finland (Luostarinen, 1970, 1979, 1994; Luostarinen & Welch, 1990), Sweden (Johanson & Vahlne, 1977), the UK (Buckley, Newbound, & Thurwell, 1979), Canada (Garnier, 1982), and Taiwan (Chang & Grub, 1992). It should be noted that these early studies viewed these firm as deviations from the mainstream pattern of internationalization, but none of them explicitly identified the phenomenon or analyzed it further.

Table 4 - Establishment of Finnish Born Globals		
Year of establishment	Number of Born Globals established	Number/Year
1985-1989	8	1.6
1990-1994	25	5.0
1995-1999	40	8.0
2000-2001	20	10.0
Source: (Luostarinen & Gabrielsson, 2004)		

In contrast to traditional internationalizing firms, Born Globals (1) go international at an early age, (2) implement rapid and parallel country roll-out strategies (as opposed to slow, incremental, and sequential), (3) possess a global vision and outlook from inception (as opposed to initial domestic orientation), and (4) rapidly implement multiple and advanced operational modes of international business on a global scale (as opposed to gradually increasing the complexity of operations within neighboring countries).

Although Born Globals are primarily in technology-intensive businesses, they can be found in a variety of industries (Luostarinen & Gabrielsson, 2004; McDougall, Shane, & Oviatt, 1994; Rennie, 1993). Some Born Global firms are located in subnational geographic clusters or networks that enable economics and internationalization for all participants (Dunning, 1995; Johanson & Vahlne, 1990). The Silicon Valley in California is perhaps the most well known such cluster (Oviatt & McDougall, 1997).

There seem to be a consensus among researchers on the importance of the Born Global phenomenon based on the following reasons: (1) Born Globals can be an engine of growth for innovation and economic development (Knight & Cavusgil, 1996); (2) Born Globals are increasing in appearance since the 1990's (Luostarinen & Gabrielsson, 2004; Madsen & Servais, 1997; Moen, 2002); (3) Born Globals have been successfully competing against larger established players, and their competitiveness has increased significantly in the past two decades (Rennie, 1993); (4) technology-intensive Born Global firms have a role in technology transfer

between the research sphere and industry, between and within different industry clusters, and in adapting advance technology to the needs of traditional firms (Autio & Yli-Renko, 1998a).

The wide recognition of the importance of the Born Global phenomenon is based on empirical research from Australia, Norway, France, Canada, the Nordic countries, Israel and other countries. A McKinsey study of Australian high-value-added manufacturing exporters identified a group of Born Global firms that began exporting, on average, only two years from inception and achieved 76 percent of their total sales through exports. These companies, even though relatively very small (\$16 million average annual sales), have been competing successfully with large MNEs. Despite being relatively young, on average 14 years, they have been responsible for almost 20 percent of Australia's high-value-added manufacturing exports. "These firms did not slowly build their way into international trade. Contrary to popular wisdom, they were Born Global" (Rennie, 1993).

An empirical study of small firms in Norway and France found that more than half of the exporting firms established since 1990 could be classified as Born Globals (Moen, 2002). In Canada, an empirical study of 75 early stage technology-based firms found that only 7% had no foreign sales (Preece, Miles, & Baetz, 1999). In the Nordic countries, a study of high-tech start-ups found that nearly 50 percent began exporting within two years of their establishment (Moen, 2002). In Finland during the economy recession of the early 1990s, new technology-based firms increased in number faster than firms in low-technology industrial sectors (Autio & Yli-Renko, 1998a).

It is expected that the phenomenon of Born Globals will become more widespread in the future (Madsen & Servais, 1997). As Born Globals are increasing in numbers, their importance in terms of innovation, employment and economic growth is growing (Moen, 2002). The growing importance of the Born Global phenomenon combined with the challenges facing Born Globals' managers and the limitations of existing theory makes Born Global research important (Moen, 2002).

2.2 Born Global research

Research on Born Globals has mainly focused on (a) explaining the recent emergence of Born Global firms, (b) characteristics of Born Global firms, (c) limitations of existing internationalization theory and development of new research approaches, and (d) key success factors.

2.2.1 Factors explaining the emergence of Born Global firms

The factors contributing to the increasing emergence of Born Global firms can be grouped into three groups (a) new market conditions, (b) technological developments, and (c) human resources:

- a) New market conditions
 - 1) Increasing role of niche markets (Holstein & Kelly, 1992; Knight & Cavusgil, 1996; Madsen & Servais, 1997; Rennie, 1993)
 - 2) Increase homogenization of markets (Oviatt & McDougall, 1994)
 - 3) Increasing global demand in many markets (Oviatt & McDougall, 1997)
 - 4) Demand for more specialized and customized products (Knight & Cavusgil, 1996; Rennie, 1993)
 - 5) Decreases in governments' protectionist policies (McDougall & Oviatt, 2000)
 - 6) Product life cycles are shortening (Rennie, 1993). Product innovations must be utilized rapidly before the technology becomes out dated or is imitated by competitors.
 - 7) Trend toward global networks (Knight & Cavusgil, 1996)
 - 8) International financing opportunities are increasingly available (Oviatt & McDougall, 1994)
 - 9) Means of internationalization (knowledge, technology, facilitating institutions, and so on) have become more accessible (Knight & Cavusgil, 1996; Rennie, 1993)
- b) Technological developments
 - 1) Advances in process technology (Knight & Cavusgil, 1996; Madsen & Servais, 1997; Rennie, 1993)

- 2) Advances in communication technology (Knight & Cavusgil, 1996; Madsen & Servais, 1997; McDougall & Oviatt, 2000; Oviatt & McDougall, 1994, 1995; Oviatt & McDougall, 1997; Rennie, 1993)
 - 3) Low cost transportation (McDougall & Oviatt, 2000; Oviatt & McDougall, 1994, 1995; Oviatt & McDougall, 1997; Rennie, 1993)
- c) Human Resources
- 1) More elaborate capabilities of people (Madsen & Servais, 1997; Oviatt & McDougall, 1994)
 - 2) Human capital is more internationally mobile (Oviatt & McDougall, 1994)

2.2.2 Characteristics of Born Globals

Previous research found that Born Globals have the following characteristics:

1. Small size, flexible, move fast (Knight & Cavusgil, 1996; Rennie, 1993)
2. Reliance on cutting edge technology (Knight & Cavusgil, 1996)
3. Managed by entrepreneurial visionaries (Knight & Cavusgil, 1996)
4. Global vision since inception (Knight & Cavusgil, 1996; Oviatt & McDougall, 1995)
5. The products that Born Globals typically sell involve substantial value adding (Knight & Cavusgil, 1996)
6. Genuine customer orientation (Knight & Cavusgil, 1996; Rennie, 1993)
7. Serving globalizing niche markets with unique products and services (Luostarinen & Gabrielsson, 2004; Oviatt & McDougall, 1997; Rennie, 1993)
8. Successfully competing with larger established players worldwide (Rennie, 1993)
9. Compete in quality and value (Rennie, 1993)
10. Operate mainly as specialized suppliers and service providers for large or medium-sized firms (Autio & Yli-Renko, 1998b, 1998a)

2.2.3 Limitations of internationalization theories

Firm internationalization has been regarded as an incremental, risk-averse process. According to this view, there is an evolutionary process in which firms start with operations and countries that are perceived to be least risky and with time use what they learn in the process to move to more advance operation modes and countries with greater business distance. All these theories and models assume that firms become international long after they have been formed. This traditional view of risk-averse, incremental firm internationalization is not able to explain the Born Global phenomenon (Oviatt & McDougall, 1997).

Internationalization Theories	Limitations demonstrated by
Uppsala model (Johanson & Vahlne, 1977; Johanson & Wiedersheim-Paul, 1975)	(Knight & Cavusgil, 1996; Madsen, Rasmussen, & Servais, 1999; Madsen & Servais, 1997; Oviatt & McDougall, 1994; Oviatt & McDougall, 1997)
Innovation model (Bilkey & Tesar, 1977; Cavusgil, 1980; Czinkota, 1982; Reid, 1981)	(Knight & Cavusgil, 1996; Madsen, Rasmussen, & Servais, 1999; Madsen & Servais, 1997; Oviatt & McDougall, 1994; Oviatt & McDougall, 1997)
Monopolistic advantage theory (Hymer, 1976)	(McDougall, Shane, & Oviatt, 1994)
Product cycle theory (Vernon, 1966)	(McDougall, Shane, & Oviatt, 1994)
Stage Theory of internationalization (Aharoni, 1966; Bilkey & Tesar, 1977; Cavusgil, 1980; Czinkota, 1982; Johanson & Vahlne, 1977; Johanson & Wiedersheim-Paul, 1975; Luostarinen, 1970, 1979)	(Andersen, 1993; Bell, McNaughton, & Young, 2001; McDougall, Shane, & Oviatt, 1994; Oviatt & McDougall, 1994)
Oligopolistic reaction theory (Knickerbocker, 1973)	(McDougall, Shane, & Oviatt, 1994)
Internalization theory (Buckley & Casson, 1976)	(McDougall, Shane, & Oviatt, 1994)

Empirical research on small firms from Norway, France, and Denmark found that the gradual development process of internationalization, as described in traditional models, was not found to be evident (Moen, 2002; Moen & Servais, 2002). Born Globals choose the most attractive markets regardless of psychic distance, have a strong international orientation from inception, and choose the most suitable distribution form in their industry (Moen & Servais, 2002). This means that stage models have become inadequate in explaining the internationalization process of Born Global firms.

Madsen and Servais (1997) argue that the Born Globals' goal is growth and long-term profit, while at the same time attempting to keep risk at a low level. This is in accordance with stages models and the Uppsala model. However, the difference between Born Globals to traditional firms, according to Madsen and Servais, is in the firms' perception of uncertainty in regard to international markets. They contend that a Born Global's perception of uncertainty regarding international markets is lower because of the international experience of founders and other employees prior to the start-up (Madsen & Servais, 1997). Another contributing factor to the rapid and early internationalization of Born Globals, according to Madsen and Servais, is the relatively low market commitment. Market commitment is composed of the amount of resources committed and the difficulty in finding alternative use for these resources. As the country specificity of market knowledge is relatively low and international sales and marketing channels are already in place, market commitment becomes relatively lower (Madsen & Servais, 1997).

2.2.4 Suggested research approaches

Oviat and McDougall developed a new framework to explain the Born Global phenomenon by integrating international business, entrepreneurship, and strategic management theory (Oviatt & McDougall, 1994). The framework suggests four necessary and sufficient elements for the existence of Born Globals: (1) organizational formation through internalization of some transactions, (2) strong reliance on alternative governance structures to access resources, (3) establishment of foreign location advantages, and (4) control over unique resources. This suggested

framework does not deal with the globalization process itself but merely points out some necessary conditions for the formation of Born Globals.

Oviatt & McDougall suggested that the influence of changes in industry internationalization on the firm should be integrated into the theoretical framework developed for Born Globals (Oviatt & McDougall, 1997).

Roberts & Santuria (1996) suggests integrating aspects of the product life cycle with generic internationalization models, but with more flexibility. From the product life cycle they perceive that the conditions of the product and its market, although not limited to its life cycle stage, determine an opportunity space for global sales. From the internationalization models they acknowledge the differences between firms in regard to their knowledge and experience in foreign markets and their perceived risk in globalization. However, they argue that some firms, even from inception, are better prepared to seize global opportunities. This leads them to the conclusion that global expansion patterns are linked to a combination of external and internal forces: (1) external- the product/market space provides the opportunity for globalization, and (2) internal- top management expectations and responsiveness to opportunity provides the means for globalization.

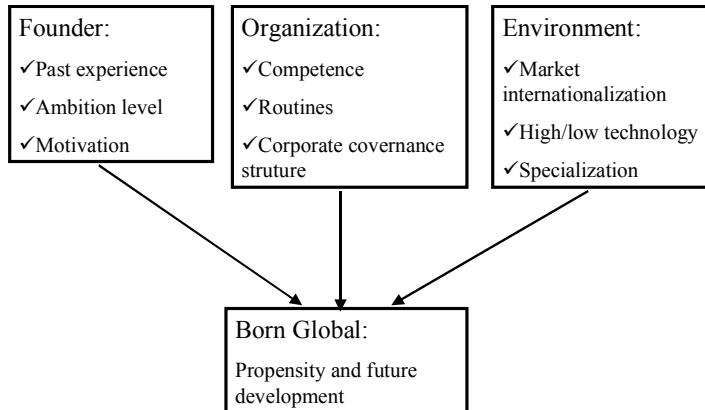
Madsen & Servais (1997) have developed a research model for studying the Born Global phenomenon (see figure 3). According to their research model, researchers need to look at

- a) the founders - past experience, ambition level and motivation.
- b) the organization - competencies, routines, and corporate governance structure.
- c) the environment - market internationalization, high/low technology, and specialization.

Kirpalani and Luostarinen (1999) suggest a revised POM pattern for Born Global (The Production, Operations, and Markets framework will be explained under the Helsinki model later in this chapter). Born Globals are not able to move gradually to more advanced products. Market strategies are no longer determined by business distance but rather by market potential. There is no domestic operations period or domestic and international operation start simultaneously. The holistic

internationalization model (described later under the Helsinki model) can be reversed and start from cooperative modes.

Figure 3 - Born Global Research Model



Source: Madsen & Servais (1997)

2.2.5 Key Success Factors

According to Oviatt and McDougall, the global vision of the founders is probably the most important characteristic associated with success of Born Globals (Oviatt & McDougall, 1995). The founders must be able to communicate their global vision to everyone else associated with the venture. However, it could be argued that unless founders have global vision at the time of establishment, the likelihood that the new venture will be Born Global is small.

The International experience of managers and the strong international networks of the entrepreneurs are also viewed by Oviatt and McDougall as important to the success of a Born Global (Oviatt & McDougall, 1995). As Born Globals must globalize since inception, or shortly after, and as the globalization process should be relatively rapid, there is certainly a need for business and market knowledge. Managerial experience could indeed serve to fill this need. Founders without prior international experience

can recruit top managers with such experience. An international network of the founders or top management, possibly including financiers, suppliers, and distributors, can certainly be helpful.

According to Knight & Cavusgil, the key element for success in Born Global firms appears to be real customer orientation and value, combined with commitment to operate in global markets by the firm's managers. Knight & Cavusgil suggest that due to lack of resources, managers of Born Global firms should use formal and informal networks and focus on niche markets. According to this view, much of the learning associated with globalizing can be acquired through information networks both at home and abroad (Knight & Cavusgil, 1996).

Specialized and customized product demand is creating niches, which offer opportunities for SMEs that are faster, more flexible and cost effective than their large competitors (Rennie, 1993). Concentration, specialization, and focus on a global niche, which is too small for large MNEs but big enough for Born Globals, can be seen as keys to the survival and success of Born Globals (Kirpalani & Luostarinen, 1999).

Oviatt and McDougall contend that *“capabilities that create competitive advantage in the domestic arena may not be the same as those that do so in the international arena. If a new venture starts out domestically, its policies and procedures are focused on domestic markets.”* (Oviatt & McDougall, 1995). Ghoshal claims that firms that internationalize early develop fewer routines and structures that could act as obstacles to their entry into foreign markets (Ghoshal, 1987). Born Global firms have not developed routines and structures that hinder their internationalization (Reuber & Fischer, 1997) and may be less resistant to new knowledge and avoid the ‘competence trap’ (Cohen & Levinthal, 1990).

A research of small technology-related new ventures found that increasing percentage of foreign sales does not by itself increase the financial performance (ROI) of new ventures (McDougall & Oviatt, 1996). Ventures that have increased their internationalization activity had significantly higher correlations between strategic

change and both relative market share and ROI. This suggests that changes in strategy may be necessary for a Born Global to be successful (McDougall & Oviatt, 1996).

Born globals compete on the basis of differentiation, placing greater emphasis on product innovation, quality, service, and marketing as strategic weapons (McDougall, Oviatt, & Shrader, 2003). In order to overcome the advantages of traditional multinationals (e.g. knowledge of the target market and economies of scale) Born Globals must be first to market a distinctively valuable product or service (Oviatt & McDougall, 1995). In order to maintain their competitive advantage, Born Globals given their limited resources, must depend on intangible assets such as tacit know-how (Oviatt & McDougall, 1995). To achieve this goal, human resources management must be very effective. Continual innovation can help keep the company ahead of its competitors. Successful Born Globals seem to follow their initial product or service with extensions that are derived from their original competitive advantage.

Coordinating the implementation of the venture strategy worldwide is also viewed as a key success factor (Oviatt & McDougall, 1995). Geographic extensions must be closely coordinated. Strong commitment by top managers to the firm's goals and shared global vision throughout the organization are important towards achieving this goal (Oviatt & McDougall, 1995).

2.3 Internationalization Literature

Internationalization literature could be divided into several major schools (Coviello & McAuley, 1999):

1. The 'Economic school' (FDI)
2. The 'Network approach school'
3. The 'Behavioral school' (Stages)

2.3.1 The Economic School (FDI)

The FDI (Foreign Direct Investment) and stages (behavioral) schools of research have all been well established and the network school is developing fast. Each of these fields has been developed somewhat independently (Coviello & McAuley, 1999). Researchers from each school of thought aim at making their theory better. Johanson & Vahlne argue that the basic ideas concerning the internationalization process are drawn from several theoretical traditions- economic theory, organization theory, and marketing theory- and most researchers feel at home only in one (Johanson & Vahlne, 1990). It is difficult to capture the internationalization concept using only one theoretical framework (Coviello & McAuley, 1999). It can be argued that in the case of Born Global firms even the three mainstream schools are not sufficient.

The Economic School's (FDI) theory was developed from neoclassical and industrial trade theory. Internationalization is viewed as a pattern of investment in foreign markets explained by rational economic analysis of location, ownership, and internalization advantages. This is a static approach where the firm evaluates the cost of economic transactions in each stage in order to choose their optimal organizational structure, ownership of value-chain activities and choice of locations. The Eclectic Paradigm is a synthesis of elements from the transaction cost (Internalization) and market power theories of the individual firm in its relationships to markets with macroeconomic approaches to international production e.g. the product life cycle and monopolistic advantage theory (Cantwell & Narula, 2001; Dunning, 1988). The Eclectic Paradigm (Dunning, 1977, 1988) has been a leading explanation for the growth of multinational activity for the past two decades (Andersen, 1997; Cantwell & Narula, 2001; Johanson & Vahlne, 1990). According to the Eclectic Paradigm, a firm will only engage in foreign value-adding activities if and when three conditions are satisfied (Dunning, 1988):

1. Ownership-Specific Advantages
2. Internalization Advantages
3. Location-Specific Advantages

FDI theory seems to be better suited for understanding the activities of MNEs (Johanson & Vahlne, 1990). FDI theory explains the existence of MNEs rather than

the process of internationalization. Critics of FDI theory claim that the Economic School research is used primarily to explain a pattern of investment and not a long-term process of international expansion (Johanson & Mattsson, 1987; Melin, 1992).

FDI theory was mainly developed to explain FDI in foreign production by MNEs. It attempts to understand the “why”, “where”, and “how” of the international production of MNEs, and leaves many questions unanswered regarding the growth and internationalization process that led the firms to become large MNEs. Evidence from empirical studies of technology-intensive Born Global firms seems to show that they rarely establish foreign manufacturing subsidiaries. A study on technology-intensive US firms (not only Born Global firms) found that only two out of the nineteen firms invested in foreign production subsidiaries (Roberts & Senturia, 1996). A study of 98 small computer software firms in Finland, Ireland, and Norway (SMOPEC countries) found that relatively few firms established overseas subsidiaries and, where these existed, they were typically sales and marketing operations (Bell, 1995). A study of 56 Israeli technology-intensive firms (Almor & Hashai, 2001) found that production was significantly less frequently internalized than R&D. As the focus of this study is on the globalization process of technology-intensive Born Globals FDI theory is not the most suitable theoretical approach for it.

2.3.2 The Network Approach School

In the network approach, the system of exchange relationship between firms is described as a network (Johanson & Mattson, 1991; Johanson & Mattsson, 1988). The specific firm is engaged in a network of business relationships with a number of different firms. Firms in the network are dependant on each other and coordinate with other firms within the network. Coordination takes place through interaction between firms in the network, not through a central plan or an organizational hierarchy. In such a network an individual firm has direct important relationships with its customers, suppliers, and distributors and via those firms, also indirect relationships with firms that have relationships with firms connected directly to it (e.g. suppliers' supplier). Each firm has a position in the network, which characterizes its relationship to other firms. This position is defined by the (a) identity of direct and indirect counter parts,

(b) role of the firm in the network, (c) importance of the firm in the network, and (d) strength of relationships with other firms (Johanson & Mattsson, 1985).

The network approach argues that internationalizing firms initially engage in a primarily domestic network. Only after entering the domestic network will the firms develop business relationships in networks in other countries (Johanson & Mattsson, 1988). This can be achieved through establishment and development of relationships in foreign country networks that are new to the firm and through connecting networks in different countries (Johanson & Vahlne, 1990). Relationships and networks can be especially important in turbulent, high-technology industries. It has been suggested that entrepreneurs establishing rapidly globalizing firms have networks of colleagues dealing with the new technology (Johanson & Vahlne, 1990). A recent study has argued that “the internationalization process of Born Globals is a matter of learning through networks” (Sharma & Blomstermo, 2003). The study also points out the importance of weak ties in the internationalization process of Born Globals. The network approach is certainly suitable for Born Global research. However the aim of this research is to study the globalization process and strategies and not the relationships between firms or the learning process.

2.3.3 The ‘Behavioral School’

Behavioral models propose an incremental “stages” approach and are generally more dynamic than FDI theory (Johanson & Vahlne, 1990; Melin, 1992). There are a number of stage models from which the most influential is clearly the ‘Uppsala Model’ (Johanson & Vahlne, 1977; Johanson & Wiedersheim-Paul, 1975) which influenced a great deal of research on the internationalization of small firms (Bell, 1995). The Uppsala model belongs to the ‘Nordic School’, which incorporates the Helsinki model (Luostarinen, 1970, 1979) and the Uppsala model (Johanson & Vahlne, 1977; Johanson & Wiedersheim-Paul, 1975). While North American researchers concentrated mainly on large mature MNEs, the Nordic researchers were more interested in SMEs from SMOPECs (Korhonen, 1999; Luostarinen, 1979).

The Uppsala Model is based on theories concerning the growth of the firm (Penrose, 1959) and the behavioral theory of the firm (Aharoni, 1966; Cyert & March, 1963).

Market knowledge and market commitment are assumed to affect decisions and the way current activities are performed. These in turn change knowledge and commitment (Aharoni, 1966). The Uppsala Model suggests that internalization of activities occurs incrementally and is influenced by increased market knowledge and commitment. Over time and through experience, firms increase their foreign market commitment. Market commitment is assumed to be composed of two factors: (1) the amount of resources committed, and (2) the degree of commitment- the degree of difficulty in finding an alternative use for the resources and transferring them to it. Increase in foreign market commitment leads to more market knowledge leading to further commitments to more distant markets. According to this view, domestic firms regard foreign markets as risky since the markets are unknown to them. To minimize the perceived risk, firms choose to go abroad at a slow and cautious pace. Firms choose the entry markets and entry modes according to their existing experience. This process was named the ‘establishment chain’, and it included the following stages: (1) no regular exports, (2) independent representative (agent), (3) sales subsidiary, (4) local manufacturing.

Market entry decisions are also influenced by ‘psychic distance’. Firms with little experimental experience of foreign markets prefer markets with a short psychic distance and subsequently enter foreign markets with successively greater ‘psychic distance’. ‘Psychic distance’ is measured according to the factors preventing or disturbing the flow of information between the firm and its foreign target market. Such factors include language, culture, political system, level of education, and industrial development.

The model divides experience into objective knowledge and experimental knowledge. Objective knowledge is obtained through activities such as marketing research. Experimental knowledge on the other hand includes 1) institutional knowledge- concerns knowledge about foreign markets and their culture, institutions, regulations and rules, 2) business knowledge- concerns knowledge about customers, their needs, and their decision making process, and 3) internationalization knowledge- concerns knowledge of the external resources and capabilities of the specific firm, as well as its internal ones. Firms’ international operations are based on experimental knowledge.

Managers first gain experience in their domestic markets and the firm gains resources before moving to foreign markets.

In Finland, Luostarinen found that internationalization was an evolutionary process in which companies became increasingly committed to, and involved in, international activities. Luostarinen also noted that involvement in international business is not limited to exports and sales but also buying products from foreign markets or cooperating in some area with a foreign firm (Luostarinen, 1970). Luostarinen divided international operation modes into three groups: 1) Inward, 2) Outward, and 3) Cooperative (Luostarinen, 1979).

The differences between the Uppsala model (Johanson & Vahlne, 1977; Johanson & Wiedersheim-Paul, 1975) and the Helsinki model (Luostarinen, 1970, 1979, 1994) are:

- 1) The Uppsala model examines the penetration pattern for a certain target country while the Finnish model also looked at the firm, country, and global level (Korhonen, 1999).
- 2) The Uppsala model focuses mainly on outward internationalization, while the Finnish model also identified the importance of inward and cooperative modes of internationalization (Korhonen, 1999).
- 3) The Uppsala model mainly looks on the 'how' question while the Finnish model also looks on the 'why' and 'where' questions (Korhonen, 1999).
- 4) The Uppsala model was originally based on four case studies, while the Finnish model is based on a mail survey of 1006 companies covering 92% of total Finnish industrial exports for 1976.

The stages description and the number of stages vary between the different stages models, but the notion of psychic distance and incremental stages development is generally supported. I have chosen to use the Helsinki model in this research, combined with the international entrepreneurship approach, because it is based on near population data and is more holistic than other stages models.

2.3.4 Shortcomings of the stages models

While the stages models approach was widely supported by empirical research we must note that these models have been mainly developed in the 70's. The global business environment however has changed dramatically since the 70's. It is not surprising than that internationalization stage models fail to explain the rapid and early internationalization process of some new companies. The following are the main criticisms of the internationalization stages theories:

- a) Firms do not necessarily adopt consistent organizational approaches to internationalization (Buckley, Newbound, & Thurwell, 1979).
- b) Many passive exporters were, at one time, active (Cannon & Willis, 1981).
- c) Firms may omit stages to accelerate the process (Cannon & Willis, 1981).
- d) "Psychic distance" has become much less relevant due to globalization, development of global communication and transportation infrastructures, and markets becoming increasingly homogeneous (Czinkota & Ursic, 1987; Nordström, 1991). A study of 187 small software firms in Finland, Ireland and Norway showed that market selection decisions of these firms were not necessarily influenced by psychic factors (Bell, 1995).
- e) Technology-intensive firms with high R&D costs, shorter product life-cycles and a concentration of the market for high-technology products accelerate the pace of internationalization (Bell, 1995; Young, 1987).
- f) Some firms do not change their preferred entry mode as they develop new export markets (Bell, 1995).
- g) Technology-intensive and service-intensive firms have the following characteristics, which question the relevance of the stage theories (Bell, 1995): (1) achieving high rapid growth within a dynamical global industry; (2) in some industries, e.g. software, the entry barriers are low and the size of the firm is not critical; (3) high-value, low-volume products makes physical distribution easy; (4) specific industry factors, e.g. the relationship between software and hardware firms and concentration of markets in the computer industry, impact internationalization strategies.
- h) Stages models are too deterministic (Johanson & Vahlne, 1990).

- i) Stages models are suited only for the early stages of internationalization when the lack of market knowledge and resources are still constraining factors (Johanson & Vahlne, 1990).
- j) General internationalization of industries and markets can role out the market knowledge factor (Johanson & Vahlne, 1990).
- k) Models do not take into account interdependencies between different country markets (Johanson & Mattsson, 1985).
- l) Traditional stage patterns are too rigid and slow (Luostarinen, 1994).

2.3.5 The Helsinki Model

The Finnish research by Luostarinen analyzed the outward internationalization process of manufacturing firms also from the perspectives of Product, Operations and Market (POM) patterns respectively (Luostarinen, 1970, 1979).

2.3.5.1 Product

Luostarinen developed a classification of products into four categories: (1) physical goods, (2) services, (3) know-how, (4) systems (see table 6). According to Finnish empirical evidence (FIBO), manufacturing companies in SMOPECs tend to introduce these four product categories in the following order: (1) physical goods, (2) services, (3) know-how, and (4) systems. 98 percent of the 997 Finnish firms that were included in the research started their outward international operations with sales of physical goods.

Table 6 - Product Categories in the Helsinki Model

Physical Goods	Services	Know-how	Systems
<ul style="list-style-type: none"> • Durable & non-durable consumer goods • Investment goods • Raw materials and intermediate goods 	<ul style="list-style-type: none"> • Planning, supervision • Installation, Testing • Training, development • Servicing, Maintenance 	<ul style="list-style-type: none"> • Management know-how • Technological know-how • Marketing know-how 	Combination of: <ul style="list-style-type: none"> • Goods • Services • Know how A problem solution: a package of hardware and software

Source (Luostarinen, 1979)

2.3.5.2 Operations

The international outward operations were divided into four categories using two major criteria: (1) marketing or production, (2) non-investment or direct-investment.

The empirical evidence from the Finnish research shows that in most cases the four categories of outward operations will be used in the following order:

- (1) Non-investment marketing operations (NIMOS).
- (2) Direct-investing marketing operations (DIMOS).
- (3) Non-investment production operations (NIPOS).
- (4) Direct-investment production operations (DIPOS).

98 percent of the 997 Finnish firms that were included in the research started their international operations by using the non-investment marketing operation mode (NIMOS). 64 percent of the firms used direct-investing marketing operations (DIMOS) as their second stage operation mode.

Table 7 - Operations Categories in the Helsinki Model		
	Non-Investment Operations	Direct-Investment Operations
Marketing Operations	<ul style="list-style-type: none"> • Goods Export • Service Export • Know-how Export • Partial/Project Export 	<ul style="list-style-type: none"> • Sales Promotions Subsidiaries • Warehousing units • Service units • Sales Subsidiaries
Production Operations	<ul style="list-style-type: none"> • Licensing • Franchising • Contract Manufacturing • Turnkey • Co/production 	<ul style="list-style-type: none"> • Assembly units • Manufacturing units

Source: (Luostarinen, 1970, 1979)

2.3.5.3 Markets

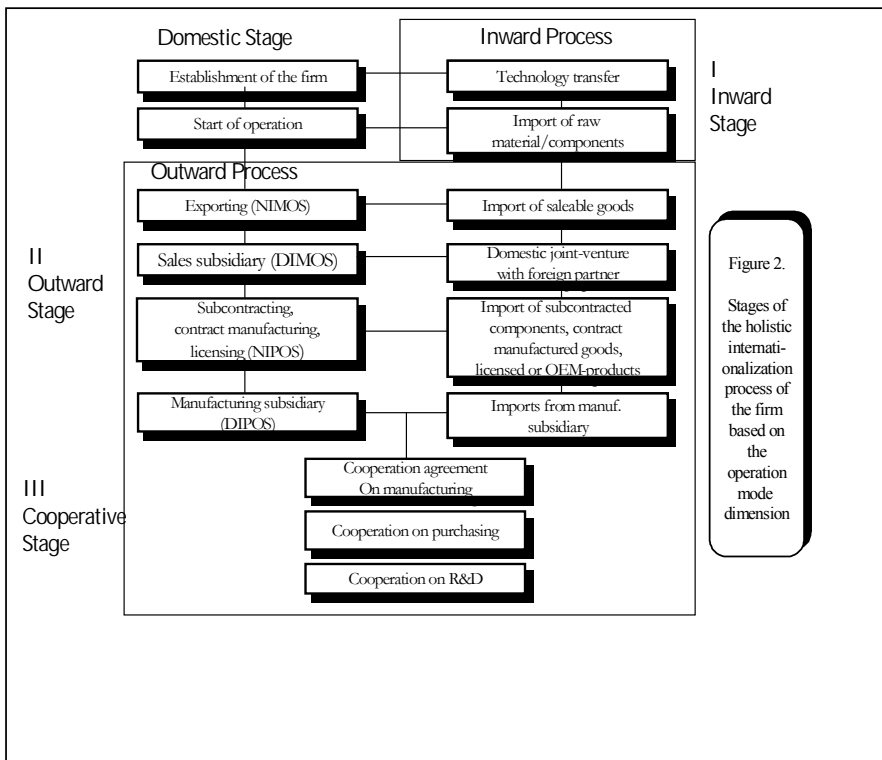
According to the Finnish research, the market pattern of international outward operations usually starts with countries that have a very small business distance to the firm's domestic market. 91.7 percent of the 997 Finnish firms that were included in the research started their international operations with countries that are very close in business distance. The term business distance is similar to the psychic distance term used in the Uppsala model and it includes factors such as geographical distance, cultural distance, and economical distance. The Finnish companies in the 1970s

tended to start their international operations in neighboring countries (Scandinavia), and then move to central Europe and Russia (a neighbor country). The third stage tended to be South and Eastern Europe and only in the fourth stage would they target the North American market. Developing countries were targeted last.

2.3.5.4 The Holistic Model

Luostarinen divided international operation modes into three groups: (1) inward, (2) outward, and (3) cooperative. Most researchers regarded outward operations of the firms, such as exports, as leading activities while inward operations, such as imports, were regarded as supporting activities. The strategic importance of inward modes was generally underestimated although they often represented more than half of a firm's total material cost. The Helsinki model view of internationalization was broad and included inward, outward, and cooperative operations.

Figure 4 - The Holistic Model



© Reijo Luostarinen, (Luostarinen, 1994)

It is interesting to note that Swedish research interests shifted slowly from inward operations to buyer-supplier dyads and relationships, with the result that later network research focused more on the network themselves and less on internationalization process issues (Korhonen, 1999). Luostarinen started to develop the idea of the holistic model in 1970 (Luostarinen, 1970), collected data in his 1979 study (Luostarinen, 1979), and published the model in 1994 (Luostarinen, 1994). The holistic model by Luostarinen can be seen in figure 4.

2.4 International Entrepreneurship

2.4.1 What is international entrepreneurship?

Entrepreneurship and international business are topics of interest to academics, business people, and governments across the world (McDougall & Oviatt, 2000). While research in international business focused mainly on established, large multinationals companies, entrepreneurship research has focused mainly on venture creation and the management of small and medium-sized businesses within the domestic context (McDougall & Oviatt, 2000). In recent years, as academics are observing accelerated internationalization among new ventures and as entrepreneurship researchers are becoming more interested in cross border business activity, there is a growing interest in combining these two research paths. This increasingly important combined path has been termed 'international entrepreneurship'.

The term 'entrepreneur' has been in use since the Middle Ages (Table 8). The term is derived from the French words "entre" and "preneur", which literally means "one who takes between" (Deakins, 1999). There is no universally acceptable definition of entrepreneur and entrepreneurship (Morrison, 1998). The difficulty in reaching a consensus on the definition of entrepreneurship seem to be rooted in the following factors: (a) entrepreneurship research overlaps with other constructs, such as innovation, change management, and strategic management, (b) entrepreneurship research can be usefully studied from a variety of perspectives ,e.g. economics, sociology, and anthropology (McDougall & Oviatt, 2000). Entrepreneurship research

can focus on the individuals who carry out an intreprenurial act or take a broader view of team or organizational entrepreneurship.

Entrepreneurs are alert to information about potentially profitable resource combinations when others are not (Barreto, 1989; Kirzner, 1979). Empirical findings suggests that not everyone looking at the same market data will come to the same conclusion about the possibility of profit (Kaish & Gilad, 1991). McDougall et al. (1994) argue that *“founders of International New Ventures are more alert to the possibilities of combining resources from different national markets because of the competencies that they have developed from their earlier activities”*. Founders of Born Global firms, according to this view, have global vision and competencies (networks, knowledge, and background) that are unique to them and that enable them to spot opportunities for profits before others. However, as not every individual spotting an opportunity acts upon it thus entrepreneurship is also *“the process of creating or seizing an opportunity and pursuing it regardless of the resources currently controlled”* (Timmons, 1994). The above views of entrepreneurship do not take into consideration Schumpeter’s view of the entrepreneur as an innovator (Schumpeter, 1934). Taking innovation into account, a firm’s entrepreneurial orientation can be viewed as *“the extent to which the top managers are inclined to take business-related risks, to favor change and innovation in order to obtain a competitive advantage for their firm, and to compete aggressively with other firms* (Miller, 1983).” (Covin & Slevin, 1989).

International entrepreneurship definition has evolved in recent years. McDougall’s definition of international entrepreneurship in 1989, was *“the development of international new ventures or start-ups that, from their inception, engage in international business, thus viewing their operating domain as international from the initial stages of the firm’s operation”* (McDougall, 1989). This early definition reflects the traditional mainstream focus of entrepreneurship research on creation of new ventures. A more recent approach suggests three dimensions to the concept of entrepreneurship: (a) innovation, (b) proactive behavior, and (c) risk seeking action (McDougall & Oviatt, 2000). Building on these three dimensions, the following definition is suggested: *“international entrepreneurship is a combination of*

innovative, proactive, and risk-seeking behavior that crosses national borders and is intended to create value in organizations.” (McDougall & Oviatt, 2000).

This study takes the stand that the use of the term ‘risk-seeking’ is problematic as it could be perceived to mean that entrepreneurs are seeking risk while my own experience suggests that entrepreneurs are more willing to take risks in order to achieve their goals, but are in no way seeking risk. This study defines international entrepreneurship, based on McDougall and Oviatt’s definition (McDougall & Oviatt, 2000), as follows: international entrepreneurship is a combination of opportunity spotting, innovative, proactive, and risk-taking (tolerating) behavior that crosses national borders and is intended to create value in organizations. Managers of Born Global firms are expected to have higher levels of risk tolerance in uncertainty situations (Knight & Cavusgil, 1996).

Table 8 - Development of Entrepreneurship Theory and Term Entrepreneur	
Stems from French: means between-taker or go-between	
Middle ages	Actor (warlike action) and person in charge of large-scale production projects.
17 th century	Person bearing risks of profit (loss) in a fixed price contract with government.
1725 Richard Cantillon	Persons bearing risks are different from those supplying capital.
1797 Beaudeau	Persons bearing risks, planning, supervising, organizing, and owning.
1803 Jan Baptiste Say	Separated the profits of the entrepreneur from those of capital.
1876 Francis Walker	Distinguished between those who supplied funds and received interest and those who received profit from managerial capabilities.
1934 Joseph Schumpeter	Entrepreneurs are innovators and develop untried technology.
1961 David McClelland	Entrepreneurs are energetic moderate-risk takers.
1964 Peter Drucker	Entrepreneurs maximize opportunities.
1975 Albert Shapero	Entrepreneurs take the initiative, organize social and economic mechanisms, and accept the risk of failure.
1979 Kirzner Israel M.	Entrepreneurs are alert to profitable opportunities for exchange.
1980 Karl Vesper	Entrepreneurs are seen differently by economists, psychologists, business persons, and politicians.
1983 Gifford Pinchot	An Intrapreneur is an entrepreneur within an already established organization.
1985 Robert Hisrich	Entrepreneurship is the process of creating something different with value by devoting the necessary time and effort, assuming the accompanying financial, psychological, and social risks, and receiving the resulting rewards of monetary and personal satisfaction.
Based on: (Hisrich & Peters, 1995), source: (Hisrich, 1986)	

2.4.2 Born Global entrepreneurship research

Since 1989, research based on case studies of Born Global firms from entrepreneurship scholars begun to be published (Jolly, Alahuhta, & Jeannet, 1992; McDougall, 1989; McDougall, Shane, & Oviatt, 1994; Oviatt & McDougall, 1994). These studies focused on the role of the founding entrepreneurs in Born Global firms. There seems to be a consensus among entrepreneurship researchers of the Born Global phenomenon that existing internationalization theories fail to explain the Born Global phenomenon and that the use of entrepreneurship theory can contribute to our understanding of the phenomenon. Existing internationalization theories ”*focus on firm-level analysis of large, mature firms, rather than the analysis of entrepreneurs and their social networks of business alliances.*” (McDougall, Shane, & Oviatt, 1994). To explain the formation of Born Global firms three questions must be answered: (a) who are the founders of the Born Globals?, (b) why do these entrepreneurs choose to compete internationally?, (c) what form do their international activities take? (McDougall, Shane, & Oviatt, 1994).

2.4.2.1 The founders

The international experience of founders or top managers is viewed by many researchers as a key success factor for the Born Globals (Madsen & Servais, 1997; Oviatt & McDougall, 1995). “*The attitudes and mental maps of the entrepreneur probably have a high explanatory power when trying to understand the internationalization patterns of such firms*” (Madsen & Servais, 1997). An empirical study of 75 early stage, technology-based, Canadian firms found that the attitudes of managers were a significant factor in explaining international intensity (Preece, Miles, & Baetz, 1999). In a study of 19 high-technology firms based in Massachusetts (US), “*the most important factor determining the attitude toward global market opportunity seems to be the make-up of founders and early management*” (Roberts & Senturia, 1996). Almost all companies aiming at global markets (9/10) in that study, had in their top management team at least one manager with experience in doing business in global markets or who have traveled or lived overseas and felt comfortable with global activities. None of the nine companies, in the study, that did not aim at global markets, had such a top manager.

A study of Norwegian and French Born Global firms found that the decision maker's global orientation and the market conditions are important factors, explaining why some firms are Born Global, while others are born locals (Moen, 2002). Knight and Cavusgil argues that managers of Born Global firms have a global orientation, which is a combination of managers outlook and competencies, and which appears to be positively correlated with export-marketing performance (Knight & Cavusgil, 1996). Kobrin found that firms with managers with more world-oriented mindsets (geocentric) are more likely to enter international markets quickly (Kobrin, 1994) . Bilkey found that firms are more likely to export when managers have lived or worked abroad (Bilkey, 1978). Dichtl et al studied SME's from Finland, Japan, South Africa, South Korea, and Germany and concluded that firms with managers who had more international experience were more successful exporters (Dichtl, Koeglmaier, & Mueller, 1990) . Stuart and Abetti found that an entrepreneur's international experience and the managerial level were the most significant factors affecting early performance of new ventures (Stuart & Abetti, 1990).

A study of 60 Born Global firms and 145 gradual globalizing firms (Harveston, Kedia, & Davis, 2000), all in high-tech industries, found that (1) managers of Born Global firms had a significantly higher levels of global orientation than managers of gradual globalizing firms, (2) managers of Born Global firms had significantly more extensive international experience than managers of gradual globalizing firms, and (3) managers of Born Global firms had a significant higher risk tolerance than managers of gradual globalizing firm.

2.4.2.2 The choice to compete internationally/globally from inception

McDougall & Shane & Oviatt (1994) suggest that the founders of Born Global firms believe "*that the venture will not develop international competencies except by practicing international business*". According to this concept, a venture established originally as a domestic venture will become path-dependant, which means that it will develop in a way appropriate for the domestic market only, and will have to overcome this path-dependence and develop organizational routines and capabilities that can create competitive advantages in the international arena, in order to become

international (Ghoshal, 1987). Firms which established domestic competencies may find it difficult to shift out of these competencies due to inertia forces (McDougall, Shane, & Oviatt, 1994).

A study of Born Global firms in Denmark and Australia found that Born Global firms were established because the founders:

- 1) Had a desire to be self-employed.
- 2) Had a good idea for a new type of production.
- 3) Had contacts in a network
- 4) Were unemployed
- 5) Combination of some of the above
- 6) Other factors

In all the cases in the study, the high degree of internationalization was not a strategic objective for the founders, but was something necessary (Rasmussen, Madsen, & Evangelista, 2001). However, the researcher also suggests that the phenomenon of Born Global firms must be studied within the context of the specific industry and its degree of internationalization. In certain industries establishing a domestic oriented firm, according to this view, is simply not possible because of the high degree of industry globalization.

2.4.2.3 Entrepreneurial Networks

A Swedish study has found that young, knowledge-based entrepreneurs are generally more ambitious networking agents than colleagues running traditional firms (Johanisson, 1998). Entrepreneurs from knowledge-based firms generally invested more time and effort in developing and maintaining personal contacts compared with entrepreneurs from traditional firms. The data also show that the personal networks of young entrepreneurs are to a great extent social. Young, knowledge-based entrepreneurs build separable networks that can satisfy specific needs. Entrepreneurial networking is defined, for the purpose of this research, as the actions by which entrepreneurs develop and maintain contacts for business development purposes. As the focus of this study is the globalization process and strategies, the topic of entrepreneurial network was outside its scope.

2.5 Technology-intensive SMEs

Technology-intensive Born Globals are also technology-intensive SMEs. While not all technology-intensive SMEs are Born Globals, Born Globals do evolve into SMEs. Thus existing literature on technology-intensive SMEs can contribute to the study of technology-intensive Born Globals. As there is limited research on the technology-intensive aspect of Born Globals this study makes use of the existing research on technology-intensive SMEs. Research on technology-intensive SMEs examines the environment in which these firms operate, their globalization triggers, geographic markets, operations, and strategies.

2.5.1 The Environment

Levit contends that high-tech products, where the universal language of customers and users facilitates standardization are among those especially likely to converge quickly toward global competition (Levitt, 1983). The move toward standardized global platforms reduces the market information risk that was traditionally associated with the internationalization process of small companies (Roberts & Senturia, 1996). The environment facing small technology-intensive firms is characterized by unpredictable and high-velocity changes, volatility, instability and hypercompetition (D'Aveni & Gunther, 1995; Evans & Wurster, 2000; Riolli-Saltzman & Luthans, 2001). In such an environment the rate of innovation, product development, and supply chain management changes dramatically. When time becomes a major resource, a firm or even an industry can become obsolete in as little as six months (Hamel, 1998). In such an environment traditional strategies are no longer relevant (Brown & Eisenhardt, 1997). Small technology-intensive firms, that are agile and flexible, continuously reinvent their organizational culture, and have a future time orientation, are better prepared to compete in such an environment (Riolli-Saltzman & Luthans, 2001). The old top-down strategic process and structures have been “blown to bits” by this new reality of the high-velocity environment (Evans & Wurster, 2000).

2.5.2 Globalization Triggers

A study of 82 technology-intensive SMEs (Lindell & Karagozoglu, 1997) identified strategic opportunities in global markets as the most important factor behind internationalization. These technology-intensive firms were proactively looking for new opportunities. The most important obstacle to internationalization identified in the research was lack of managerial experience and competence to exploit international business. A study of Massachusetts-based PC firms identified the following external triggers for beginning international market activities in high-technology firms: (1) domestic customers with overseas facilities, (2) domestic distribution partners, (3) foreign distribution partners, (4) foreign customers, and (5) proactive decision from internal company management. Only two of these five forces mattered significantly: (1) foreign distribution partners (external), and (2) proactive managerial push (internal). Companies with a proactive management global push typically began seeking global opportunities within the first year (Roberts & Senturia, 1996).

Bell's research of small software companies found that contact with foreign suppliers to obtain hardware, local software distribution rights, or production licenses led to export activities. Almost 10 percent of the firms began exporting before they had any domestic sales. The age and size of the software firm had no significant influence on the decision to internationalize. All of the evidence in the study suggested that software firms internationalize very rapidly. Bell claims that choice of market entry modes and limited human and financial resources present significant barriers, which prevent many specialized software firms from internationalizing beyond a certain point (Bell, 1995).

2.5.3 Geographic Markets

Roberts & Santuria identified four factors that influence the territorial expansion programs of the companies (Roberts & Senturia, 1996): (1) regulatory factors – certain products are subject to regulatory approval in each country, (2) platform factors- when a specific industry have multiple platforms there is a link between the potential markets to the penetration of the appropriate platforms in foreign markets

(e.g. GSM, TDMA, CDMA in cellular phones, and Macintosh, PC, UNIX in computers and software), (3) local market factors – degree of standardization of the product vs. localization and the market maturity, (4) familiarity factors – this factor is similar to the psychic distance in the Uppsala model. The familiarity factors seemed to have the most impact on the decisions regarding where to invest in foreign staffing.

As to market selection, a study of 98 small computer software firms in Finland, Ireland, and Norway (SMOPEC countries) found that “psychic distance” describes a commonly occurring phenomenon, but does not provide an adequate explanation for the firms’ market selection (Bell, 1995). 30-50 percent of firms in the study had initiated exports with sales to countries, which could not be considered close ones as to “psychic distance”. The research identified three important factors which strongly influenced the firms’ initial and subsequent market selection decisions: (1) following the customers- companies enter a foreign market to serve their domestic customers, (2) sector targeting- targeting and entering markets which were experiencing growth in their specialized niches, and (3) industry specific trends.

2.5.4 Operations

An empirical study of 213 small high-technology UK firms (Jones, 2001) found that there was a group of firms that established foreign links at a very early stage in their life, and another group that formed their first cross-border links at a later stage. Firms tended to establish their first international link during the first three years or after more than seven years. During the first three years from inception 43.7 percent of the firms imported from overseas-based suppliers, 34.3 percent of the firms used export through foreign-based agent/distributor, 21.1 percent of the firms exported through a domestic-based intermediary and 12.2 percent exported through company representatives/overseas branches, 17.4 percent did contract manufacturing for overseas customers, and 12.7 percent did contract R&D for overseas firms.

Table 9- Modes of Operation of Small High-Technology Firms	
Mode of operation	% of firms using the mode in first 10 years
Imports from overseas-based suppliers	57.3
Export through foreign-based agent/distributor	46.5
Export through domestic-based intermediary	32.4
Contract manufacturing at home country for overseas firms	30.5
Distribution of imports in the domestic market	29.1
Cross-border cooperative R&D project	23.5
Contract R&D for overseas firms	21.6
Technology service/consultancy performed overseas	19.2
Export through company representatives/branches overseas	18.3
Source: Jones 2001	

During the first 10 years after inception (Table 9), 57.3 percent had imported from overseas-based supplier, 46.5 percent used export through foreign-based agent/distributor, 32.4 percent exported through a domestic-based intermediary, and 18.3 percent exported through company representatives/overseas branches (see table 9). Overall trade-related activities were found to predominate, closely followed by contract manufacturing (Jones, 2001). According to the data, firms that used export through domestic-based intermediary started exporting 5.9 years on average from inception (see Table 10). Firms that exported through foreign-based agent/distributor started on average 6 years after inception. Imports from overseas-based suppliers started, on average, 6.4 years after inception and contract R&D from overseas firms started on average 7.2 years after inception (Jones, 2001).

Table 10– Time of Use of Modes of Operation by Small High-Technology Firms

Mode of operation	Mean years
Export through domestic-based intermediary	5.9
Export through foreign-based agent/distributor	6.0
Imports from overseas-based suppliers	6.4
Contract R&D for overseas firms	7.2
Cross-border cooperative R&D project	7.5
Technology service/consultancy performed overseas	8.2
Source: (Jones, 2001)	

Formal cross-border cooperative agreement has been carried out by few of the firms studied. The most commonly used cooperative agreement was a distribution agreement with suppliers of complimentary products, which was used by 17.8 percent of the firms. However, companies using these formal cooperative modes have tended to do so at a relatively early stage, 4.6-6.9 years after inception on average (Jones, 2001).

Jones examined the first foreign operation mode used by the firms and found that 52 percent of the companies established more than one foreign mode of operation in their first step of internationalization. 90.2 percent of the firms had a marketing/distribution foreign link in their first stage of internationalization. Only 9.7 percent of the firms had a combination of foreign operation modes that did not include marketing / distribution in their first internationalization stage.

Roberts & Santuria (1996), following the behavioral school’s stages approach, found that firms started their international activities in different initial modes, but then tended to progress to the following modes. The first mode was reliance on third party experts (exports via third-party trading company). However, only three of the 19 companies in the study started in this initial internationalization mode. All the companies that started in this mode reached no more than 10 percent foreign revenues while operating in this mode. The second initial mode was reactive home-based support for overseas distribution activities, in which firms were typically solicited by overseas distribution partners and agreed to supply them in a limited support arrangement. All three companies that started in the first mode moved to this more

advanced mode and five of the 19 companies entered global activities in this mode. The third mode was active home-based management of distribution activities. This mode originates from the internal influence of the management, which identified foreign activities as worthy of internal resource allocation. 11 of the 19 companies had started their international operations in this mode. The products supported by this global strategy tended to be higher priced and more complex. All the 8 companies that operated in the second mode (3 of them originally started in the first mode) later moved to this more advanced mode. The fourth mode identified was local management/ownership of overseas distribution activities. Even the most aggressive companies did not enter this advanced mode before reaching 10 percent of their revenues from foreign markets. 12 of the 19 companies eventually reached this mode. The most advanced mode identified was direct global investment in other value-chain activities. Only 2 of the 19 firms invested in foreign production subsidiaries. Roberts & Senturia concluded that unique aspects of one high-technology industry, desktop hardware and software, result in a rapid globalization pattern which in general does not lead to the establishment of production subsidiaries. This pattern is inconsistent with traditional internationalization models (Roberts & Senturia, 1996).

As to entry modes, Bell's study found that firms developing standard "off the shelf" software packages were more likely to appoint agents or distributors in the markets, while firms developing software packages that must be customized rely, almost exclusively, on their own export sales staff to deal with end-users. In some cases the relationships with hardware manufacturers and the software developers enabled the software firms to use the existing distribution channels of the hardware firms. Large hardware manufacturers were happy to assist small software firms with their distribution as it improved their ability to offer their own customers a "total solution" and by this increasing the value of their own products. Relatively few firms established overseas subsidiaries and, where these existed, they were typically sales and marketing operations. Only a few cases of licensing or joint ventures were found. Products were generally targeted at industrial (Business to Business) rather than consumer markets leading to preference of exporting as the preferred entry mode. The decision to export was also influenced by the relatively short product life cycle of many software products. The need for extensive customer support led to close interaction between the software developers and their customers (Bell, 1995).

A study of Israeli knowledge-intensive Born Globals (see table 11) found that on average 18-31 percent of sales revenues (depending on industry) are allocated to marketing and sales activities while 13-18 percent, on average, are allocated to R&D activities (Hashai & Almor, 2003). An earlier study of Israeli knowledge-intensive SMEs found that R&D, marketing & sales, and after sales services are significantly more frequently performed internally than production (Hashai & Almor, 2001). The same research also found that R&D was located in the home country significantly more frequently than marketing & sales, and after sales services. Marketing & sales, and after sales services were located outside the home country significantly more frequently than R&D (Hashai & Almor, 2001).

Table 11- Israel Industry comparison of median values of variables in 1997

Industry:	<i>Electronics (n=12)</i>	<i>Telecom. (n=8)</i>	<i>Software (n=18)</i>	<i>Total (n=41)*</i>
General data:				
Initial IPO	1994	1996	1994	1994
Year established	1989	1988	1987	1987
# of employees	191	241	269	239
Sales M USD	63.2	36.0	34.2	41.0
% of public ownership	35	37	36	38
Company value M USD	152.0	148.0	114.5	130.0
Value/employee K USD	350.9	457.3	505.7	466.1
Financial ratios:				
Profit in %	3	0	11	9
ROE in %	6	0	13	6
Current ratio	3.6	4.9	3.5	4.3
LT debt to equity	.48	.24	.29	.30
R&D/sales in %	13	18	17	16
R&D/employee in %	7	11	8	8
Marketing / sales in %	25	18	31	25

*Total includes 3 companies classified as "other industries".

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2.5.5 Strategy

One important factor in choosing how to compete in the global arena is clearly the limited and relatively few resources possessed by Born Globals. These small limited resources can explain why Born Global firms tend to internalize a smaller percentage of the resources essential to their survival than do mature organizations and why entrepreneurs must rely on hybrid structures for controlling many vital assets (Oviatt & McDougall, 1994). The small size of the firm also affects the firm's choice of customers. Aharoni found that small businesses are at their best when they sell to a small number of sophisticated customers who buy quality, or to customers who demand frequent changes to a specialized product and are willing to pay a price premium (Aharoni, 1994).

Kohn found that SMEs investing in foreign markets followed a "deep niche" strategy. These firms had a position of market dominance and technological leadership and focused on producer goods (goods for the enterprise customer segment and not the consumer customer segment). These firms, while small in absolute terms, can be large and industry leaders within their industries as they tend to originate in emerging industries. These firms face the risk that their technology will be copied or that new developments will make the technology obsolete. They aim to gain first-mover advantages that will give them the leadership advantage in the emerging and unstructured industry. Kohn claimed that the tendency to focus on producer (industrial) goods is linked to the limited resources of small firms. Only large firms, according to Kohn, are able to absorb the costs of making the product and marketing modifications necessary in consumer products adaptation to local markets. Small firms investing in foreign markets tend to be technology-intensive and rely on R&D-based technological advantages (Kohn, 1997).

The study of technology-intensive SMEs, by Lindell and Karagozoglu, identified three organizational responses to tough international competition, both in the US and Scandinavia: (1) closer customer relations, (2) long-term relationships with suppliers, and (3) international cooperative agreements and alliances. Internally, the SMEs developed their technological strategies and quality control programs and improved management skills. The impact of global competition on the R&D activities of

technology-intensive SMEs had three major factors: (1) shorter times to develop new product, (2) a larger number of new product introductions, and (3) emphasis on higher R&D efficiency. An interesting finding of the study was that on the R&D level, only a little over half of the firms in the study had established foreign or domestic alliances. The suggested explanation was that technology-intensive firms had a niche, global and focused orientation from their inception. These firms know their markets, customers and competitors. The results also suggested that strategies of technology-intensive SMEs in the US and Scandinavia were similar (Lindell & Karagozoglu, 1997)

A study of 59 Finnish electronic firms (Autio, Sapienza, & Almeida, 2000) found that the earlier in their development that firms ventured into international competition and the greater their knowledge intensity, the more rapidly they grew internationally. The researchers suggest that new firms are more flexible and can rapidly learn the competencies necessary to achieve high growth in foreign markets. According to this view the survival and success of born-global firms may be explained by their ability to adapt to and innovate more rapidly in new and dynamic environments. The research also suggests that firms with highly imitable products or knowledge base may be motivated to increase sales rapidly in order to cash in before advantage is eroded. However, the researchers also note that early internationalizing firms have much higher rates of mortality than those of older firms that underwent similar changes.

2.6 Industrial Market Segmentation

The segmentation of industrial markets has received considerably less attention in literature than the segmentation of consumer markets (Sudharshan & Winter, 1998; Verhallen, Frambach, & Prabhu, 1998). Literature on segmentation in industrial markets discusses the questions to be asked to prepare the segmentation, suggests segmentation criteria, and offers mathematical tools. Perhaps the most dominant models in industrial marketing are the “nested approach” (Shapiro & Bonoma, 1987) and the two-level method which mixes macro and micro segmentation (Frank,

Massy, & Wind, 1972; Wind & Cardozo, 1974). The “nested approach” suggests starting with easier criteria and finishing with the most difficult to obtain:

- (a) Environment criteria – activity, size, geographic location.
- (b) Exploitation criteria – client technology, type of product bought, experience.
- (c) Purchasing criteria – purchasing organization, purchasing strategy.
- (d) Circumstance criteria – order urgency, quantity.
- (e) Personal features of the decision maker.

The two level method starts with the macro-segments (size, activity, geographical location, etc.). One or more macro-segments are selected according to their advantages and micro-segments are identified inside these macro-segments. In addition to this well-known literature there are several models using one or more of the following bases for segmentation (Millier, 2000):

- Geographical segmentation
- Demographic segmentation
- Psychographic segmentation
- Behavioral segmentation
- Segmentation by opportunity of purchase
- Segmentation by circumstance of use
- Segmentation by rate of use
- Segmentation by rate of fidelity

3 Research Methodology

3.1 Epistemology, Ontology and the Researcher

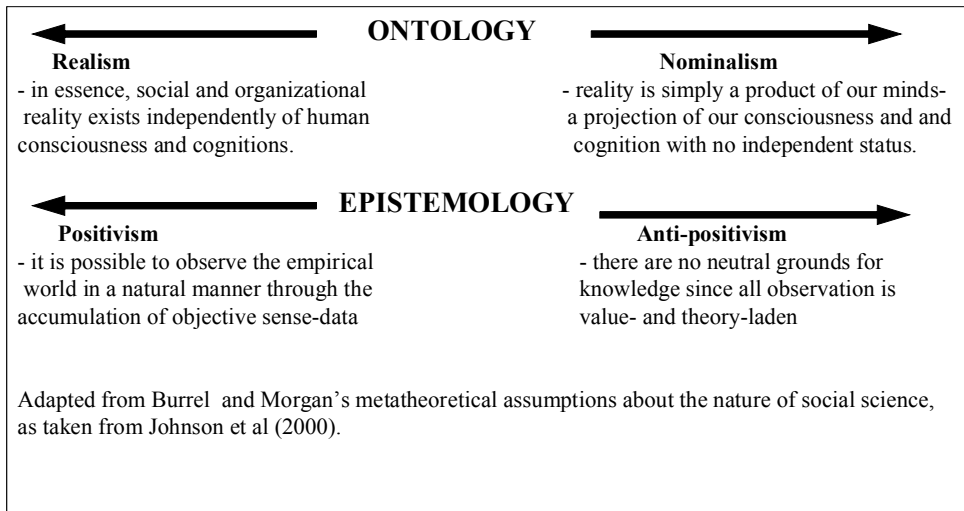
In social studies, common-sense as well as the expert knowledge of both the researcher himself and those of his objects are invaluable resources. The historical roots of this view can be found in Aristotle's concept of endoxa (derived from the Greek word 'doxa' meaning opinion). For Aristotle, Endoxa contains both common-sense opinions and knowledge obtained by the researcher (Kakkuri-Knuuttila, 1997). According to Glaser and Strauss (1967), the researcher can get and develop crucial insights not only during and from his research, but also from his personal experience prior to or outside it (Glaser & Strauss, 1967).

The relationship between subject and researcher is an indicator of the ontological and epistemological assumptions on which a given study is based (Johnson & Duberley, 2000). Ontology (derived from the Greek words 'ontos', being, and 'logos', theory or knowledge) is the assumptions the researcher makes about the world. The researcher ontological assumptions can be:

- (a) Subjectivism/Nominalism- the object of investigation is the product of consciousness. What we take to be external social and natural reality is merely a creation of our consciousness and cognitions.
- (b) Realism - the object of investigation exists independently of our cognitive structure.

Epistemology refers to our grounds to knowledge (Ramenyi, Williams, Money, & Swartz, 1998). The word epistemology derives from two Greek words. 'Episteme' in Greek means knowledge or science, and 'logos' means knowledge, information, or theory. Epistemology can include ways of knowing about the world –the nature, origins, and scope of knowledge, as well as its claims to reliability. Epistemology is the study of the criteria by which we can know what does and does not constitute scientific knowledge (Johnson & Duberley, 2000).

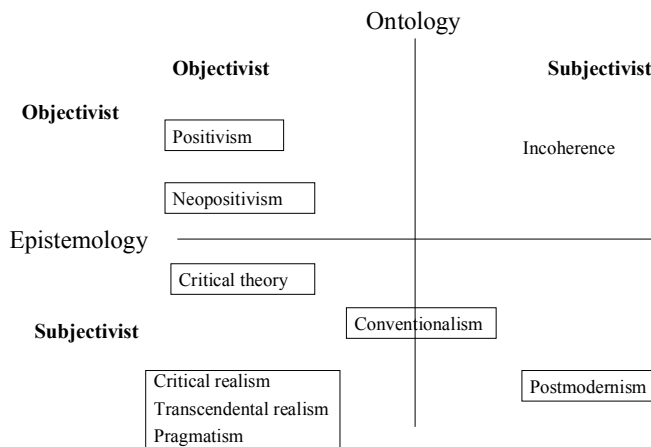
Figure 5 - Ontology and Epistemology



I see myself as a transcendental realist. This means that I think that “*social phenomena exists not only in the mind but also in the objective world- and that some lawful and reasonably stable relationships are to be found among them*” (Miles & Huberman, 1994). Reality is constituted not only by events, and our experience or perception of these events, but also by structures, mechanisms, powers, and tendencies. Regularities and sequences that link together phenomena can be identified and from these patterns it is possible to derive constructs that lie beneath individual and social life. Most of these constructs are invisible to the human eye; nevertheless, they lie beneath actual events and govern or produce them. According to Dobson research aiming at explanation implies that there is an underlying truth that is open to explanation and thus suggests a realist stance on the part of the researcher (Dobson, 2001). Miles and Huberman (1994) describe the transcendental realism approach to qualitative research as incorporating an interpretive element: “*We agree with interpretivists who point out that knowledge is a social and historical product and that “facts” come to us laden with theory. We affirm the existence and importance of the subjective, the phenomenological, the meaning-making at the center of social life. Our aim is to register and “transcend” these processes by building theories to account for a real world that is both bounded and perceptually laden, and to test these theories in our various disciplines.*” (Miles & Huberman, 1994).

Transcendental realism contains ontological objective (realism) and epistemological subjective (anti-positivist) assumptions (Johnson & Duberley, 2000). The case study method used in this research is a research tactic for the social scientist as experiments are for the natural scientist (Ramenyi, Williams, Money, & Swartz, 1998). Because of the flexible nature of case studies, they may be almost entirely positivistic or almost entirely phenomenological study or anything between.

Figure 6 - Transcendental Realism



My own personal experience as an entrepreneur started upon my release from the Israeli Defense Force with the establishment of a swimming school that operated during the summer time. During my studies in Tel-Aviv University, I established a PC sales business and upon graduation I established 'Atlantis Software Ltd', which was a born international firm. The idea behind the establishment of the company was to develop, manufacture, and market educational software, mainly for children and home use, for the European market. At the time (1989), there were over 100 educational PC software programs for children sold in Israel and very few such programs, if at all, sold in Europe. As soon as I identified this business opportunity I started to study the subject. This was a considerable challenge. I had just completed my studies, so I had no real money. There were at least three established Israeli companies in Israel in this field at the time. All three companies have been generating income from domestic sales and had been attempting in one way or another to enter European markets. As

for myself, I had very little interest in the Israeli domestic market, as it was very small. The investment in developing software for Europe or for the domestic market is similar, as the only additional costs are of translation of the software to the different European languages. As each language opened a new market, these additional costs were considered to be very small. Within a year 'Atantis Software Ltd.' was selling in Holland, Sweden, Germany, and Israel. The marketing and manufacturing was moved to Europe. The motivation behind moving the marketing and manufacturing to Europe was to avoid the European sensitivity concerning Israeli companies. R&D activity remained in Israel. In the second year, sales were also started in Norway and Finland. From the first year of operations, less than 10 percent of our sales were in Israel. Since 1989, I have been involved in international business in my own companies.

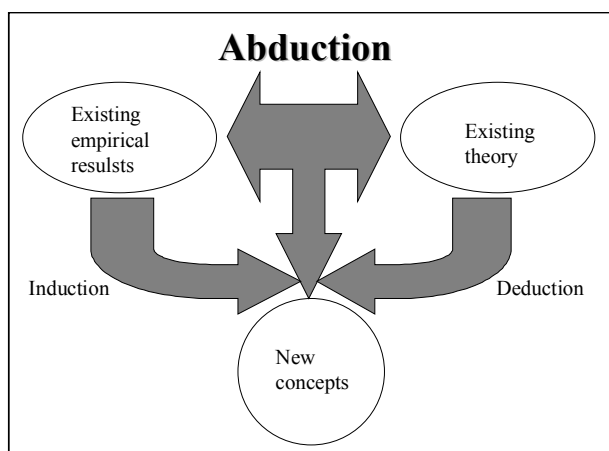
My experience as a founder of a technology-intensive born international helped me in my research. I had a working knowledge of the language of the entrepreneurs that founded these companies and an understanding of the entrepreneurship culture. I had experience in targeting and entering new foreign markets and in management of an international technology-intensive start-up. The difficulty was the pre-conditioned judgment that my working experience imposed. I took into account that these companies might be different from my own born international. I was aware that these companies become global and made an IPO (Initial Public Offering), while my company failed to become global and did not make an IPO. The possibility of a start-up raising money in a stock exchange was relatively unknown in Israel in 1989. Exposure to a wide range of theory also served to overcome the difficulty imposed by my working experience. The fact that I was just starting my career as a researcher meant that I was not locked into any specific theory, which enabled me to expose myself to a wide range of theory in the area of Born Globals, internationalization, globalization and entrepreneurship.

3.2 Abductive Reasoning

Deductive approaches are concerned with developing propositions from current theory and making them testable in the real world. In inductive approaches, theory is systematically generated from data. The abductive approach suggests constant

movement between data and ideas, which enables the creation of analytic ideas (Coffey & Atkinson, 1996). By constantly going 'back and forth' from one type of research activity to another and between empirical observations and theory, the researcher is able to expand his understanding of both theory and empirical phenomena. The confrontation of theory with the empirical world is more or less continuous throughout the research process. An abductive approach is fruitful if the researcher's objective is to discover new things. Similar to 'grounded theory', the main concern, in the abductive approach, is related to the generation of new concepts and development of theoretical models, rather than confirmation of existing theory. The comparative method developed for grounded theory relies on continuous comparison of data and theory beginning with data collection (Glaser & Strauss, 1967; Strauss, 1987).

Figure 7 - Abduction



During this study I have been constantly moving between data, data analysis, and theory. Upon starting my research and formulating my research questions and objectives, I familiarized myself with the relevant literature on the topic. During this initial stage I decided not to tie myself to any specific theory. I chose to start generating ideas from the data and then return to existing theory. Each data collection event (e.g. interview, receiving of annual reports) was followed by analysis and going back to the theory. I found this process to best fit my study, as my aim was to

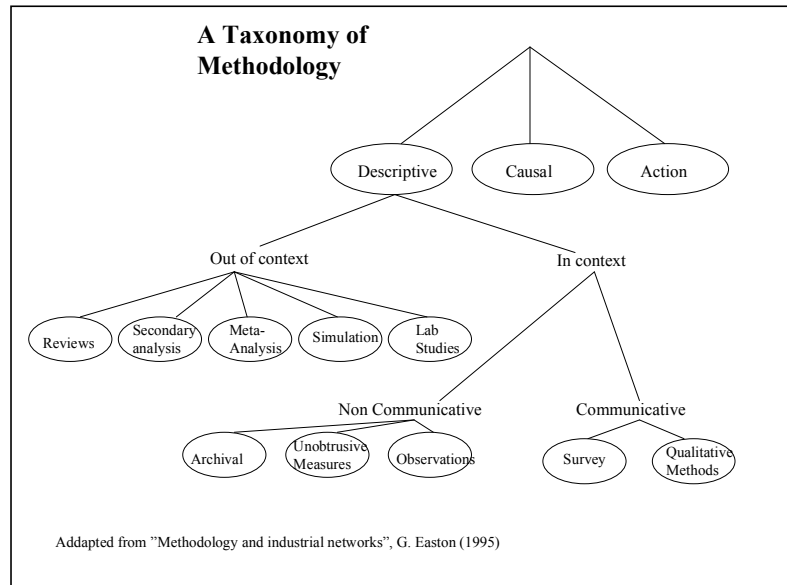
generate new concepts. This activity of constantly moving between empirical findings and theory is best described by the concept of abductive reasoning.

3.3 Taxonomy of Methodologies

Using the taxonomy of methodologies suggested by Geoffrey Easton (Easton, 1995) the first step is to choose between three different types of methodologies: action, causal, and descriptive research. Causal research has the objective of explanation and assigning causality. This type of research is clearly linked to the positivist approach. Action research has the goal of changing the phenomena under study. Taking into account the subject of this research, it is hard to see how this methodology could be used towards achieving the aims of this research. Descriptive methodologies are those that do not attempt to ascribe causality, but are concerned with understanding, comprehension, and illumination. This approach is clearly linked to a realist or constructivist epistemology. By positioning myself as a transcendental realist and taking into account that my aim in this study is not to assign causality but rather to understand and illuminate the Born Global phenomenon the choice of descriptive methodology seems natural and justified.

In the next step, the researcher has to decide if the phenomenon can be studied usefully outside its natural context. In the case of this research the unit of analysis is the case firms. Organizations cannot literally be taken out of their existing setting (Easton, 1995). The influences of external factors such as industry characteristics, globalization of markets, domestic country characteristics, and others cannot be ignored. This leads to the conclusion that the Born Global phenomena cannot be researched out of context.

Figure 8 - Taxonomy of Methodology



Having decided that the phenomena should be researched in its natural context the next and third step is to decide on a communication or non-communicative methodology. The non-communicative methods include archival research and observations of which respondents are not generally aware. These methods do not seem to be sufficient for this study. While archival research was one of the methods used in this research, it is simply not possible to get all the information needed by using only this method. In all cases there were limited materials available on the first years in the firms' life. In addition, insights about the motivation and reasons for certain strategies and action could not be obtained by archival research. The use of observation was not possible because the events researched have already occurred. The use of observation would require that the researcher take part in top management meeting over a period of a few years, starting from establishment of the firm. There are considerable difficulties in such an approach. The first difficulty is that it is not likely that the presence of an observer would be noticed and not regarded as a commonplace. An additional problem is the selection of the companies. At the stage of establishment the researcher has no way of knowing which firms will become Born Global and which firms will fail to become global or even cease to exist. The only possibility will be to select firms that have a Born Global orientation from the start.

There is also a limit on the number of firms a study can observe during the same period. The period of time required for the empirical research using observation on this topic will be in years, probably at least five years.

The conclusion is then that communicative methodologies are needed which leaves us with the options of surveys or qualitative methods. The use of a survey was rejected for several reasons and qualitative research using case studies as a method was chosen. The study of 98 small software firms from Finland, Ireland, and Norway (Bell, 1995) illustrates the need for qualitative research. Although the quantitative data from the mail surveys seemed to support the notion of “psychic distance”, the qualitative information obtained during the in-depth interviews indicated that (1) reactive and opportunistic exporting preceded any planned activities, and (2) market selection decisions of small software firms were not necessarily influenced by psychic factors.

In addition, my own experience as an international entrepreneur and my knowledge of technology-intensive Born Global firms suggested to me that the founders and top-management of these companies are busy men and women, who dislike paper work. This was indeed confirmed when first attempting to use a questionnaire identical to the one used in a previous Finnish research in order to facilitate the possibility of comparison. Unfortunately, the first founder to see the questionnaire dropped out of the research. Other candidates were also not enthusiastic about filling in a questionnaire and the method was quickly ruled out.

3.4 Case study versus other research methods

Multi-case, comparative, study research based on longitudinal analysis was selected as the methodological approach. Case study methodology is usually considered to be most appropriate in the early stages of research (Eisenhardt, 1989), which is clearly the state of research on Born Global firms. The amount of research on the Born Global phenomenon has been growing since 1994. However, the globalization process of Born Global firms, particularly regarding the product, operation, and market strategies, has not been substantially researched. A strength of this method is the

likelihood of it resulting in a new theory (Eisenhardt, 1989), and it is particularly recommended when trying to answer “how” and “why” questions about contemporary events over which control can not be achieved (Yin, 1994). This situation described by Yin closely fits this research. The research aims to study the questions of ‘how can technology-intensive Born Globals, with relatively limited resources, rapidly globalize their operations from inception?’ and ‘why do Born Global start-ups choose a global strategy from inception?’ Clearly no control over the globalization process of the firms in the study could have been achieved.

Many researchers have presented criticism of case study research methodology. The greatest concerns have been over the lack of rigor, the possibilities for scientific generalization, and massive unreadable documents as a result. These common concerns can be allayed by closely following the guidelines presented by Yin (Yin, 1994) and Eisenhardt (Eisenhardt, 1989). Special attention has been paid to the research design in order to avoid these problems.

Table 12 - Relevant situations for different research studies (Yin, 1994)

Strategy	Form of research question	Requires control over behavioral events?	Focuses on contemporary events?
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival analysis	Who, what, where, how many, how much	No	Yes/no
History	How, why	No	No
Case study	How, why	No	Yes

According to Glaser and Strauss (Glaser & Strauss, 1967) building a conceptual framework based on earlier literature and studies is unnecessary and not even recommended. As recommended by Eisenhardt, I have attempted to begin the research with no theory under consideration and no hypothesis to test (Eisenhardt, 1989). Literature on the research subject, however, was reviewed in order to familiarize myself with current research on the subject. However no theoretical

perspective was chosen prior to the empirical research. It was important to start the research without a preordained theoretical perspective or proposition in order to avoid possible bias and limiting of the findings.

Multiple-case study design was chosen, as the evidence from multiple cases is often considered more compelling mainly because it offers an opportunity to follow replication logic. Each case is carefully selected so that it either (a) predicts similar results (a literal replication) or (b) produces contrasting results but for the predictable reasons (a theoretical replication). The multiple cases also offer the researcher a deeper understanding of the researched phenomenon than a single case. Five cases have been chosen as empirical grounding of findings would not have been very convincing with fewer than 4 cases and with more than 10 cases the complexity and volume of the data could have been overwhelming (Eisenhardt, 1989).

3.5 Data Collection and Analysis

The data collection and analysis was carried out in two stages. During the first stage, two companies were researched. These first cases have been used as pilot cases and helped to refine the data collection plans. The second stage carried out approximately six months later included three additional companies. The method of investigation included analysis of multiple sources of evidence: (1) personal interviews with founders and top management, (2) e-mail interviews, (3) press articles, (4) press releases, (5) annual reports, (6) marketing materials, (7) company Internet sites, and (8) other Internet sites and databases.

Semi-structured personal interviews have been recorded and later transcribed. For backup reasons, some notes have been taken during the interviews. Founders and top executives have been asked about the reasons for establishing the new venture, the background of the founders, the firm's decision to enter foreign markets, the reasons behind the decisions, and the process of foreign market entry. To reduce the risk of informant bias, interviews were made with more than one manager in each firm.

The data gathering and analysis was based on the widely accepted literature on case study methodology as written by Yin (Yin, 1994) and Eisenhardt (Eisenhardt, 1989).

As presented by Eisenhardt (Eisenhardt, 1989), the data gathering and analysis process used in this study can be divided to the following steps:

- a) Getting started phase: the initial posing of the research questions was made and important constructs have been identified (e.g. different market entry strategies). Literature was reviewed on internationalization theories, Born Global research, and globalization of technology-intensive firms. The purpose of the literature review was to acquaint myself with the relevant literature. However, no theoretical framework was chosen.
- b) Selecting the case: cases were chosen for theoretical, not statistical, reasons. The selection of the case companies was based on the logic of theoretical sampling following replication logic (literal and theoretical). The theoretical sampling originated to a large extent from the work of Glaser and Strauss (Glaser & Strauss, 1967). Theoretical sampling, according to Yin (Yin, 1994), is based on replication logic. Each case is carefully selected so that it either (a) predicts similar results (literal replication), or (b) produces contrary results, but for predictable reasons (theoretical replication). According to Eisenhardt (Eisenhardt, 1989), the goal of theoretical sampling should be to choose cases that are likely to replicate or extend the emergent theory. It makes sense, according to Eisenhardt (Eisenhardt, 1989), to choose cases such as extreme situations and polar types. The selected cases were all telecommunication firms, which provided a good base for replicating the findings. Within the telecommunication industry extreme different types of companies were selected as suggested by Eisenhardt (Eisenhardt, 1989). As there are no directories or public available resources to identify Born Global firms (McDougall, Shane, & Oviatt, 1994), the list of Israeli firms that were traded in foreign stock exchanges during the year 2001 was used in order to identify Israeli technology-intensive Born Global firms. An updated list of all Israeli companies listed in foreign stock exchanges in 2003 is provided in appendix 3. The cases have been selected from a predefined population (technology-intensive Israeli Born Global firms traded in foreign stock exchanges), which helps to define the limits for generalizing the findings (Eisenhardt, 1989). From the 145 Israeli companies traded in foreign stock exchanges approximately 60 were identified as technology-intensive Born Globals. Though the total number of technology-intensive Born Globals of these 145

companies is probably higher, it was sufficient for the purposes of this study to identify only 60 firms. Approximately 30 companies were selected and approached. The selection criteria were as follows:

- 1) Registered on the NASDAQ or various EU stock exchanges.
- 2) Technology-intensive: invest 5% or more in R&D
- 3) Established not earlier than 1989.
- 4) Not subsidiaries or divisions or greenfields or joint ventures of larger companies.
- 5) Have operations outside the domestic continent, in at least two other continents.
- 6) Generated over 75% of their sales from foreign markets.
- 7) Started exporting within 2 years of their establishment.

* The criteria for sales share outside the domestic continent do not apply to the Israeli companies. Due to the location and special situation of Israel, all the firms obtain more than 90 percent of their revenues from outside the domestic continent.

c) Data collection methods design: use of multiple data collection methods makes triangulation possible and enhances the confidence in the findings (Eisenhardt, 1989). The data collection protocol was as follows:

- 1) Perform information search from secondary sources: Internet sites, university databases, annual reports, newspaper articles, company printed materials, and other written sources.
- 2) Preparation of general case study questions making use of information collected from secondary data sources
- 3) Conducting semi-structured interviews. Each interview to be recorded and later transcribed. For safety reasons notes of key points also to be taken during the interview.

d) Entering the field - as recommended by Eisenhardt (Eisenhardt, 1989), the data collection and analysis were not isolated activities. Data collection and analysis were carried out simultaneously over a period of approximately one year. The freedom to make adjustments during the data collection process is a key feature of theory-building case research (Eisenhardt, 1989). During the data collection process and analysis I found that adjustments to the interview protocol were indeed required. When important sources of information were

located outside of Israel, e-mail interviews were conducted. E-mail was also used as a follow-up to interviews when needed. Interviews were carried out mainly in Hebrew. One personal interview and the e-mail interviews were conducted in English. Interviews were tape recorded and later transcribed. Important points were written down as field notes.

- e) Analyzing within-case data – a detailed case study was written for each firm. These write ups served to make the researcher more familiar with each case and as basis for the next phase. Each case study was sent to the case firms for comments.
- f) Cross-case analysis: categories and dimensions were selected and then looked for across the cases. This cross-case searching tactic forces the researcher to go beyond the initial impressions and improve the likelihood of accurate and reliable theory. This process began simultaneously with the data collection, continued through the write ups of the single cases and ended approximately nine months after the data collection was completed.
- g) Developing a theoretical framework that fits the data. In replication logic, cases, which confirm the theoretical framework, enhance confidence in its validity. This process was carried out simultaneously with the previous phase of cross-case analysis. During this process the original conceptual framework has evolved.
- h) Comparing the findings to existing literature.

3.6 Unit of Analysis

Defining what is the “case” is an important case study design element. As suggested by Yin (1989), the unit of analysis will be defined through (1) general definition, (2) persons included, (3) geographic area, and (4) time boundaries.

General definition: the unit of analysis is the 5 cases of Israeli technology-intensive Born Global firms selected for this research: Emblaze Systems Ltd (established 1994), VocalTec Communication Ltd. (established in 1989), BATM Advance Communications Ltd. (established in 1992), Orckit Communications Ltd. (established in 1990), and VCON Telecommunications Ltd. (established in 1993).

Persons included: since the research aims at understanding the longitudinal globalization process and strategies of the case companies the persons included in the research were the founders and top management.

Geographic area: Since the globalization process and strategies are the focus of study there was no place to limit the geographic focus.

Time Boundaries: Each case starts at the time of establishment of the firm and ends at the situation at the time of the research. Thus, for the multiple-case study the time frame ranges from 1989 to 2002.

3.7 Case Study Protocol

A case study protocol is essential when using a multiple-case study. The protocol increases the reliability of the research and guides the investigator in carrying out the research (Yin, 1994). According to the guidelines presented by Yin (1994), a protocol including the following sections was prepared:

- a) An overview of the case study project: the overview included the research objectives and questions, and relevant readings on (1) technology-intensive Born Globals, (2) Israeli technology-intensive start-up, and (3) Israeli high-tech industry.
- b) Field procedures: An introduction letter, with an additional page printed by the Academy of Finland on the Born Global research project and the LIIKE program, with the request for an interview was prepared. Helsinki School of Economics, the Academy of Finland, and Tekes (The National Technology Agency in Finland) were used as credentials. The letter of introduction with the Academy of Finland page was sent to all suitable candidates (founders, CEOs, and top management). General sources of information were identified and information was collected on the case companies prior to entering the field. The information was collected through Internet sites, annual reports, articles in the press, and press releases. During the process, permission to use the Tel-Aviv University, Faculty of Management, databases was granted.

- c) The case study questions were developed based on the questionnaire used in the Finnish FIBO research. As interview candidates seemed to be unwilling to fill in the questionnaire before the interview the following tactic was used: (1) data gathered prior to the interviews was used to answer some of the questions; (2) issues not covered by the collected information were put in the form of specific questions to each company. In order to avoid steering the discussion with overly rigid questions, the questions were semi-structured and treated as tentative. During the interview, questions could be reformulated or modified and additional sub-questions added; (3) Potential sources of information for answering each question in each company were identified, including candidates for interviews and other data that can be provided by the companies (e.g. annual reports, marketing materials, and press releases); (4) The issue of the founders' background, which was not included in the Finnish research, was added. During the empirical work the issues of financing, marketing, and competitive edges were also added.
- d) A guide for the case study report: the outline of the report, format of narrative, and bibliographical information. The audience was identified as from both the scientific society, including the examiners of the doctoral study, and business management. Single case reports were to be included.

3.8 Validity and Reliability of Case Study research

A set of logical tests, as described by Yin (1989), will be used to deal with the issue of validity and reliability of the research:

Construct validity: establishing correct operational measures for the concepts being studied. As suggested by Yin (1989), three tactics have been used to increase construct validity: (a) using multiple sources of evidence, (b) chain of evidence, and (c) draft case study report reviewed by key informants. Attention has also been given to the definitions in this study. Terms such as 'global', 'Born Global', and 'technology-intensive' can have different definitions. Technology intensity, as an example, can be measured by the percent of R&D investment of total sales-turnover as was used in this study (Almor & Hashai, 2001; Lindell & Karagozoglu, 1997). An

alternative approach is to measure the reputation of the firm, technological excellence, the knowledge embedded in its products and services, and the global rating of knowledge intensity according to management ratings (Autio, Sapienza, & Almeida, 2000).

Internal validity: Internal validity refers to the establishment of causal relationship (Yin, 1994) and the credibility of the research- do the findings of the study make sense? (Miles & Huberman, 1994). Since the research focuses on events that cannot be directly observed, there is a need to check whether all possibilities and explanations have been taken into account, all the evidence is convergent and the explanation offered is air-tight. Two tactics, as suggested by Yin, have been used for this purpose: (a) explanation building and (b) pattern-matching. Explanation building analyzes case study data by building an explanation about the case. Pattern matching compares empirically based patterns with predicted patterns (Yin, 1994).

External Validity: This deals with establishing whether the research findings can be generalized. Case study research relies on analytical generalization (Yin, 1994). The external validity of this study has been tested through replication of the findings of the five case studies. In addition sufficient detailed description of the cases has been provided. The external validity was also enhanced by comparing the findings with existing literature and research results (Eisenhardt, 1989; Miles & Huberman, 1994).

Reliability: The reliability means that the operations of the study, such as data collection procedures, can be repeated with the same results (Yin, 1994). In order to minimize the errors and biases in the study, all procedures of the study were documented, a case study protocol was used, and a case study database was created.

4 Conceptual Framework

Based on the literature review, a conceptual holistic framework has been developed (figure 10). As recommended by Eisenhardt, the data collection and analysis were not isolated activities (Eisenhardt, 1989). Thus the conceptual framework has evolved during the process of data collection and analysis. The framework consists of four groups of factors which influence the globalization strategies of technology-intensive Born Globals: meso factors - industry factors, macro factors - country factors, micro factors - company factors, and milli-micro factors - the founders' factors. It is the stand of this study that a holistic view consisting of all these factors is needed in order to provide a comprehensive explanation of the early rapid globalization process of technology-intensive Born Globals. The holistic view will be utilized to present:

- 1) a framework for explaining the factors behind the early rapid globalization process of technology-intensive Born Globals (figure 9).
- 2) a conceptual framework for explaining the globalization strategies (POM strategies) of technology-intensive Born Globals (figure 10).

4.1.1 Factors behind the early rapid globalization of technology-intensive Born Globals

Building on Luostarinen's Pull-Push diagram and his internationalization-factors model (Luostarinen, 1994), a framework to explain the factors behind the early rapid globalization of technology-intensive Born Globals has been developed (figure 9). The new framework includes: meso factors, macro factors, micro factors, and milli-micro factors.

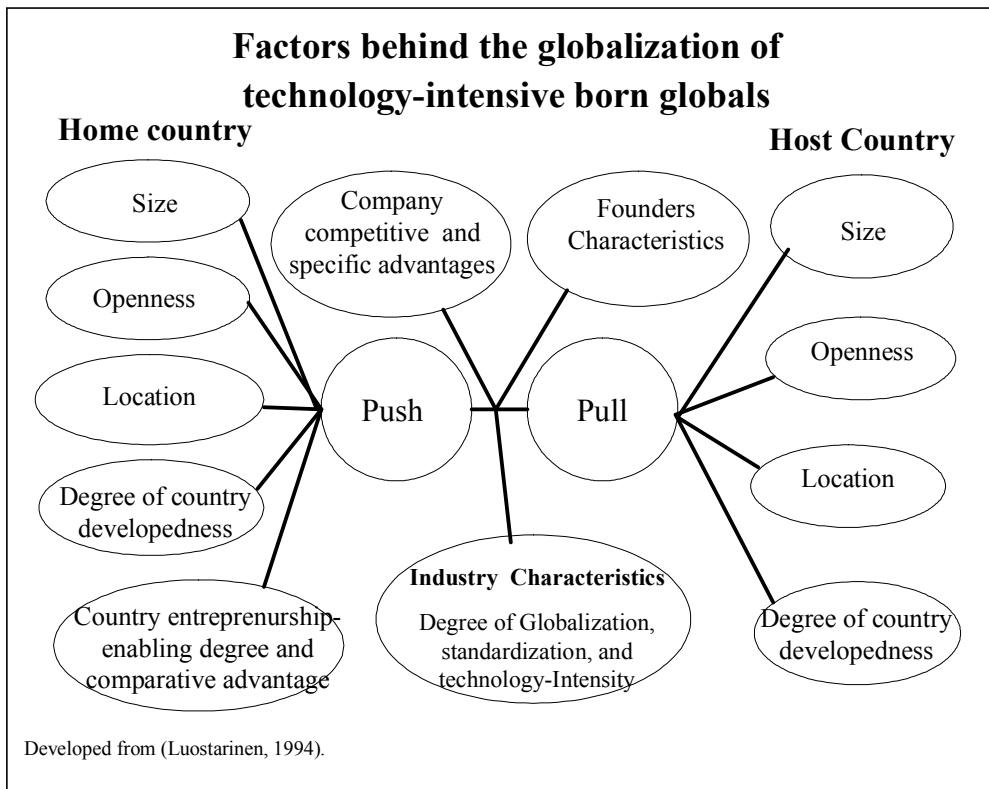
The meso factors consist of the industry characteristics including technology intensity, degree of standardization, and degree of globalization. As explained in sub chapter 2.5, these factors clearly influence the globalization process of technology-intensive Born Globals and thus must be taken into account. *“People do not make decisions to exploit entrepreneurial opportunities in a vacuum. Rather, they are influenced by the industry context in which they operate.”*(Shane, 2003 – chapter 6). *“The research and development intensity of an industry should enhance opportunities*

for new firms to be used to exploit opportunities because the knowledge that makes entrepreneurial opportunities possible is often generated through research and development activities.” (Shane, 2003 – chapter 6). A longitudinal study of 1,053 new ventures, representative of all industry sectors and geographical regions, found that some industries appear more supportive of new venture growth than other industries (Cooper, Gimeno-Gascon, & Woo, 1994).

The macro factors for both home and host countries include: (1) size, (2) openness, (3) degree of developedness, and (4) location. For the home country, additional factors have been added: an entrepreneurship-enabling environment, and comparative advantage. The smaller and more open a home country is the stronger the push forces on domestic companies to enter foreign markets. The bigger and more open a target country is the stronger the pull forces on the foreign firm to enter the country (Luostarinen, 1994). The one factor that seems to have been neglected is the degree of developedness of both home and host countries. The degree of developedness is directly connected to the market size. The less developed a home country is the smaller the home market is for certain products. A large developing country can have a small market for some technology-intensive products. Thus, regardless of the home country's large size, the push forces on the domestic firm can be strong. A large developing country can have weaker pull forces for certain products and services.

The location of the home and host countries is also a globalization factor. Israel has no significant potential neighboring markets for its technology-intensive firms. Thus Israeli technology-intensive Born Globals are forced to enter markets outside their domestic continent as soon as they start international operations. As to the host country location, it has been shown that geographical distance was a factor in the internationalization of traditional Finnish manufacturing firms (Luostarinen, 1970, 1979).

Figure 9 - Factors behind the globalization of technology-intensive start-ups



An entrepreneurship-enabling environment and the home country’s comparative advantage are highly important factors influencing the establishment and early rapid globalization of technology-intensive Born Global firms. *“People do not make decisions to exploit entrepreneurial opportunities in a vacuum, but instead are influenced by the context in which they operate. One important dimension of the context that influences opportunity exploitation is the institutional environment. The institutional environment consists of economic, political and cultural context in which the entrepreneur finds himself.”* (Shane, 2003 –chapter 7).

“Traditional thinking about the management of innovation focuses almost exclusively on internal factors - the capabilities and processes within companies for creating and commercializing technology. Although the importance of these factors is undeniable,

the external environment for innovation is at least as important. For example, the striking innovative output of Israeli firms is due not simply to more effective technology management, but also to Israel's favorable environment for innovation, including strong university-industry linkages and a large pool of highly trained scientists and engineers. The most fertile location for innovation also varies markedly across fields. The United States has been an especially attractive environment for innovation in pharmaceuticals in the 1990s, while Sweden and Finland have seen extraordinary rates of innovation in wireless technology.” (Porter & Stern, 2001).

Israel, with its high number of mature stage Born Globals (Born Globals that have become global vs. Born Globals in earlier stages), has certainly developed a comparative advantage in high-tech international entrepreneurship through its highly skilled work force, developed venture capital market, and government policies that support technology-intensive international entrepreneurship. These Israeli comparative advantages are directly linked to governmental policies. The actions of the Israeli government helped develop the venture capital market in Israel to the second most active venture capital market in the world behind Silicon Valley. The establishment of high-tech start-ups has been made less risky for the founders through the governmental incubators program. The Israeli government also invested in education, which results in Israel's highly skilled labor force. Government subsidies to R&D and exports also play a supportive part. In 2000, the Israeli government invested 4.2 percent of GDP in civilian R&D (while in Finland it was 3.2 percent, and in the US 2.2 percent), of which 73 percent was invested in business R&D and 18 percent in academic R&D.

A study on US, Israeli and Irish policy models on start-up finance found that governments can address market failures in start-up financing in three ways: (a) by assuming the role of a passive partner; (b) by assuming the role of the catalyst; and (c) by investing directly in start-ups and fostering a business-friendly environment (Papadimitriou & Mourdoukoutas, 2002). According to this study the US policy makers have been indirect, providing funds and creating a regime favorable to the growth of the private venture capital industry. Israeli policy makers have been less indirect, taking equity position in start-ups and in venture capital funds in partnership

with the private sector. Irish policy makers have been direct, setting up and managing start-up venture capital funds.

The Israeli government assisted the creation of an Israeli venture capital market through the formation of its first venture fund, Yozma I, in 1993. Originating from a government program aimed at prompting venture investments in Israel, Yozma I has transformed the domestic landscape of private equity investments. Over a period of three years, the Group established ten venture capital funds with experienced venture partners from outside Israel (Cardwell, Mäkelä, Jokinen, & Kumpulainen, 1999). Among the partners were foreign venture capitalist such as Walden, Advent, Oxton, and Star. Corporate venturers such as Daimler Benz, DEG, and GAN also played key roles. These partners raised \$150 million on top of Yozma's \$100 million. In parallel, Yozma started making direct investments in start-up companies. This marked the beginning of a professionally managed venture capital market in Israel. In the four years following the establishment of Yozma, hundreds of Israeli companies received venture backing, more than 20 companies successfully completed IPOs, and over 10 companies were acquired by a large international corporation.

Israel also initiated a highly successful incubator system in 1991. Projects accepted into the incubator program can receive a grant of up to 85 percent of the firm's project budget. If the firm succeeds, it must reimburse the government through royalties, which can represent up to 3 percent of total revenues. From 1991 to the middle of 1998, the incubator programs accepted 610 companies out of about 9,000 applications. Of these companies, 397 graduated to become "mature" companies. This is a very high success rate given that in the US the average success rate of incubators projects is around 10 percent (Cardwell, Mäkelä, Jokinen, & Kumpulainen, 1999).

The Office of the Chief Scientist, together with the Ministry of Science, and the Ministry of Absorption, has established an independent organization to encourage and support individual technological entrepreneurship and innovation. Called MESER, this unit assists individual inventors during the earliest stages of their projects. This includes evaluating the technological and economic potential of the idea, preparation of a patent proposal for submission to patent authorities, construction of a prototype,

preparation of a business plan, establishing contact with the appropriate industry representative, and attracting investors.

The MAGNET program is another successful initiative of the Israeli Office of the Chief Scientist. The program encourages development of new technologies in cooperative ventures between the industry and leading academic scientific research in the area. Based on technology teaming, developers and researchers from industrial companies and academic research institutes work cooperatively in the development of the basic technologies they need for the next generation of their line of products.

Without all these government activities, as well as other government activities not mentioned here, it is highly doubtful whether Israel would have produced so many technology-intensive start-ups and so many mature stage Born Globals that are traded on foreign stock exchanges.

In the micro factors, Luostarinen refers to company-specific advantages gained through internationalization including: economies of scale, specialization, global alternatives (purchasing, manufacturing, selling, financing, personnel, taxation, R&D And so on), and integration (Luostarinen, 1994). To these firm factors, it is necessary to add the firm's competitive advantage, which enables the firm to compete globally. A firm must have at least some competitive edge or excellence in order to have a successful internationalization (Luostarinen, 1994). According to Porter, small companies must have a competitive advantage that is hard to imitate or that large competitors choose not to imitate (Porter, 1997).

The importance of the milli-micro factors, the founders, was covered in sub-chapter 2.4.2.

4.1.2 Globalization strategies (POM strategies) of technology-intensive Born Globals

Although the new POM framework presented here (figure 10) has been developed on the basis of the literature review, some factors have been added during the empirical study as will be noted in the following explanation. The early rapid globalization process and POM strategies of technology-intensive Born Globals are influenced by all the factors mentioned in the previous sub chapter. As the meso (industry) and macro (home and host countries) factors have been covered in the previous subchapter and the milli-micro factors (the founders) have been covered in sub-chapter 2.4.2, what remain are the micro (company) factors.

The micro factors consist of four groups: (1) company characteristics; (2) financing; (3) marketing; and (4) customer segmentation. Company characteristics includes: (1) Competitive edges, (2) Specific advantages of the company, (3) Company's classification, and (4) Method of establishment. While the competitive edges and specific advantages of the firm (see previous subchapter) were included in the conceptual framework based on the literature review, the later two characteristics were added during the data collection and analysis process.

The term 'company's classification' refers to the traditional division of firms into manufacturing or service companies. The Helsinki model, as most of the internationalization theories and models, was developed for manufacturing firms. Researchers have recognized that different type of firms, such as service firms, clearly differ from manufacturing firms. This study takes the stand that the telecommunication case firms included in this study are neither manufacturing firms nor service firms. Thus it is necessary to understand the special characteristics of these companies, which will be termed 'knowledge firms' in this study, and how these characteristics influence the globalization strategies of the firms.

Case studies of Finnish Born Global firms have been divided into five categories (Luostarinen & Gabrielsson, 2001): (a) high-tech, (b) high design, (c) high quality service, (d) high know-how, and (e) high systems. Indeed, it might be necessary to classify Born Global firms into a few categories as has been suggested in the Finnish

Born Global research. However, the five case companies included in this study seem to differ in characteristics from the Finnish companies studied in the Born Global project under each category. Thus there was a need to use a different classification for these companies. As this study examines only telecommunication firms, there was no need to classify the companies into more than one category. The term 'knowledge firms' was chosen for the purpose of this study. Similar firms have also been termed knowledge-intensive (Almor & Hashai, 2001). While the term knowledge firms is similar to knowledge-intensive or high know-how the term knowledge firms seems more in line with manufacturing or service firms. The issue of company classification is of particular importance when comparing research findings. It can be assumed that companies with different characteristics might use different globalization strategies.

Technology-intensive companies can be manufacturing companies, service companies or knowledge companies. Manufacturing companies produce tangible goods. Nokia, Toshiba, and Volvo develop and manufacture hardware (tangible goods). Knowledge companies on the other hand mainly produce knowledge. Knowledge companies mostly buy hardware components from outside suppliers, assemble these components and install their knowledge in them. Microsoft, for example, does not manufacture CDs but simply burn its software on them. The case firms in this study mostly write algorithms and software. While their final products include hardware the hardware components are usually purchased from outside suppliers.

Knowledge companies are also not service companies. Service companies provide services rather than tangible goods. Services are characterized by five attributes separating them from physical products: intangibility, inseparability, perishability, variability, and ownership (Grönroos, 1990; Shostack, 1977). Intangibility refers to the fact that there is no physical product. Inseparability means that the service is produced and consumed simultaneously. Perishability means that the service cannot be stored. Variability refers to the service production not being exactly the same for each delivery. Finally, ownership implies that it is difficult to transfer the ownership of a service. Knowledge firms on the other side can produce tangible or intangible goods that are not inseparable and perishable. These goods are often exactly the same for each delivery and it is possible to transfer ownership on these knowledge goods.

This study uses the term knowledge companies, not software companies, as knowledge firms are not necessarily software companies. We can think of knowledge firms researching the DNA sequence and selling the information to pharmaceutical companies, or a biotechnology firm developing new medical drugs and licensing their products to established pharmaceutical companies. These firms are not software companies, and certainly not manufacturing or service companies. While this study differentiates between knowledge, manufacturing and service firms, it does not claim that other additional classifications might not be needed. The purpose of using the term 'knowledge companies' is to illustrate the different characteristics of these companies from those of traditional manufacturing or service companies. Thus the development of a new classification system is beyond the scope of this study.

The second company characteristic to be added is the method of establishment. Companies can be established as greenfields, as acquisitions, as mergers, or by divesting a part of an existing company. In this study, all the case studies were independent greenfields. Though VCON was a spin-off from Optibase, it was spunoff at a very early stage when the R&D work of its first prototype was ready and before any marketing activities started. It is also important to note that the markets and customers of Optibase products were different from those of VCON. All the case companies started from scratch, building on the business ideas and innovations of their founders. It is the stand of this study that start-ups which start from scratch clearly differ from newly established firms which are (1) a spin-off at an advance stage, (2) subsidiaries or divisions of other companies, (3) established by other international or global firms, or (4) a merger of existing companies. A new firm established by other international or global firms, or a subsidiary or division of such firms, will clearly have an advantage of the international business knowledge and possibly also contacts of the founding firms. These firms might also be able to relay on the founding companies resources for their globalization process.

To illustrate this point we can take the case of a Finnish sawmill that exports its sawn timber across Europe, Japan, North Africa, and the Middle East. As it wishes to add value to its products, the sawmill invests in a new log house or furniture manufacturing company. The newly founded company gains all the business knowledge and contacts which the established mature sawmill has gained over many

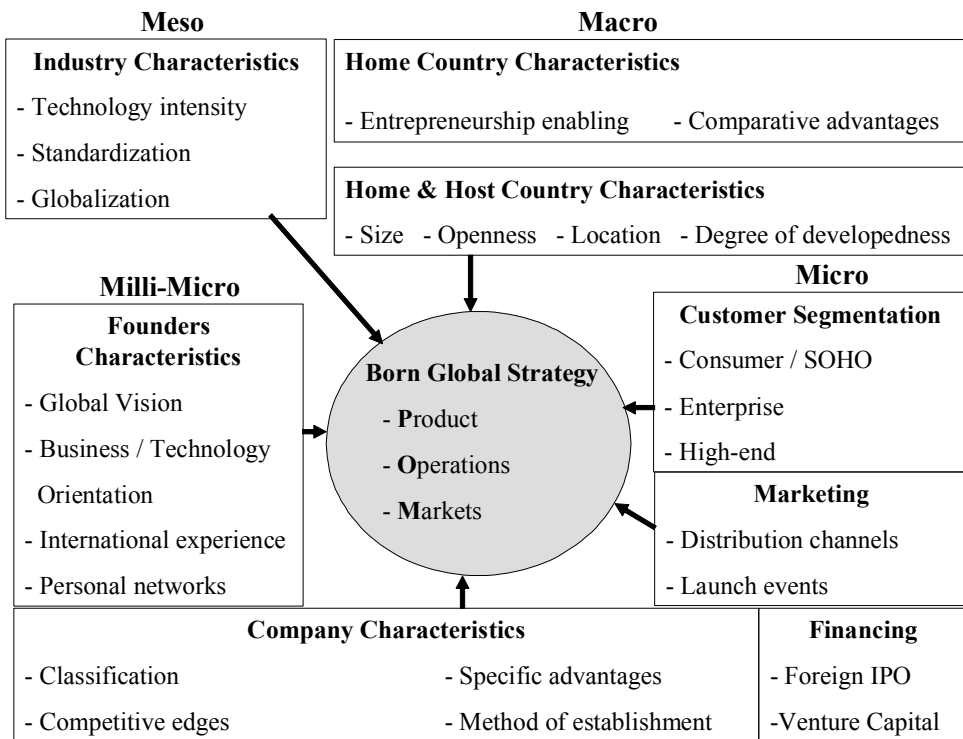
years. An additional example can be a group of employees who decide to leave their current employer and establish their own firm, doing the same business as previously. This group has all the business knowledge and contacts which were gained by their previous employer during the years. In both examples the internationalization or globalization process will probably be more rapid due to this transfer of knowledge and existing personal networks.

The second micro factor to be added during the empirical work and analysis was financing. The financing option chosen by the firm seems to influence its globalization process. Obtaining adequate capital is important to the exploitation of entrepreneurial opportunities. New ventures with more capital are more likely to survive and grow (Shane, 2003). In the previous Born Global globalization factors framework our interest was on the forces behind the early rapid globalization process. Thus the home's country entrepreneurship enabling environment and comparative advantage, which include financing possibilities, were included in the macro factors. In the current POM framework the aim is to identify the factors which influence the firm's POM strategy, hence the need to include financing options in the micro factors.

While there seems to be a considerable amount of research concerning venture capital and governmental promotional funds, the managerial and strategic implications of different financing choices made by Born Globals since their establishment are not widely studied by international business researchers. There is little research on the investment decisions made by entrepreneurs in order to develop their business and the bases for these decisions (Amit, Glosten, & Muller, 1990). Founders of Born Global firms chose between different forms of financing at different stages of the companies' growth. Each financing decision has strategic implications for the firm and its founders. At establishment, founders can chose to use their own funds, family funds, governmental help, private investors (angels), bank loans, or if possible generate money from subcontracting or other company activities. At a later stage, the founders can chose to use or not to use venture capital. The question of IPO and the location of the IPO also have implications. As these issues have come up during the empirical work and taking into account the influence of the financial decisions on the globalization process and strategies of the firm, it was necessary to take them into account.

The third and fourth micro factors to be added were the marketing and customer segmentation factors. The marketing choices in general and in particular the market segmentation choices made by the firms were significantly important to the firms' POM strategy. Marketing includes the choice of distribution channels and use of launch events. These topics will be covered in the case descriptions and during the cross-case analysis.

Figure 10 – Conceptual Framework



5 The cases

The conceptual framework developed in this study uses meso, macro, micro and milli-micro factors in explaining the POM strategies of technology-intensive Born Globals. The industry (Meso) and home country (Macro) characteristics which are identical to all the firms in this study were covered in the introduction chapter. The issue of company's classification was examined during the development of the conceptual framework in the previous chapter. The case descriptions will examine the (1) founders characteristics (milli-micro), (2) method of establishment (micro), (3) marketing and customer segmentation (micro), (4) financing (micro), (5) competitive edges (micro), and (6) host countries' characteristics. The marketing and customer segmentation are covered in the operations and products subchapters while the host countries' characteristics are covered in the markets subchapters.

According to the definition used in this study (see subchapter 1.6), all case companies are Born Globals. In order to enable the reader to evaluate the analysis and findings of this study each case is covered in detail. Each case examines the POM strategies of the company and the above mentioned factors. The research period for each company is from its establishment to the end of 2002.

Case companies and research periods:

BATM Advanced Communications Ltd.	1992 - 2002
Emblaze Systems Ltd.	1994 - 2002
Orckit Communications Ltd.	1990 - 2002
VCON Telecommunications Ltd	1994 - 2002
VocalTec Communications Ltd.	1989 - 2002

5.1 BATM Advanced Communications Ltd.

BATM (L.S.E.: BVC) started its international activity from its establishment in 1992. In 1999, only seven years from its inception, BATM was a world leader in the development and manufacture of advance switches and connectivity devices for Local Area Networks (LAN) and Wide Area Networks (WAN) used for both the data communication and telecommunications industries. From 1997 to 2001, 82 percent to 96.7 percent of BATM's revenues came from abroad through sales under its own brand name and OEM agreements with IBM, 3M and Lucent Technologies. BATM has been generating revenues in Europe, America, Far East, Africa, and Israel (see table 13).

5.1.1 Founders and Method of Establishment

BATM began developing network equipment products in 1991 and was established as a company in 1992 by Dr. Zvi Marom and Gershon Baras. While Dr. Zvi Marom was the active partner and is still the CEO, the investment of Gershon Baras, Chairman of the Board until 1997, was financially oriented. Unlike many technology-intensive start-ups, BATM generated revenues and has been profitable since it was founded.

Dr. Marom was and still is the key force behind BATM. Dr. Marom holds degrees in engineering and medicine. Prior to establishing BATM, Dr. Marom was the head of the Electrical Faculty of the Israeli Open University and a senior consultant to several industrial and academic institutes, and served in the Israeli Defense Force (IDF) in combat command posts. Prior to establishing BATM, Dr. Marom was a lecturer in the university and wanted to build something of his own. He had a few ideas in the field of telecommunication and thought he had a good knowledge in the field, which he found to be interesting and very important.

Dr. Marom founded BATM as a bootstrap with Dr. Marom as the employee, the boss, and the dishwasher. During this early phase there was no possibility for Dr. Marom to receive any income from the cash strapped company. Dr. Marom clearly had a global vision. He was never interested in selling to the Israeli domestic market as he understood that it is simply too small and that the company has a future only if it

targeted foreign markets and became international. This meant that from the very start all the manuals were written in English and the equipment was built according to international standards. This was done even though it was much harder and more costly to certify the equipment to international standards than to local Israeli standards.

Dr. Marom clearly had a business orientation and not a technology orientation. The main motivation behind the establishment of BATM was Dr. Marom's wish to build his own business. The technology itself was not the main motivation behind the establishment of BATM. Dr. Marom had no international business experience and no personal network of contacts to assist him in building the company.

5.1.2 Products

BATM started with products for LAN (Local Area Networks) data communication. Later it also developed products for WAN (Wide Area Networks) and finally for IP (Internet Protocol) communication. The software component in the products has become more dramatic and the system area in which BATM sells its products became wider. As BATM products developed, their customers have also become bigger. In its early stages BATM products' end-users were firms that had a LAN system. Later, with the WAN products the end-users firms were bigger in size. While small and medium size companies use LAN only large organizations use WAN. With the LAN and WAN products, BATM's buyers have been computer firms, large corporations, cellular communication firms, military, university, science centers and so on. Finally with its IP and WAN products BATM moved to target telecom companies. In 2000 more than 90 percent of BATM's customers were telecom companies. During 2003 BATM's website stated that their current customers were incumbent and emerging service providers, including Ameritech, AT&T, Bell South, British Telecom, Cable & Wireless, Concert, GTE, MCI/Worldcom, McLeod/Ovation, NextLink, Sprint, Verizon (formerly Bell Atlantic), and Winstar.

When moving to more heavy, sophisticated, and high value-added products the orders in money terms naturally become bigger. If at the starting stage an order of \$1,000 was a big event today Dr. Marom is informed on orders of hundreds of thousands

USD only at the end of the month. The term commonly used during the interviews in the companies to describe the move to larger high-end customers and the development of more sophisticated, high value-added complete solutions was '*climbing the food chain*'. According to Dr. Marom, BATM always wanted large customers but at the beginning they had nothing to offer them. Dr. Marom also added that the changes in technology and products that have occurred in the company since it was founded are due to changes in technology used around the world.

BATM does not sell project but chooses to work through system integrators that sell the project. BATM does try to supply as many of the project elements as possible including cooperating with other firms that have complimentary equipments. Dr. Marom's holds the view that it would be a wrong move for BATM to become a system integrator in order to carry out projects. BATM does not customize its products.

BATM develops software, but sells hardware that includes its software. The hardware components are purchased from external suppliers. BATM subcontracts its manufacturing and actually the only manufacturing done in BATM is assembly operations and the installation of BATM's software.

5.1.3 Operations

Around 70% of the data communication of mid-size computers in the world at the time around BATM's establishment (1991-1993) was according to a protocol by IBM (52-50). Dr. Marom did reverse engineering on the protocol and developed some products for data communication using this protocol. In the early phases of development, Dr. Marom did not know who would buy these products. Later, when the first products were completed, and as he realized that they were much better than the existing products in the market, including IBM's own products, BATM offered the products to IBM. The process was not easy and took a long time. Towards the final stages of this process, in the last quarter of 1993, IBM contacted BATM and suggested a partnership in a project of building new software that is suitable to the products which BATM was developing. Dr. Marom agreed and BATM joined the

project in which all other partners were big corporations that were much larger than BATM.

IBM also started to order (OEM) and was marketing the products under their own logo. Some of IBM's partners also started to order and IBM's certified distributors around the globe were also distributing BATM's products under the IBM logo. BATM's sales increased, with IBM only, to around \$2.5 million. According to Dr. Marom, the money was important, but more important was the confidence it gave to BATM. Dr. Marom had no prior experience with such a demanding, strict, and rigorous MNE as IBM with their own standards laboratories. For Dr. Marom, the fact that IBM started to order confirmed that BATM was going in the right direction. The money from the sales was used to hire more employees, which enabled the company to invest in R&D, support, and sales. In 1995, BATM had revenues of \$7.62 million and a profit of \$2.44 million. During 1996, IBM purchased equipment from BATM for \$2.7 million and BATM revenues were \$9.75 million with a pre-tax profit of \$3.04 million.

At the time prior to its relationship with IBM the company started export operations to Europe. BATM entered Germany, Italy, Finland and Belgium (in this order) as will be described in more detail in the subchapter dealing with markets. The process of locating potential buyers was simply by opening professional magazines and through them identifying the potential buyers.

In August 1999 Dr. Marom hired the former Israeli prime minister, Benjamin Netanyahu, who had been defeated in the Israeli May elections. Netanyahu was recruited as a senior adviser for international strategy. According to 'Yediot Acharonot', an Israeli daily newspaper, on 10th August 1999, Dr. Marom, BATM's Marketing Manager, and BATM's Financial Manager discussed how to advance BATM's efforts to enter the large telecommunication firms in the world. Their conclusion was that they needed someone who could open the doors for them. The three of them looked at each other and said 'Bibi' (Netanyahu's nickname). Five minutes later Dr. Marom was on his way to Jerusalem together with the other two managers. The recruiting of Netanyahu in itself managed to put BATM in newspaper

headlines around the world, including ‘The Wall Street Journal’ and other leading newspapers.

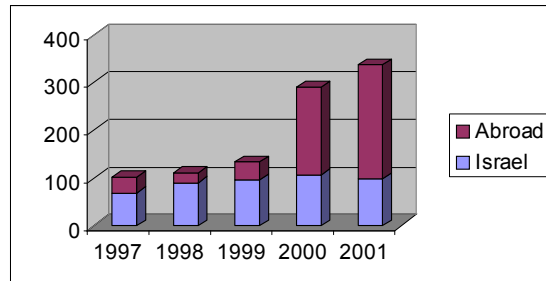
At the IST (Information Society Technologies) conference in Helsinki on November 1999 the investment in Netanyahu paid off. Dr. Marom and Netanyahu approached Jorma Ollila the CEO of Nokia and started talking with him. In Mr. Pieper’s own words: “Yes, I mean if you want to talk to the president of Nokia, without calling or even if Zevi was calling and he says “who are you?”...but if Netanyahu...I mean...he doesn’t really want to talk to Netanyahu about BATM, that’s for sure, he just wants to talk with Netanyahu about all kinds of other things. But in the meantime, because of that contact that we had, he pushed us a little bit you know...the rest of the organization...and now we are one of the preferred manufacturers for Nokia”. In April 2000 BATM signed an agreement with Nokia to integrate BATM Titan Internet protocol switches in some of Nokia’s products. The agreement, with estimated orders of several million dollars, was highly important to BATM as mobile communication seemed to move toward phones that enabled the users to use the Internet. The negotiations with Nokia took several months, during which Nokia checked and compared switches from several suppliers. The negotiation gathered momentum following the IST conference in Helsinki on November 1999 and the meeting of Nokia’s CEO Jorma Ollila with Netanyahu and Dr. Marom.

In July 2000, BATM entered into a purchase and distribution contract with Sprint North Supply, the distribution arm of the US telecommunication carrier Sprint. According to the agreement Sprint North Supply made an initial order of \$5 million. The deal improved BATM’s and Telco’s (BATM’s subsidiary in the US) ability to serve the US market through top class logistics and distribution systems. In 2000, BATM won a deal to build AT&T wireless US 3G network.

In 2001, against the gloomy global economic and telecommunication background, BATM had to reorganize some of its operations and cut costs. While some of BATM competitors have seen severe decreases in their sales levels, BATM reached revenues of \$82 million in 2001 down only 11% from its 2000 revenues of \$91.8 million. For the first time in BATM’s history it produced an operating loss, however their balance sheet remained strong, with cash and short-term investments of over \$56 million.

During the year the identification of the Far East as a significant potential market started to bear fruits with sales of \$4.889 million up 845% from \$0.578 million in 2000. In 2001, BATM's served major customers in the government, transportation, academic, banking, and telecom sectors. In April 2001, BATM announced its plans to expand its R&D center in Bulgaria.

Figure 11 - BATM Employees



Source: BATM's annual reports

BATM's strategy from the beginning and up to today, regarding opening of offices in target countries, has not changed. First a salesman in BATM is in charge of sales and business development in the target country. BATM opens an office in a target country once the country reaches a certain level of business and the business is developing at a self-sustaining level. An alternative road to achieve a revenue stream that justifies opening a local office was via IBM sales as was the case in Germany and France. In France BATM's started its sales operations through IBM. When sales reached a certain level, IBM approached BATM and requested that they open a local office to support them. As there were enough revenues coming in from the French market BATM decided to open an office. The offices are needed first of all to support BATM's customers including technical support, pre-sale support, after-sale support, and training. The second task of the offices is to look for new business. BATM's offices do not sell directly to end-users. While the first task is the basic function of each office the second task can be preformed only in a later stage. At an early stage, there are enough revenues to justify opening a local office for support, but possibly not enough revenues to justify hiring additional personnel for business development.

Small countries like Ireland will always be handled directly from Israel as they cannot generate enough revenues to justify opening a local office. In certain cases, like the Nordic countries, when the entire group of countries reaches a certain level of revenues a regional office can be opened.

In each country BATM has one or more distributors and a few partners. The distributor does not contribute to the sales and marketing effort, but simply has a logistical role, which entitles him to low margins. The distributor brings the product from Israel, clears them with customs, stocks them in his warehouse, and delivers them to the customers. Business development and sales activities are carried out by BATM and its partners. A partner can be selected based on the relationships he already has (his existing network). In other cases, a buyer can come to BATM and tell them that he found a certain customer that can bring a lot of revenues to BATM. The buyer is ready to do everything that is needed to facilitate the sale. He is ready to hire technical people, sales people and to do everything needed to support the customer. BATM will be ready to make a contract with the buyer giving him exclusivity with his customer as long as the revenues are over a certain agreed level. The buyer becomes a partner, which hopefully can bring more customers later on. The partner can choose to buy directly from BATM or from the local distributor. The pricing is identical in both cases. A partner can also become a distributor at a later stage. The partner concept is very important to BATM, as these firms are the entry ticket to BATM's end-users. The end-users trust the partners, which makes BATM's entry much easier. On its part, BATM gives the partner some kind of exclusivity, which ensures the partner good profit margins. According to Mr. Henk Pieper, BATM, unlike Cisco Systems, does not sell to everybody.

The R&D activity core is located in Israel but there are also R&D centers outside Israel in Boston, Geneva, and Bulgaria. R&D centers are located near research institutes: The Technion in Israel, MIT in Boston, and the European Laboratory for Particle Physics (CERN) in Geneva. Because of BATM's small size they have a very rigorous recruiting organization and they are constantly looking for good employees. They are also looking for the right mix of young employees and employees with experience. BATM has also been working for a number of years with top universities

in Eastern Europe, with the aim of recruiting top-level mathematicians and physicians. In 1999, BATM opened an R&D center in Bulgaria and in 2002 decided to expand the activity of its R&D center in Bulgaria by doubling the number of programmers by the year end. At the time twelve programmers were employed.

5.1.3.1 Subsidiaries

In 1994, BATM established a wholly owned subsidiary in the UK under the name B.A.T.M (UK) Ltd., which engaged in marketing BATM's products in Europe and providing services and support to foreign customers. In 1999, BATM established a wholly owned subsidiary in Germany under the name B.A.T.M GMBH Ltd., which engaged in marketing the company products in Europe and providing services and support to foreign customers. The German subsidiary also had offices in France, Poland, Hungary, and Austria. During 1999 BATM also opened an R&D center in Bulgaria.

The US subsidiary was opened only in 1999. Interestingly, in a press conference in November 2000 Dr. Marom told reporters that in order to be a world leader you must sell in the American market and this is a market that you either conquer or crash in the attempt. Given the importance of the American market and the fear of crashing in it without sufficient financial resources, BATM waited three years after its IPO before entering the market. Up to that point, BATM products were sold in the American market mainly through its distributors and OEM sales. Only after BATM reached sales of over \$20 million and was profitable enough to raise money did they enter the American market.

In 2000, BATM established a subsidiary in France. In France, as in Germany, BATM had offices in order to support its local customers, prior to establishing a subsidiary. In 2002, BATM had foreign subsidiaries in the US, the UK, Germany and France; R&D center in Bulgaria; and offices in China, Austria, Poland, and Hungary. The offices main function is technical support. In Germany alone, BATM has five offices that provide rigorous technical support to BATM's customers.

5.1.3.1.1 Acquisitions

In 1994 BATM purchased 30 percent of the shares of B.T.T.-Beres Communication Technologies Ltd., which engaged in representing foreign companies and providing technical support services in the communication field. In 1995, B.T.T issued additional shares, increasing BATM's percentage shareholding to 50 percent. In June 1998 BATM purchased the remaining 50 percent of B.T.T.

In July 1995, BATM acquired an 85 percent interest in BAT-NET Communication Networks Ltd., which engaged in the installation of communication networks.

In May 1997, BATM acquired a 54 percent interest in CONNECTronix, a US corporation engaged in marketing computer communication products. The acquisition cost was \$443,000. Restructuring and repositioning in CONNECTronix required increased marketing spending, which has contributed to a loss in the subsidiary between the time of acquisition and the year-end. CONNECTronix was expected to play a major role in supporting the sales of BATM optical fiber products in the future. In January 1999, BATM purchased a further 23 percent of CONNECTronix for \$184,000, and the remaining 23 percent were acquired in February for \$110,000.

In October 1997 BATM acquired 15.8 percent of the shares of Shiron Satellite Communications (1996) Ltd., which was a leading edge developer of satellite communications systems, which have already entered into OEM agreements with several major telecommunications companies in the US and Europe. BATM and Shiron are cooperating in R&D. The acquisition cost was \$2 million. Shiron was divested in October 2000 for a profit of \$2 million.

In July 1998 BATM acquired 1.28 percent of the shares of Lynx Photonic Networks Inc., a small Israeli small start-up engaged in research and development. The acquisition cost was \$50,000. In 1999 BATM started collaboration with Lynx Photonic Networks Inc., in which BATM had a stake, in the commercialization of research that would enable much broader band traffic to be switched rapidly. In November 1999, as part of an additional funding, BATM invested \$37,000 in Lynx Photonic Networks Inc. and its total interest was diluted to 1.12 percent. In 2000, BATM held 3.35 percent of Lynx.

In February 1999, BATM acquired NetWiz, a complementary developer of high-speed network switches with over \$2 million of sales. The vendor was unable to exploit the technology and strapped for cash, and it enabled BATM to buy the team and the intellectual property rights for under \$2 million. According to a report by SHORE CAPITAL, buying a comparable company may have cost up to 10 times the amount. NetWiz were at the time developing products with CERN (European Laboratory for Particle Physics in Geneva) in Switzerland. The European R&D program financed the R&D cooperation. When BATM bought NetWiz they bought all the technology and the R&D team and also the entry into the EU R&D program. After the acquisition, a new period started in BATM as they went from infrastructure products to Internet products (IP protocol). BATM raised a lot of money at the time and a lot of R&D had been done in the area.

In February 2000, BATM acquired Telco Systems, a major US manufacturer of network transport and access systems for leading telecommunication companies, for \$326 million from which \$260.8 million in cash and the balance in shares. Around two weeks after the purchase, BATM received an order from Bell South for Telco Systems products of \$6-\$7 million. The deal gave BATM access to a direct distribution and sales force in the US, the worlds biggest market for telecoms services. The acquisition also tripled BATM's revenues and was expected to pave the way for obtaining a NASDAQ listing. In 2000, Telco Systems contributed 76 percent of BATAM's revenues!

In March 2000, BATM acquired 49.9 percent of Eldor Computers Ltd., a maker of integrated computer hardware, software, and communications products for \$3.8 million. The acquisition was targeted at strengthening BATM's ability to develop its own home market.

In August 2000 BATM acquired 19.9 percent from Lantech, which is headquartered in Taipei, Taiwan. The deal was made by a stock swap in which Lantech received \$5 million in BATM's shares. The deal enabled BATM to rapidly enlarge their production capability and to develop their business in Asia.

In August 2000 BATM, through Telco Systems, acquired the network access unit team of Ezenia Inc. Under the agreement, Telco Systems acquired the products and the employees associated with the Series I, Series II, BRICK™, and Smart-ISDN™ product families, as well as the new StreamSpan products for broadband, on demand streaming video. The acquisition was part of BATM's strategy to acquire complimentary technology.

In November 2000, BATM acquired 25 percent of ATS, an American company. ATS was a world leader in factory automation in areas as diverse as telecommunications, semiconductors, fiber optics, automotive, computers, solar energy, and consumer products.

5.1.3.1.2 Joint Ventures

No joint ventures that created a new entity have been established by BATM. According to the definitions used in this study (see subchapter 1.6), the joint ventures operations of BATM have been classified as strategic alliances.

5.1.3.2 Strategic Alliances

In the last quarter of 1993, a partnership with IBM and other big corporations in a project for building new software suitable to the products that BATM was developing.

In 1998, a technological alliance with 3M was established. 3M announced orders worth \$12.5 million of equipment from BATM to be supplied by the end of 1999. In September 1999, BATM received an \$18.5 million order from 3M to be supplied during 2000.

In October 1998, BATM announced a joint venture with Lannet, a Lucent subsidiary. According to a statement by Dr. Zvi Marom, BATM believed that the next major trend in data communications will be the use of fiber optics for local area networking and that the joint venture served to position BATM well in order to take a significant share of this rapidly growing market.

In December 1999, BATM used a joint venture with American firms including 3M, in order to enter the area of Internet telephony.

In March 2000, BATM announced a partnership with Samsung Electronic Co. to cooperate on developing switches for Samsung's television set-top Internet systems and other products requiring high-speed computer connections. BATM also tried to develop a partnership with Sun Microsystems, Inc. a maker of Internet servers, in order to boost its North American sales.

In March 2000, it was reported that BATM and Savan are cooperating in supplying VDSL systems to Singapore Telecom. VDSL is considered to be the next generation of DSL technology. Savan was a maker of VDSL chips for data communications, in which Singapore Telecom was holding 4 percent. Under the BATM-SAVAN agreement, SAVAN's chips were integrated into BATM's new Titan switch (the Titan switch was originally developed by NetWiz, acquired by BATM on February 1999). It is interesting to note that SAVAN was another Israeli Born Global founded in 1994.

In April 2000, SUN Microsystems signed a cooperation agreement with BATM. Under the agreement, SUN would buy BATM switches for communication networks as well as develop new products jointly. SUN also purchased BATM shares in a value of 10 million. It is interesting to note that SUN was interested in the Titan switches, which clearly indicates that NetWiz was a very successful acquisition for BATM.

ECI Telecom Ltd (an Israeli company traded in NASDAQ), BATM, and Israeli academic institutions made a consortium, in the Magnet program, to develop Electro-Optical communication technology. The MAGNET Program, under the office of the Israeli Chief Scientist in the Ministry of Industry and Trade, is dedicated to the establishment of a technological infrastructure for the next generation, and to the creation of a cooperative technological reservoir - containing a combination of knowledge from the industrial sector and the academic world. MAGNET enables industrial companies to draw from a vast and varied technology pool, giving them the capabilities to develop innovative, high value-added products with high export potential. The budget allocated by MAGNET for this project was \$20-\$30 million.

In January 2002, Telco Systems, a wholly owned subsidiary of BATM, announced a partnership with the European Organization for Nuclear Research (CERN) and Exbit, a subsidiary of Vitesse Semiconductor Corporation, to develop a multiplayer 10 Gigabit Ethernet switch for ultra-fast networks. The EU financially supported the project.

5.1.4 Markets

In parallel with the process on entering into cooperation with IBM, the company started its own sales activity by targeting Europe first. Dr. Marom decided that BATM's first target country would be Germany. Germany was chosen, according to Dr. Marom, because it was a technological market that was influenced greatly by the quality of the product technology. Dr. Marom believed that if he would come to potential buyers and claim that he has a better product they would take the product to a laboratory for checking. According to this line of thought, validation of BATM's quality claims would then lead to the purchase of BATM's products. This proved to be true and BATM sales in Germany started growing.

After Germany, Dr. Marom targeted Italy because Italy was at the time buying big quantities of the same type of products that BATM was offering. Entry into the Italian market was followed by an entry into the Finnish market. The Finnish buyer knew BATM's German buyer and was buying products through him. One day the German told the Finn about BATM. The Finn called Dr. Marom and shortly after that came for a visit in Israel. Surprisingly, the biggest buyer in BATM's second year was the Finnish company. While the Finnish company was small in size BATM was a major supplier for them.

At this stage, buyers started to approach BATM as a result of a mouth-to-ear process. BATM did not have enough money to advertise at the time so they had to rely on the mouth-to-ear process via existing buyers. BATM also started to participate in the CeBit exhibition in Germany through the Israeli export institute and slowly the business was growing. The fourth country entered resulting from this process was Belgium. When IBM started to order and market BATM's products under the IBM logo, BATM continued to sell products to its own customers under its own brand

name. At the time, BATM had no subsidiaries and no offices abroad as they simply did not have the necessary resources.

It is interesting to note that while Dr. Marom, the CEO of BATM, chose target countries regardless of cultural aspects this was not the case regarding Henk Pieper, BATM's European Sales Manager. Prior to his appointment as the European Sales Manager for BATM, Henk Pieper has been working in NetWiz, which was acquired by BATM in 1999. Henk Pieper who is originally from Holland, feels that his own mentality goes very well with the Scandinavians, Germans, and basically with the northern part of Europe. Southern Europe, like Italy and Greece for example, according to Mr. Pieper, has a different mentality and it took him some time to understand how they do business in those countries. As a result, Henk Pieper naturally first directed his efforts to northern Europe. At the time of the interview (2002), Henk Pieper felt that he had been fairly successful with the Nordic countries. The German market was totally supported by the German office and the French office supported the French and Spanish markets.

	1997	1998	1999	2000	2001
Europe	8.034	11.741	9.446	8.148	11.550
America (Mainly North America)	1.655	5.336	12.346	80.873	62.715
Israel	0.686	0.616	4.862	2.715	2.787
South Africa	0.081	0.098	0.083	0.062	0.060
Far East	0.101	0.281	0.177	0.578	4.889
Total	10.557	18.072	26.914	91.876	82.001
Source: BATM's annual reports					

In the UK, the market was big and interesting. BATM had an office there but its success had been limited. At the time, the UK office was reporting to Henk Pieper, who was also assisting local employees in getting new partners and generating more revenues. The current revenues in the UK were not sufficient at the moment for hiring more employees to do business development. Given the size of the UK market and

advantage of the local English language, it could have been expected that BATM would do better in the UK. According to Henk Pieper, the UK market was very conservative. He personally had never encountered another equally conservative one. In addition, the UK market was saturated with similar types of products. UK firms, in Henk Pieper's view, do not readily switch to new technologies. On the other hand, the Scandinavian market is 'the market' for new technology. As could be expected given Henk Pieper's background and taking the cultural issue into consideration, southern European markets such as Italy, Greece and Turkey still required much work.

At the time of the interview Henk Pieper was the only salesman in Israel in charge of sales in European countries excluding Germany, France and Spain that were handled by the local offices. This meant that when Henk Pieper was focusing his efforts on the UK, while supporting all the other European countries under his care, it was difficult for him to put much effort into Italy. The decision to focus on the UK first was agreed between Henk Pieper and Dr. Marom. This does not mean that Henk Pieper and BATM were not active in Italy, but that the focus of efforts in Europe at the time of the interview (2002) was in the UK. According to Henk Pieper, the entry to Italy was more a coincidental then planned and it happened through a meeting in Italy with a company that Henk Pieper identified as a perfect fit for BATM. The Italian company was a typical example of a company with low-end products that needed high-end products, making it a perfect fit for BATM with its high-end products. After a few meetings a contract was signed and Italy started to generate large revenues, but not enough to justify opening an office yet.

During 1999, BATM started operations in the US by hiring local salesmen. Prior to 1999, BATM sold its products in the US through its distributors and OEM agreements. When BATM thought that the business was starting to develop in the US on a self-sustaining level, they decided that they did not want to build a marketing organization there but preferred instead to acquire an existing organization. On February 4, 2000, BATM acquired Telco Systems Inc., which was located in Massachusetts, US, for \$330 million. It is interesting to note that by 2000 76 percent of BATM sales were from Telco Systems, which is a wholly owned subsidiary of BATM.

Year	Turnover	Pre-tax profit	Gross R&D	Net R&D	Selling expenses
1995	7.62	2.72			
1996	9.75	3.07			
1997	10.557	1.458	1.209	0.643	1.828
1998	18.072	3.621	1.492	0.782	2.825
1999	26.914	8.453	3.038	1.397	3.644
2000	91.876	-26.058*	14.707	13.1375	14.621
2001	82.001	-266.847**	15.655	14.293	20.255

* Operating profit 8.3, during 2000 BATM acquired Telco Systems, 49.9% of Eldor, Ezenia!'s Network Access products, and 19.9% of Lantech. Most of the acquisitions were made with cash. Marketing and sales expenditure went up to \$21 million from \$5.9 million in the previous year. Most of the investment in marketing and sales was in the US. BATM also opened offices in France, Poland and Austria and expanded the marketing activity in the German branch.

** \$255 million write down of goodwill. The bulk of it represents amortization (\$66 million) and write-off of goodwill (\$189 m) in connection with the acquisition of Telco Systems in 2000.

Source: BATM's annual reports

During 2001, BATM made preparations toward entering the Chinese market and increased their operations in Korea and Hong Kong. Since the economic downturn in 2001, BATM recognized the Far East as a significant potential market. The company increased its efforts in the area accordingly and the result was evident in the sharp increase in sales from \$0.578 million in 2000 to \$4.889 million in 2001.

5.1.5 Financing

The first investor in BATM was Gershon Baras, who was the co-founder of BATM. In July 1996 BATM raised \$12.5 million in the AIM (Alternative Investment Market) stock exchange in London, which was designed for young companies. The money was raised in order to develop the marketing infrastructure in the US, build a new building in Yokneam, enable strategic acquisitions, and obtain working capital. Dr. Marom chose to raise money in London for many reasons:

- 1) The geographical distance – the trend at the time in Israel was to raise money in New- York. Dr. Marom thought that a small

firm's management should focus on the firm and not start traveling to the US, which requires around a week each time and meetings with numerous analysts. When traveling to London you can fly in the morning and return in the evening thus minimizing the disruption to the firm

- 2) Dr. Marom visited the NASDAQ and reached the conclusion that it was not suitable for BATM. NASDAQ required, for example, BATM to put together an investor relationship team. Dr. Marom did not think that BATM should invest its profits in an investor relationship team.
- 3) The London stock exchange stood out from the other stock exchanges in Europe in its size and quality.
- 4) The language – Dr. Marom did not want to raise money in a country that he is not familiar with its relevant laws and could not read the law unless it was translated for him. In the UK BATM's management could simply take the relevant law books and study them.
- 5) The Israeli news articles of the time also mention the gloomy situation of the Tel-Aviv stock exchange at the time was a reason not to raise money in Israel. However this was not mentioned in the interview with Mr. Marom, possibly because he did not see it as an important factor. Dr. Marom was not interested in the Israeli domestic market and wanted to build BATM into an international firm and raising money abroad seemed to be a step in that direction.

In 1997 David Goldman, who was the former driving force behind Sage, the UK software company, was appointed chairman of BATM. David Goldman joined the board in 1996 at the flotation of BATM in the AIM. In July 1998 Gershon Baras, sold his 36.9 percent holding of BATM's shares through SHORE CAPITAL, a UK stockbrokers firm, and retired from the board. Under this deal, David Goldman purchased 20 percent of BATM's shares.

In 1999, 3M acquired 4.34 percent of BATM shares and was granted a one year option to subscribe for additional shares to increase its holding to up to 9.99 percent of the company.

In July 1999, trading in BATM shares, which previously took place on the AIM (Alternative Investment Market) in London, began on the main market. In October 1999 BATM reached a market value of \$1,700 million. In November 1999 BATM raised \$205 million in the London stock exchange for 9.6 percent of its shares giving it a market value of \$2,300 million. Until 1999, most of BATM revenues were from Europe and the money raised was intended for entry into the US market. During 1999-2000, BATM raised around \$300 million including around \$205 million in 1999 and \$84 million in 2000 in the London stock exchange, and around \$9 million invested by SUN Microsystems in 2000.

According to 'Yediot Acharonot', an Israeli daily newspaper, BATM was traded in September 2000 with a market value of \$3,500 million and the London Stock Exchange selected Dr. Zvi Marom as the technological man of the year. In October 2000, two Israeli technology-intensive firms were included in the new FTSE eTX 50 European index. The new index was established in order to cover the European technology shares of companies with a market value of over €110 million. BATM, with a market value of around €3,000 million, was number ten on the list and Geo Interactive (later to be renamed EMBLAZE), another Israeli listed company, was in twenty-fourth place with a market value of around € 1,200 million.

5.1.6 Competitive Edges

According to Dr. Marom, to be able to compete against large MNEs, BATM must have a huge technological advantage. An American telecomm group report, published one day before the interview with Dr. Marom, compared the performance of BATM's and Cisco Systems's products. According to the report, BATM's products performance was at least double that of Cisco Systems's and in most cases around triple. Comparing performance per cost showed that BATM's products were six to ten times more efficient than Cisco Systems's products. When asked how BATM manages to maintain such a technological advantage, Dr. Marom explained that

BATM's business is mostly software, not hardware. The final product is hardware, but it contains a huge amount of software. Dr. Marom believes that in software, like in music, the size is important only in the sales organization. If you have, as Cisco Systems does, thousands of salesmen around the globe then you are everywhere and you can sell much. In the area of product development and the quality of the product, as in music, if you take for example a hundred average composers, none of them will reach the quality of Mozart or Beethoven. You might be able to use your size to bring your product to the market faster but you will not necessarily achieve a better product quality.

Fortunately for BATM, there are still many buyers in the telecommunication business, especially the big ones, which like to take products for testing. All of BATM's customers are large firms and all of them take the equipment for checking. In a press conference in November 2000, Dr. Marom told reporters that it is important to supply products in high quality and reliability in order to convince your customer to increase your share in its total purchases. Dr. Marom also added that it is wise not only to compete against competitors as Cisco Systems and Lucent, but also to cooperate with them. BATM managed, at the time of the interview, to achieve this goal with Lucent and hoped in the future to cooperate with Cisco Systems as well.

Brett Arends from The Daily Mail (13.9.2000) thought that BATM's success is a result of its focus on niche technologies: *"The company focuses on niche technologies under-served by industry giants like Cisco Systems and Lucent."*

Henk Pieper believes that a huge selling point for BATM is their R&D. BATM's R&D allows them to go to large companies such as Nokia, Eriksson, or Nortel and tell them that they can develop for them a product that they are lacking in a certain amount of time and at a certain price. Henk Pieper believes that BATM is very good at that. Some large firms approach BATM with such requests. Large competitors such as Cisco Systems can only work on big volumes, while BATM can work on small volumes as well. Henk Pieper explains that if a company like Cisco Systems needs to develop such a product then they need to change their R&D priority and to justify that they need a huge order. BATM can be much more flexible. At the time of the interview, BATM was doing a project with Nortel, which is one of the biggest

manufacturers of telecom equipment. Nortel approached BATM because BATM had the exact correct product at the exact time that Nortel needed it for their project.

BATM is of a size that allows them to change in any direction if needed. Mr. Pieper gave the example of Eriksson to illustrate how this flexibility can generate new business for BATM. Eriksson were doing a project all over Sweden with a certain business model. According to Eriksson's business model for the project, they needed a certain amount of equipment with certain functionality, cost and delivery time. Eriksson approached BATM's big competitors but none of them could produce what Eriksson was actually looking for in time. Someone from Eriksson met Henk Pieper at an exhibition and asked him whether BATM could produce the required equipment for them in time. BATM could and did.

It is interesting to note that other Israeli companies that were developing similar products to those of BATM went out of business or were acquired (e.g. ADACOM was acquired by the IDEAL Group in 1999). BATM is currently (2002) the only Israeli company in this business area.

5.2 Emblaze Systems Ltd

Emblaze Systems Ltd (LSE: BLZ.L, Previously Geo Interactive Ltd.) is a global leader in providing commercial mobile media solutions for wireless carriers, ISPs, content providers, and handset manufacturers. Emblaze began generating revenues abroad soon after its establishment in 1994. In 1996, Emblaze was generating revenues in Europe and North America. In 1997 Emblaze started generating revenues in the Far East. From 1995 to 2002, excluding 2001, more than 97 percent of revenues were generated outside the domestic continent (see table 17).

5.2.1 Founders and Method of Establishment

Emblaze Systems Ltd was founded in 1994 as Geo Interactive Ltd. To understand what made Emblaze a Born Global company, it is essential to start by looking at its four founders: Eli Reifman, Tzuri Daboosh, Naftali Shani and Sharon Carmel.

Eli Reifman was 24 years old when Geo was founded and is the current CEO. He was previously head of technical development and acting head of all production in the training development center of the Israeli Defense Force. At the age of 15, Eli Reifman started his own international business. Using a fax and phone, in his home he traded commodities such as sugar and cement. Before the army, Eli Reifman attempted to study economics at Tel-Aviv University, but failed to pass the first year.

Sharon Carmel was 23 years old when Geo was founded and was the CTO of Emblaze until April 2001, when he stepped down. He served with Tzuri Daboosh and Eli Reifman in the Israeli Defense Force, where he was head of R&D for the technical development department and served as head of production for the training development center. Sharon did his first computer course at Tel-Aviv University at the age of 12.

Tzuri Daboosh was 28 years old when Geo was founded. Tzuri Daboosh was previously a civilian advisor and head of knowledge engineering and the man-machine interface division in the training development center of the Israeli Defense Force.

Naftali Shani was 47 years old when Geo was founded and its first CEO. Prior to founding Geo, Naftali Shani served as general manager of Bartrade Ltd. (a subsidiary of Bank Leumi, one of Israel's leading banks), dealing with trade finance and counter-trade worldwide, and as General Manager of the Israeli chemical company, Pazchem. Prior to this, Naftali Shani was treasurer and controller of the Israeli Prime Minister's Office.

Three of the four founders (Eli Reifman, Tzuri Daboosh and Sharon Carmel) had served together in the training development center of the Israeli Defense Force. After being released from service, Tzuri Daboosh attended the Betzalel Art Academy for two years and then opened his own company. Sharon Carmel joined the company as a partner shortly after upon his release from the army. During the same period, Eli Reifman, also newly released from the army, was doing business with Naftali Shani. In 1994 the four decided to join forces and established Geo Interactive Ltd. (later renamed Emblaze Systems Ltd.). The new founded company was to develop and market computer best training (CBT) products. Eli Reifman and Naftali Shani were to handle the business side, which included sales and marketing, while Sharon Carmel and Tzuri Daboosh were to handle the product development. The information on the age of the founders has been given only in this case as three of the four founders were younger than the founders of the other case companies.

5.2.2 Products

Emblaze started its operations with Multimedia software development projects for foreign companies. Following the development of the Emblaze technology that enabled multimedia over the Internet, subcontracting operations were stopped. The first Emblaze-based product was a software package priced at around \$100 for the Consumer/SOHO (Small Offices, Home Offices) customer segment. The next product was the "Emblaze Creator", a software tool for creative real-time interactive multimedia on the Internet. The Creator was a shelf product with a price of around \$1000 that targeted the enterprise customer segment. Emblaze also sold smaller, more specific software packages priced around \$300 for the enterprise and SOHO segments. Other products were an image compression program and web site building

program, targeting the consumers/SOHO segments, with a price of \$100 each. Unlike its main competing software at the time from Microsoft and Real Networks, the Emblaze technology facilitated video and audio on the Internet with no need for plug-ins or servers.

When Emblaze decided to move into the high-end customer segment, they had to offer full end-to-end solutions including hardware. The prices of solutions for ISPs (Internet Service Providers) were in the tens of thousands of dollars. The next stage was the development of systems for cellular networks that were priced in the hundreds of thousands of dollars. The decision to target the cellular phones market also led to the decision to develop cellular chips with Emblaze technology for cellular phones. The physical chips were manufactured by ARM holdings, which installed the Emblaze cellular technology on them. Emblaze also developed software versions of its technology for cellular phones.

5.2.3 Operations

The founders believed that they had developed skills in multimedia development that gave them a competitive advantage in the global market. The next step was to find out how to use these skills in order to develop the business and make some money. The founders decided to focus on international markets and not on the small domestic Israeli market. Eli Reifman and Naftali Shani went to Los Angeles, where they started to look for potential customers through the Israeli consulate and other contacts of Naftali Shani. They generated around a hundred leads, including Saban Entertainment Inc., the company that brought us "Mighty Morphin Power Rangers" and McGraw-Hill. McGraw-Hill Education was the largest kindergarten through 12th grade publisher in the US and a leading global provider of education materials and professional information. Prior to approaching potential customers, Eli Reifman and Naftali Shani developed different approaches to fit each one of them.

To Saban Entertainment Inc., they proposed to develop a PC game based on the "Power Rangers" TV series and to complete the software in half the time it took other companies. They also claimed that Geo could include video clips in their PC software at a time when very few companies could actually do it. They finally closed a deal

with Saban on the condition that if the software development was not completed on time, there would be no payment. To McGraw-Hill they promised to develop multimedia software which was much superior to the existing software distributed by McGraw-Hill at the time. During the meeting with McGraw-Hill, it was suggested that Geo should take part in a current tender for software development. Upon looking at the tender details Mr. Reifman and Mr. Shani agreed to present a demo within two weeks. Within these two weeks, Geo had developed a fully working prototype of the software, naturally without the full content. Geo won the tender and started developing educational software in mathematics and history for McGraw-Hill. The operation mode in these deals was subcontracting. Geo was developing the software for McGraw-Hill and Saban Entertainment for a fee. McGraw-Hill and Saban Entertainment did all the manufacturing, marketing, and sales.

At the end of 1994, Sharon Carmel and Tzuri Daboosh returned from an exhibition in the US with an Internet connection kit. After having successfully established the Internet connection, they observed that the media included only text and pictures. For multimedia people as themselves it seemed dull. One day when Tzuri Daboosh and Sharon Carmel were sitting together, Tzuri Daboosh suggested to Sharon Carmel that they develop something that would enable animation over the Internet. Sharon Carmel's first reaction was that it was not possible as it took around five minutes at the time just to see text. However, around an hour later Sharon Carmel decided to give it a try and after an hour's work Sharon had a simple working model that enabled him to transfer a simple animation from one computer to another. Naturally they went to tell Eli Reifman. Eli Reifman called for an urgent meeting in which he asked Sharon Carmel and Tzuri Daboosh whether they would be ready to make a demonstration at MILIA, a leading digital media exhibition and conference in Cannes, France, that would take place in around three months. Sharon Carmel answered that it was possible. They went ahead and reserved a place for the demonstration in MILIA, in February 1996, but neglected to check what other companies had a presentation at the same time slot. At the scheduled time only around three journalists arrived to see the demonstration. It was soon discovered that one of the major companies in the field had a presentation in the same time slot. They went ahead with the demonstration anyway and as they completed it, the few journalists present ran to the main hall and

brought other journalist to see Geo's demonstration. They quickly filled the hall and Geo had to do two or three additional demonstrations with full halls.

The impact of the demonstration in MILIA exceeded all expectations. Tzuri Daboosh and Eli Reifman recall that around 400 news articles, in 10 to 20 languages followed the exhibition. The founders realized that they had found a promising new direction for the company and that they should continue to develop this promising technology. While the export of R&D services brought substantial revenues, the Emblaze technology represented a much higher growth potential and the decision was made to abandon the export of R&D services and focus on the new technology. By starting their operations prior to the Emblaze technology with export of R&D services, the founders avoided the need to deal with distribution, marketing, and sales on a global scale shortly after establishing the company. With the development of the Emblaze technology, the company had a product that was global in nature and thus it created the need to deal with distribution, marketing, and sales issues on a global scale. They decided to target the consumer/SOHO (Small Offices and Home Offices) customer segment and the solution was a worldwide distribution agreement with Symantec (Norton Anti Virus, Norton Utilities, pcAnywhere, WinFax PRO).

In May 1997, Geo withdrew from their agreement with Symantec, only three months after signing the agreement, and started to set up their own independent distribution network through a newly established US subsidiary named "Geo Publishing". The subsidiary was established in order to enable Geo to achieve higher sales in a short time, while maintaining full control over all distribution channels. The staff was made of former Packard-Bell employees. The new US subsidiary "Geo Publishing" took care of production, dispatch, marketing, sales, and technical support for all Geo products in the US. At the time, Geo Publishing had about 20 employees in the US and Geo in Israel had about 50 employees.

Initially, Geo targeted the US Internet market, which was the world's largest. Geo Publishing signed distribution and service agreements with leading US distributors (TechData, Insight, Ingram, and Merisel) and has grown its retail presence in the US in some of the largest computer outlets (including CompUSA, Fry's Electronics, ComputerCity, and Egghead) and was available in more than 650 locations across the

US during 1997. Outside the US, Geo developed strategic relationships throughout Europe and Asia with various partners (e.g. the UK, Holland, Belgium, Luxemburg, Japan, Germany, Finland, Australia, Poland, Romania, the Czech Republic, Bulgaria, India, Indonesia, and Hong Kong). According to Eli Reifman Geo had, at the time, more shelf-space than Symantec and 'PC Data magazine' placed Geo in the seventh place by sales of software in the US.

Unfortunately Geo discovered that development of their own retail distribution networks was a process that required large financial resources and time. Large investments were needed in promotion and other aspects and indeed, Geo invested heavily in advertising. In 1997, Geo posted \$3.1 million in revenues and \$10.4 million in operating losses. Geo was working in a market with no clear leader and no really massive competitor lusting after more market share. The largest company in the field, Macromedia, had only slightly more than \$100 million in sales and was not very profitable.

The difficulties in achieving profitability in the consumer/SOHO customer segment led Geo to decide to move to the enterprise segment. This change of strategy represented a change of the whole business model. Product prices went up from around \$100 to around \$500 to \$1000. The former distribution channels developed for retail sales were no longer suitable and they had to find new partners that fit their new strategy. Instead of retail sales, they used Value Added Resellers (VARs) and professional catalogues. The American subsidiary was responsible for the North American market while Europe and Asia were handled from Israel.

The move to the enterprise segment still left Emblaze with a large number of potential customers and the necessity of working through VARs and distributors. Products prices did indeed rise and the number of potential customers was indeed lower from the consumer/SOHO customer segment, but sales were still achieved mainly through partners and a large number of sales were needed to cover their marketing and R&D costs. The basic problems that existed in the consumer/SOHO segment were reduced to some degree, but were still there and thus the move was unsuccessful. An additional problem encountered by Emblaze at the time was that while they offered software-based solutions, their competitors, such as Real Networks, offered a full

solution including the hardware, which was preferred by enterprise customers. Geo's customers at this stage were mostly Internet site builders. A few articles in the press suggest that the focus on the unattractive customer segment of Internet site builders was a result of inexperienced management.

1998 was supposed to be Geo's breakthrough year with estimated revenues of \$50 million and a net profit of \$12 million. Unfortunately, Geo's revenues in 1998 were only \$964,000 with an annual loss of \$17.5 million. The reason Geo gave for the poor result was the institution of a number of new standards (MPEG 4, XML, and DHTML). The streaming audio/video market has undergone a dramatic consolidation process during 1997-1998. Geo's main competitors in 1998 were Real Networks (Real Player) and Microsoft (Media Player). Geo was in real danger of going out of business or being acquired.

In October 1998, Geo realizing that changes were in order, appointed Shai Schiller as general manager. Shai Schiller formerly held various senior positions in Comverse Technology, Inc., an Israeli global leading provider of software and systems enabling network-based multimedia enhanced communications services. The appointment of the new CEO was followed by recruitment of professional and experienced managers from outside the company. The new CEO, together with Eli Reifman, decided on a new strategy focusing on a completely different type of customer. Instead of marketing its products mainly to Internet site builders, where it was competing with Real Networks and Microsoft, Geo turned to the high-end customer segment, which demands products of high technological quality. Emblaze started to offer full end-to-end solutions, including hardware. In the beginning stage of this strategic shift to high-end customers Emblaze focused on the Internet market with the ISPs (Internet Service Providers) and major web sites as their customers. Prices of products for ISPs were in the tens of thousands of dollars and the number of potential customers was much smaller. However, after a while they realized that they could not generate enough revenues from the Internet segment and decided to check whether they could use their Emblaze technology and know-how in the cellular customer segment, especially as they were experts in streaming video and audio through a narrow band. Sharon Carmel was given the task of checking this possibility and after checking the

market and meeting with Samsung, they finally decided to focus on the cellular market.

When Emblazed moved into the high-end segment, they understood that these new customers, especially carriers, needed support and demanded a service that was reliable as a dial tone. This meant that actually 50 percent of what they sell to high-end customers is service. The clear conclusion was that they needed local representation. Eli Reifman gave the example of Italy, where Geo sold a system to an operator and opened a local support center.

The Emblaze technology could also be integrated with mobile phones. Sales of chips for mobile phones manufacturers, such as Samsung and Motorola, did not require local support. At this stage, the number of potential customers around the world was around 300. This meant that all the sales and marketing activities could be handled directly by Emblaze with 20 to 30 salesmen located in seven offices around the world. In 2000, a sales office was opened in New York and new sales channels were established in Europe and the Far East.

The decision to move from consumer/SOHO and enterprises customers to high-end customers was a crucial one. At the time, Real Networks sold its competing software for \$29 on its Internet site (today the basic versions of Real Player and Media Player can be downloaded free on the Internet). There was simply no way in which a company in the size of Geo could have competed with Real Networks and Microsoft and be profitable. This latest change of business model was the third such change in the short time since the company's establishment. Keeping this in mind, it is interesting to note that according to Eli Reifman and some news articles, Geo was two or three times on the edge of bankruptcy before the decision was made to focus on the high-end market. Looking at Geo's financial results, we can see that the change toward high-end customers in 1999 followed a dramatic fall in sales and increase of net loss in 1998.

In an attempt to create an additional source of revenues Geo launched WebRadio.com in 1998, which became a fully owned subsidiary with offices in Los Angeles. WebRadio was a service that facilitated radio and television broadcast over the

Internet. The business model behind WebRadio was that of broadcast.com, which had contracts with 385 radio stations and was acquired by Yahoo at the beginning of 1999 for \$5.7 billion in shares. As Geo was using its own Emblaze technology it was thought that it could offer these services at a far more competitive price than those charged by broadcast.com.

The change of strategy brought results, and in December 1999 Geo was traded at a company value of \$1.4 billion following agreements with Energis, PlanetOnline, and a framework agreement with Samsung Electronics, to incorporate Emblaze technology into the next generation mobile phones and other devices, for a few million dollars. In November 1999, Energis, a UK company, signed an agreement with Geo in which: (1) Energis paid \$2.5 million in cash for the right to use the Emblaze technology; (2) Geo was to receive 50 percent of Energis' revenues from the Emblaze service; (3) Energis acquired 5.6 percent of Geo for \$13 million.

The agreement with PlanetOnline, an Internet access server and a subsidiary of Energis, amounted to \$12.5 million and an additional investment of \$12 million in equity. The fact that Geo also introduced high-end infrastructure solutions for cellular carriers also contributed to high expectations from the company. At this point in time, WebRadio had 160 radio stations with revenues of \$700-\$1,500 per month per station. About 60 percent of WebRadio income came from events transmitted on the Internet (e.g. a meeting of a CEO with investors and analysts or an opening of a hotel). Geo finished 1999 with revenues of \$7.5 million and was expected to achieve sales of \$25 million at 2000.

In April 2000, Geo acquired Orca Computers Ltd. for \$33 million in shares. Orca was an Israeli corporation that developed interactive systems offering a complete solution for data-management, e-commerce and digital video. Geo also signed a strategic partnership agreement with ARM holdings, which manufactures chips facilitating operation of "heavy" applications requiring bandwidth and large memory in mobile devices. Samsung was the first manufacturer of mobile phones to use the ARM chips with Geo's technology. In August 2000, Geo acquired Zapex Research Ltd., which helped Geo develop the second generation of Geo's cellular chip.

WebRadio, Geo's fully owned subsidiary, signed an agreement with Westwood One, a radio content provider from the CBS group. Under the agreement, Westwood One received 6.5 percent of the shares of WebRadio and an option for another 4.5 percent in exchange for the subscription of 450 radio stations to WebRadio's service (tripling the number of stations). This move added about \$4 million a year in revenues. This also meant a potential additional 5,000 stations with which Westwood One was connected. If these stations subscribed to WebRadio, it would have meant another \$30 million per year.

In September 2000, Geo's CEO Shai Schiller resigned and was replaced by Eli Reifman, who was previously responsible for investor relations and marketing. Following the Korean company Samsung, Nokia, and Eriksson undertook cooperation with Geo at the end of 2000. Geo's technology was to be integrated with the Nokia 9210 color communicator and the Emblaze player was to be included in Nokia's devices and servers for communication providers. Eriksson made a licensing agreement to integrate Geo's Emblaze technology with its new generation telephones and networks. Geo also entered into trials with companies such as France Telecom, ITN, Bright Alley, Singapore Telecom, and Sonofon. Geo finished 2000 with \$330.958 million in current assets of which \$185.369 million were cash and cash equivalent, \$75.097 million were short-term deposits, and \$56.337 million in short-term marketable securities. Geo's sales increased from \$7.501 million in 1999 to \$30.712 million in 2000 and its net profit increased from \$7.467 million to \$11.556 million.

On February 5, 2001, Geo Interactive Media Group Ltd (Geo) changed its name to Emblaze Systems Ltd. The company had offices in LA, London, Seoul and Tokyo. In June 2001, Emblaze acquired 19.8 percent in AlphaCell Wireless Ltd, a provider of fully tailored rich-media handsets for segmented target markets. In 2002 AlphaCell Wireless became a fully owned subsidiary of Emblaze Systems. Unfortunately for Emblaze, the telecommunication industry was particularly hard-hit by the global economy slowdown in 2001. The tragedy of September 11 followed by the collapse of Enron made the situation even worse. Sales of cellular phones were slowing down and wireless networks operators were experiencing a slump in new connections. For

Emblaze the year 2001 started well. Telecommunication operators and service providers around the world approached Emblaze to learn more about rich-media personal communications. Many of these companies wanted to conduct a field trial of streaming solutions or MPEG4 chips. During 2001 Emblaze demonstrated its technological capabilities to over 100 mobile carriers and all top terminal manufacturers, representing around a third of the global cellular industry. More than 40 field trials were conducted. However, due to the global slowdown and the economic difficulties faced by Emblaze’s global telecom partners, the conversion of the trials and tenders into revenue generating deployment has been delayed. Emblaze finished 2001 with \$350 million in cash and no debt, but with a net loss of \$29.138 million and a decrease in revenues from \$30.712 million in 2000 to \$23.312 million in 2001.

	1995	1996	1997	1998	1999	2000	2001	2002
Revenues	0.775	1.38	3.059	0.964*	7.501	30.712	23.312	6.839
Net Income (loss)	(0.765)	(1.078)	(9.858)	(17.53)	7.467	11.556	(29.138)	(91.006)
Sales & Marketing	0.264	0.776	6.575	9.612	8.249	13.887	20.3	21.413
R&D net	0.34	0.416	3.91	5.672	4.645	6.63	19.2	29.224

* The fall in revenues in 1998, according to Geo, was a result of the adoption of new standards unexpected by Geo, which forced it to delay the introduction of new products and the phasing-out of the retail market.

Source: Emblaze’s annual reports

2002 was also a hard year for the telecom industry, which up to 2000 had enjoyed seven years of growth and prosperity from which Emblaze had benefited. In 2000, Emblaze reached \$30 million in revenues with a net profit of \$11.556 million. 2001 and 2002 turned out to break the upward trend. Despite the dramatic downturn in the global telecom industry in 2001-2002, Emblaze finished 2002 with approximately \$300 million in cash and no debt. Emblaze trimmed overheads and operating expenses and also reduced their headcount. The expectation in Emblaze was that the

3G wireless revolution would take off in 2005 and they positioned themselves accordingly.

During 2002-2003, it became clear that the cellular world was moving in the direction of enabling high quality images, audio, video and conferencing on cellular networks. All cellular phone manufacturing started coming out with mobile phones with color screens that enabled viewing and transmitting pictures and graphics in addition to voice. Emblaze offers an end-to-end solution for establishing next-generation rich-media services. It continues to invest in R&D, pioneer commercial deployments, gain entry into prime clients, and develop its marketing channels and global presence. Its focus remains on the cellular market and the entire infrastructure package for the rich-media services sector. Emblaze services include consulting, designing, hardware, software, integration, implementation, customization, maintenance, and ongoing support.

Table 16 - EMBLAZE Employees					
Year	1995	1996	1997	1998	2000
Employees	17	29	150	160	250
Source: Emblaze's annual reports					

5.2.3.1 Subsidiaries

In 1997, Geo established the US subsidiary “Geo Publishing”. “Geo Publishing” took care of production, dispatch, marketing, sales, and technical support for all Geo products in the US. In 1997, Geo established a subsidiary in Israel, EduNET Ltd., with the intention of using the Emblaze technology for the delivery of educational titles over the Internet.

In 1998, Geo established WebRadio.com, a service that facilitated radio and television broadcasting over the Internet, as a fully owned subsidiary with offices in Los Angeles. WebRadio.com Inc operations were discontinued in September 2001.

In 2002, Emblaze had six active subsidiaries: Orca Interactive Ltd. (acquired in 2000), Emblaze Semiconductor Ltd. (acquired 2000 – Zapex), AlphaCell Wireless Ltd. (acquired 2001), Emblaze Systems Inc (US), Emblaze Systems U.K. and Emblaze Systems B.V. Emblaze’s foreign offices in China, Germany, Singapore, the UK, the US, and Korea were used for support and sales. All R&D was conducted in Israel.

5.2.3.1.1 Acquisitions

In April 2000, Geo acquired Orca for \$33 million. Orca was an Israeli start-up that developed a content management engine for interactive television, with an option of including work with a database, e-commerce tool, and video broadcast on demand. Orca worked in cooperation with Oracle and Silicon Graphics and designed its products both for Internet companies and for communication operators.

In August 2000, Geo acquired Zapex Research Ltd, an Israeli company controlled by the Japanese conglomerate Brother, for \$27 million through a share swap. Zapex helped Geo develop the second generation of Geo’s cellular chip. Zapex was renamed Emblaze Research Ltd. and later renamed again as Emblaze Semiconductor Ltd.

Geo also invested \$5 million in 2000 in a US company, Tornado Development, a leading developer of Unified Messaging solutions. Tornado Development incorporated the Emblaze streaming media technology into the Tornado Messenger Unified Messaging engine for carriers, ISPs, portals, and private enterprises. Emblaze agreed to offer Tornado Messenger as part of its Emblaze Messaging solution for streaming audio and video over IP and cellular networks. Both companies agreed to co-market the products and share the revenues generated from such activities. Geo’s strategy at that time was to seek M&As to boost their growth.

In June 2001, Emblaze acquired 19.8 percent in AlphaCell wireless 2001 Ltd., a provider of fully tailored rich-media handsets for segmented target markets, for \$6.4 million. AlphaCell wireless became a wholly owned subsidiary in 2002.

In July 2002, Emblaze acquired UcnGO 2000 Ltd, an Israeli-based company, and UcnGO INC., a US-based company, in a cost of \$3.6 million through a share swap.

UcnGO products and technology were complimentary to Emblaze's solutions and were essential for all types of media transfer services such as MMS and streaming media.

5.2.3.1.2 Joint Ventures

In October 1997, EduNet, a joint venture between Geo and the USA publishing house McGraw-Hill was established. EduNet was to market on a subscription basis half-hour educational games accessible directly via the Internet. EduNet was spun off shortly after its establishment.

5.2.3.2 Strategic Alliances

In 2000, Geo signed a strategic partnership agreement with ARM holdings, which manufactures chips facilitating operation of "heavy" applications requiring bandwidth and large memory in mobile devices. ARM competes with Texas Instruments for the status of "the cellular Intel".

In 2000, Emblaze's management realized that 'Emblaze cannot win the future alone' and decided to diversify the technology risk by entering into strategic alliances. This led to the establishment of the Emblaze Partner Development Program launched in January 2001. Among the companies that chose Emblaze as a partner were Eriksson, Microsoft, and Network Appliance.

5.2.4 Markets

As to market entry, the data suggests, as was confirmed by Eli Reifman, that Emblaze clearly had a strategy of the US first then Europe and finally Asia. The decisions were based on the size of the market and the potential sales and resources needed, including translations and support. Cultural issues were never taken into consideration. With its different countries and languages, Europe was considered to be much more problematic than the US. Decisions on target markets were in many cases taken after using consultants. In the 2000 annual report we can see that Emblaze was certain that Asia, '*where take-up of new technology is faster than anywhere else on the planet*' will be the first to take up video applications followed by Europe, '*which have*

delivered a high volume of subscribers to conventional mobile phone technology'. These types of considerations were the basis for Emblaze's market decisions. It is important to note, however, that not all the entries into new markets were a result of strategic decisions made by Emblaze. In some cases, entry in to new markets was a result, for example, of exhibitions and approaches made by customers.

	1995	1996	1997	1998	1999	2000	2001	2002
Europe		10.2%	15.5%	13.6%	89.8%	55%	9.6%	35.4%
North America	100%	89.8%	66.7%	41.6%	10%	9.9%	2%	1%
Far East			17.2%	44.8%		33%	25%	60.8%
Middle East			0.6%		0.2%	2.1%	63.4%	2.8%

Source: Emblaze's annual reports

5.2.5 Financing

In the early stage the three younger partners lived together in a three-room apartment in which they also worked. They had no investors, which meant that part of the equipment they had to bring from home, and they also had to take some personal loans. According to Tzuri Daboosh, venture capital or some type of governmental help was not used in this early stage as the process was simply too hard and time-consuming and by the time the money was available the company was being closed down. In view of these difficulties in raising venture capital or governmental help, the founders decided to search for private investors. This approach proved to be successful when MALAM Systems, an Israeli computer company, invested a few hundred thousand dollars in the start-up. Shortly after the MALAM investment, the subcontracting projects brought hundreds of thousands of dollars of revenues to the start-up and in the middle of 1995 Geo already had 20 employees.

However, further development of the Emblaze technology required more money and the founders decided to go public. The question was in which stock exchange and how to finance the process. After approaching many potential investors, the Israeli Bank for Industry development agreed to loan Geo \$1.5 million. The founders decided on the AIM (Alternative Investment Market) stock exchange in London, which was designed for young companies, because the process was faster and the requirements were less strict than those of the NASDAQ. In October 1996, they raised \$19 million, which gave them a market value of \$158 million. Following the move from subcontracting operations to the development of Emblaze technology, Geo was considered a classic start-up with zero revenue and zero profit. On the basis of the money raised in London, Geo developed a strategy around Emblaze Internet technology.

In June 1998, Geo raised an additional \$42.8 million on the London primary stock exchange giving it a market value of \$281 million and in August the Israeli Investment Center approved \$2.2 million for Geo's expansion. In January 2000, Geo made a private placement raising \$400 million with a market value of \$4.4 billion. This meant a rise of 14,000% in market value since the new CEO was appointed in 1999. Geo used the funds raised in order to make a number of important strategic moves to facilitate its conquest on internet-television-cellular market share.

5.2.6 Competitive Edges

Emblaze's main competitive edge was clearly its technological advantage. Most of the time, Emblaze had a technological lead of around 18 months on its competitors. It was the first to introduce a technology that enabled animation over the Internet. In 2000, when many companies talked about broadcasting video to mobile phones, the only company that was able to arrange a real working demonstration was Emblaze.

The technological advantage, however, is not the whole story behind the success of Emblaze. Since the establishment of Emblaze, many competing start-ups claimed that they had a superior technology. Most of these start-ups, if not all, went out of business. While some strategic mistakes were made along the way, the leadership of

the founders and the company's flexibility and entrepreneurial spirit were clearly important contributing factors to the success achieved by Emblaze.

5.3 Orckit Communications Ltd.

Orckit (NASDAQ: ORCT) is a leading provider of advanced telecom equipment targeting high capacity broadband services. Orckit is a major shareholder of Corrigent Systems, which is developing metro transport telecom products designed to provide SONET (Synchronous Optical NETWORK) and Ethernet (Local Area Network technology) services utilizing advance packet technologies. Orckit has generated revenues from abroad since its establishment in 1990. In 1996, Orckit generated revenues in Europe, North America, and Israel. From 1996 to 2001, more than 91 percent of the turnover was generated outside the domestic continent (see table 20).

5.3.1 Founders and Method of Establishment

Orckit Communications Ltd. was established in 1990 by Eric Paneth and Izhak Tamir. Eric Paneth has been Chairman of the Board of Directors and CEO of Orckit since its founding in 1990. From 1975 until 1983, Eric Paneth was a senior engineer in the Israeli Ministry of Defense, and from 1985 to 1990, a technical department head in the Israeli Ministry of Defense. From 1983 until 1985, he was employed by Linkabit Inc., in San Diego, California. Eric Paneth holds an advanced engineering degree from the Israel Institute of Technology, commonly known as the Technion. Since January 2000, Eric Paneth has been a director of Tioga Technologies Ltd.

Izhak Tamir has been President and a Director of Orckit since its founding in 1990. Izhak Tamir holds an engineering degree from the Technion and an M.B.A. from Tel Aviv University. From 1978 to 1985, Izhak Tamir was a senior engineer in the Israeli Ministry of Defense. From 1985 until 1987, he was vice president of A.T. Communication Channels Ltd., a subsidiary of Bezeq. From 1987 until 1989, Izhak Tamir worked for ComStream Inc., in San Diego, California. Since January 2000, Izhak Tamir has been chairman of the board of directors of Tioga Technologies Ltd.

Izhak Tamir's work in ComStream can be seen as a key to the establishment of Orckit. When Izhak Tamir joined ComStream, an American start-up, he was the 30th employee in the company. Before joining the company, Izhak Tamir did not even know what a start-up was. ComStream signed a major agreement with Toshiba with the goal of developing satellite communication technology. Because of his

experience in the Israeli Ministry of Defense, Izhak Tamir became a key person in the company and acted as the contact person for ComStream with Toshiba. After a two years period, in which ComStream grew to 100 employees, it was time for Izhak Tamir to return to Israel. In these two years, Izhak Tamir realized that he had learned all the business aspects of the company and that he really enjoyed combining the business side with the engineering side. Upon leaving ComStream in 1990, he managed to convince it to invest in his newly founded company, Orckit, a sum of \$75,000 to start development of next generation equipment. Six months later Eric Paneth joined Izhak Tamir and they obtained a participation of \$0.8 million (the total budget was \$1.6 million) from the BIRD foundation for their project with ComStream. At this stage they recruited 3 more engineers. This first project was a subcontracting job performed by Orckit.

5.3.2 Products

Orckit started its activities by performing R&D work for ComStream and other foreign firms. The next stage was the development of their own HDSL (High speed Digital Subscriber Line) product. The cables connecting most households to the phone network are mainly simple pairs of twisted copper wire, which have only been able to carry analogue traffic. DSL technology enables much higher speeds across the twisted pair lines from the exchange to the home. HDSL is used for wideband digital transmission within a corporate site and between the telephone company and a customer. The main characteristic of HDSL is that it is symmetrical; an equal amount of bandwidth is available in both directions. At this stage the physical product, the chip, was developed by Brooktree and Orckit developed the software which was installed on the chip.

At the next stage with its ADSL (Asymmetric Digital Subscriber Line) product, Orckit developed the whole chip including the chip base, the hardware itself, and the software. ADSL is asymmetric: a higher speed is available from the exchange to the user (downstream) and a slower speed from the user to the exchange (upstream)

5.3.3 Operations

While working on their first project with ComStream, the founders used their American connections to find more projects for the newly established company. They subcontracted 5 to 6 projects until the end of 1993. During this first three-year period of subcontracting, they learned much about how to do business. One important lesson, according to Izhak Tamir, was to be tough in negotiations and not to be impressed by the size of the opposite party. At this point they came up with the idea for their first product - the HDSL. The subcontracting continued until 1997 but at the same time the company started to work on HDSL technology. In 1993 they recruited an HDSL project manager.

One of Orckit subcontracting projects was for Brooktree, a chip company. Orckit developed their HDSL product on the basis of Brooktree's chip. The chips are the basic processors on which other products can be developed. The Brooktree chip was the basis on which companies could develop their HDSL products. Orckit's HDSL product was developed with General DataCom, an American company. General DataCom had the marketing rights in the US and Orckit in Europe. In 1993, when they already had a working HDSL prototype, the main marketing efforts were in Europe. Although it is a very hard task to sell to telecoms, Orckit had one big advantage over its competitors – vertical integration. Brooktree sold the chip developed by Orckit to all of Orckit's competitors. However, as Orckit developed the chip they could implement requested changes very rapidly. For the competitors it was much more complicated and time consuming. This vertical integration gave Orckit a big advantage.

The story of the Orckit – ComStream connection is interesting. Brooktree was located just next to ComStream. One day in the parking lot the CEO of Brooktree met the founder of ComStream and told him that he is fed up with the company that is working with them on HDSL. The founder of ComStream recommended Orckit and shortly after that Brooktree's CEO indeed made the call to Orckit. They talked three times on the phone and then the Americans asked Orckit to send them a video so they could see how they look. Finally a contract was signed. With General DataCom it was

a different story as Orckit approached them. It took several meetings before they signed a contract.

In the beginning of HDSL sales in Europe, the goal was to enter the European telephone companies, which are generally considered to be conservative. With the HDSL, Orckit could not sell in the US because of their agreement with General DataCom. Orckit reached an agreement with General DataCom that enabled it to use General DataCom's distributors in Europe. It took Orckit about six months to discover that these distributors were simply not suitable. Parallel to working with General DataCom's distributors, they decided to utilize the standard committees as a vehicle to penetrate the European PTTs (Postal, Telegraph and Telephone - Generic European name usually used to refer to state-owned telephone companies). Izhak Tamir began to attend meetings of the European standards committee, which met once or twice a month. There was a great deal of teamwork in these meetings and people got to know each other very well. Through these contacts, Orckit started the process of building relationships with the telephone companies that were represented in those meetings.

With the ADSL Orckit already had contacts with all of these companies and contacted them directly. Orckit took part in tenders, in some cases with a partner and in some cases alone. To Telia in Sweden, and in South Africa they went alone. In Holland they went with Lucent, in Germany with Fujitsu or Bosch. In every case they first approached the telephone company, which was the end-customer, and asked them with whom they would like to work. These companies eventually approached Orckit. In the first Deutsche Telekom tender in which Orckit took part, in 1997, they submitted three offers - with Bosch, Lucent, and Fujitsu. In June 1997 Orckit won a tender to supply HDSL systems to China, and in July to supply ADSL systems to Telecom Italia.

While marketing the HDSL products Orckit was looking for the next generation product, which they believed was the ADSL. In 1995 the company had around 40 workers and most of the resources were invested in developing the ADSL technology even though they could not be certain that it would be the future technology. At the

time it was thought that ADSL technology would be intended for Video-on-Demand applications. As all field trials of Video-on-Demand failed, not because of the technology, but because of the business model, Orckit faced a crisis. The HDSL market was looking good but most of the resources were invested in the ADSL and it looked like there might not be a market for the product. Orckit considered whether they should stop the ADSL development (the costs were huge and future market for this product was in doubt) or also develop the ADSL chip. Control over the chip could ensure the competitive position of Orckit in the future ADSL market, assuming that there would be such a market.

According to Orckit's 1998 annual report, ADSL was becoming the popular choice of telecoms around the world as the most immediate, cost-efficient enabler of broadband transmission over copper wire. Commercial deployment by major telecoms began. Orckit won two major tenders for the largest deployments in the world (with GTE and Deutsche Telekom AG). Orckit's competitors at the time were large MNEs. In 1998, Orckit established an office in China, in addition to its offices in Europe and The US. In 1998-9 news articles show that Orckit had sales around the globe including: Italy, France, Holland, Ireland, Sweden, Germany, China, Norway, Czech Republic, Argentina, the US, and Israel. In 1998 Orckit together with Fujitsu reached an agreement with GTE, an American telephone company, in which GTE was to offer Orckit's products in 16 states in the US. In November 1998, Orckit signed an agreement with Lucent for the distribution of DSL equipment in Europe, Africa and the Middle East. Orckit's 1998 annual report shows that it had made a transition to provide end-to-end solutions and as a result had to expand its customer support division. In 1999, Orckit was chosen to supply HDSL systems to the two main incumbent telecom companies in Argentina. In 1999, Orckit was ranked among the top DSL Suppliers worldwide in two reports of Dataquest, an industry analyst group.

In the ADSL market, Orckit was second to Alcatel. The development of ADSL technology required hundreds of millions of dollars and the strategy was to raise this money all the time. Profitability was to be achieved in 2001. In 1998, Izhak Tamir started to be concerned whether Orckit would be able to raise sufficient money to support the strategy. This was followed by some problems with Deutsche Telekom concerning the price of the ADSL product. Orckit concluded that if they could not

maintain the higher price with Deutsche Telekom they would be unable to pursue a strategy of obtaining market share based on forward pricing without raising additional \$200 million. In other words, the business model was simply not working and they would have to exit the business. This was not a simple decision. At the time, the company had around 800 employees and the future for the ADSL technology seemed bright.

In April 2000, Orckit Communications approved a plan to spin-off its semiconductor division to its shareholders. The spin-off named Tioga Technologies Ltd. owned Orckit's former semiconductor business and the business of Silicon Value Ltd (see details under acquisitions). In May 2000 Orckit won a major Korean DSL contract and its stock price declined to \$27 from a high of \$90. Some analysts claimed that the problem at Orckit was the manufacturing cost and not the sales. In order to reduce its manufacturing costs, Orckit acquired new technologies. Unfortunately the market perception was that the integration process of these acquisitions could be costly and further delay profitability. An additional problem, according to analysts, was that Orckit sacrificed its profit margins to increase market share. According to Izhak Tamir, it seems that the entire ADSL market was selling products at a loss in order to get market share in the hope of a brighter future. This strategy, together with a dependency on Deutsche Telekom, seems to have failed. The problem with Deutsche Telekom indeed reduced Orckit's earnings and was a major factor in the stock price decline. The market was intensely competitive.

Many of Orckit's competitors and potential competitors were large established companies that had better name recognition and greater financial, technical, manufacturing, marketing, and personnel resources than Orckit. Orckit's competitors included companies such as Alcatel, Cisco Systems Inc., ECI Telecom Ltd., Lucent Technologies Inc., and Siemens AG. In 2001, Verizon, which was Orckit's largest customer and accounted for all its US sales in 2000 and 2001, started to engage larger vendors of DSL products. In addition, many telephone companies had or could have adopted policies that favor the deployment of fiber optics or wireless technology. Taking all this into account Orckit had only two choices: (1) to continue to sell and lose money and hope for a brighter future with high profitability, or (2) to exit the ADSL market.

In June 2000, while the global telecom business was going well, Orckit exited the ADSL market after concluding that it was not profitable. This was at a time when Orckit was considered a world leader in ADSL technology and the technology itself seemed to have a very promising future. When the proposal to exit the ADSL market was brought to Orckit's board, the board members did not take it seriously. After lengthy discussions, the tough decision was made. As a result the stock price went down sharply. In parallel Orckit negotiated all its existing ADSL contracts with more than 15 customers, including Deutsche Telekom and the Israeli Bezeq, to whom it was selling products at unprofitable prices. In July 2000, Orckit released a profit warning for the second quarter.

At the time, Orckit's liabilities exceeded its assets. In the quarter following the date of the exit decision (Q3 2000), the negative cash flow was \$30 million. In the fourth quarter of 2000 the situation improved and the negative cash flow was \$10 million. It was during 2001, a year in which the Telecom market was in crisis, that Orckit started to flourish thanks to the tough decision to exit the ADSL market that was taken at the right time. In 2001, Orckit was profitable and its cash exceeded its liabilities by \$70 million.

Table 18 - Orckit Employees		
Year	1998	1999
Employees	343	583 (271 in R&D)
Source: Orckit's annual reports		

At the time of the exit, Orckit had \$115 million and a debt of \$125 million. When they decided to exit the ADSL business they also fired many employees. At the end of 2002 Orckit had around \$80 million above the debt. One year after the decision to exit the ADSL market, which was highly criticized by capital markets analysts at the time; we can clearly see a shift in the views as presented in news articles. Izhak Tamir was now seen as the only prophet standing at the gate in the time of the exit. He was seen as the only one with the courage to say that the king was naked.

Since the exit decision, the big telecommunication companies continued to invest huge amounts of money in DSL technology while the telephone operators were still buying the old modems as result of the global economic crisis and the slow down in the pace of technology and communication around the world. While most of the technology and telecommunication companies around the world continued to report poor quarterly results Orckit began to show an operating profit in the third quarter of 2001.

In retrospect, Izhak Tamir believes that the decision to exit the ADSL market saved Orckit. He compares their situation with that of the Titanic. Orckit was number two in the market but they understood that the ship was about to sink so they lowered four lifeboats: Corrigent Systems, Spediant Systems, Siliquent Technologies, and Tetis. Corrigent is developing metro transport telecom products designed to support SONET and Ethernet services utilizing Resilient Packet Ring (RPR) technology. Spediant is developing innovative access solutions that enable telecom carriers to deploy fiber-speed broadband services over copper wires. Siliquent Technologies is a fabless semiconductor company developing Ethernet Processing Unit (EPU) for high performance storage and computing over a Ethernet infrastructure. In 2002, one news article view was that even if Corrigent failed, Izhak Tamir proved that he knows when to cut failures on time and with tens of millions in the bank.

Orckit seem to have been dependant on a few big corporations. According to Izhak Tamir, when Fujitsu sold an Orckit product to the first customer they become dependant on Orckit. The damage that can be caused to Fujitsu's other businesses by that buyer if the product will not function well is considerable. There was also the danger that these large corporations, like Fujitsu, would choose to develop the technology themselves. This was why the technology had to be protected carefully. In addition, Orckit also signed an exclusive agreement with Fujitsu, for example, for five years in which Fujitsu was not permitted to develop the technology themselves. Izhak Tamir was aware that this legal protection was not sufficient. However, during this time Orckit got to know the end-users and learned a lot.

Table 19 - Orckit Key Financial Figures, in USD million							
	1995	1996	1997	1998	1999	2000	2001
Revenues	6.439	13.716	27.547	45.249	88.864	131.867	141.647
Net Income (loss)		(3.106)	(0.158)	(15.749)	(24.992)	(106.654)	0.856
R&D, net	2.596	3.32	4.347	10.099	15.786	30.86	19.085
Source: Orckit's annual reports							

5.3.3.1 Subsidiaries

In 1998, Orckit established an office in China in addition to its offices in Europe and the US. After exiting the ADSL market, the strategy of Orckit was to initiate new technology projects and Orckit was divided into four small groups: Corrigit systems, Spediant, Siliquent Technologies and Tetis. The first to be established was of Corrigit Systems Inc., a US subsidiary, which was formed in 2000. In 2001 additional technology projects were initiated and the three additional subsidiaries were formed. The best 150 employees in Orckit were transferred from all their current tasks to the newly formed subsidiaries. Orckit was left with around 400 employees and all the customers they wanted to get rid of. In 2003 only 11 employees were left at Orckit and about 170 in its subsidiaries down from a high of 800 employees before the spin-off of Tioga.

In 2001, Siliquent Technologies, one of the newly formed subsidiaries and a provider of technology for the storage network application industry, raised \$10 million in equity financing from Benchmark and Greylock, a tier one venture capital firm in the US. During 2001 it became clear that most of Orckit's R&D investments would go to Corrigit Systems. Orckit was in the process of closing down its current operation and making Corrigit Systems or Spediant the new Orckit.

5.3.3.1.1 Acquisitions

In April 2000, Orckit acquired 100 percent of Silicon Value LTD., an Israeli corporation engaged in the design, development, production and sale of application-specific integrated circuits. The acquisition goal was to supplement the planned spin-off of the semiconductor division, Tioga Technologies. In 2002-2003 STMicroelectronics acquired Tioga in a two stage deal in which they paid around \$32 million and assumed all of Tioga's liabilities.

In May 2000, Orckit decided to acquire E.D.S.L Networks, an Israeli corporation engaged in the development of infrastructure for high-speed Internet access, for \$38 million in shares, in order to expand its offering to the multi-tenant unit market with VDSL technology. In 2001, E.D.S.L halted its operations.

5.3.3.1.2 Joint Ventures

No joint ventures that created a new entity have been established by Orckit. According to the definitions used in this study (see subchapter 1.6), the joint ventures operations of Orckit have been classified as strategic alliances.

5.3.3.2 Strategic Alliances

Orckit's strategy was always built on alliances. In 1997 Orckit announced that Orckit and Fujitsu Microelectronics would jointly develop the new generation of ADSL components, which would be distributed by Fujitsu. In November an R&D joint venture, to develop HDSL 2 technology, with Rockwell Semiconductor systems, a leading developer and manufacturer of fax and modem chipsets and other telecommunications technology, was announced. In December a joint R&D project, to develop VDSL technology, was announced by Orckit and Siemens Public Telecommunication division.

In 1998, the strategic alliances had a dramatic positive impact on Orckit's market penetration. In particular, Orckit's alliance with Fujitsu Network Communication won the tender for GTE in the US and the alliance with Fujitsu Limited won the tender for

the Deutsche Telekom tender in Germany. In 1998, Orckit also joined forces with Lucent Technologies Inc. in a sales and marketing agreement that targeted Europe and the Middle East.

In January 2000, Orckit and Raiotronica Group of Spain announced an alliance in which they would jointly set-up a center, which would market, service and manufacture DSL products in Spain and Latin America.

5.3.4 Markets

Orckit's main marketing effort was in Europe due to the agreement with General DataCom in the HSDL. The market entry main criterion was market potential. This meant that at the beginning, Orckit left out small countries like Austria and focused on the big markets. However, they did need one small country to be their first customer in order to demonstrate Orckit's capabilities. The big companies usually do not buy products before some other company has bought them. For Orckit, the first country was Cyprus. After Cyprus they were able to sell to France Telecom and Telecom Italia. Orckit also sold in South Africa, after Cyprus, but most of their energy was focused on the big markets. In the HDSL, it was mainly a 'learning by trying' process.

With the ADSL it was a different situation. Orckit had the contacts with their potential customers and they had the experience in doing business with them. They entered first of all because of the technology. When the big OEM customers got to know Orckit, many of them approached it in order to bid jointly in tenders. These companies include Lucent, Fujitsu, Bosch, and Siemens. The ADSL was an infrastructure product, which meant that higher levels in the organizations had to be reached and the competition was tougher. In the US market, Orckit decided to distribute only through Fujitsu under an OEM agreement. The contact with Fujitsu was through Orckit's office in the US. Orckit had ten employees in the US and a former General DataCom employee headed the office. The workers in the US knew the Fujitsu people and after Fujitsu tested the products they started to work together.

	1996	1997	1998	1999	2000	2001
US	21.6%	11.3%	48.2%	53.4%	67.9%	78.6%
Europe-country A	36%	22.3%	9%	8.8%	NA	16.5% *
Israel	4.6%	8.6%	6.4%	3.9%	7.9%	1.6%
Other countries	37.8%	57.8%	36.4%	33.9	24.2%	3.3%

- All Europe
- The US revenues in 2000 and 2001 were from sales to Verizon

5.3.5 Financing

The first subcontracting project carried out by Orckit, the ComStream-Orckit project, received \$0.8 million from the BIRD foundation and ComStream invested the remaining \$0.8 million. BIRD is an Israel-US Binational Industrial Research and Development foundation. Its mission is to stimulate, promote and support industrial R&D of mutual benefit to the US and Israel.

At the end of 1993, Orckit had accumulated a net profit of more than a \$1 million from its export of R&D services. Export of R&D services was a major source of finance for R&D and it enabled the founders, after three public offerings and two private placements, to hold onto around 30 percent of the company.

Orckit's HDSL product was developed with the help of the BIRD foundation and in cooperation with General DataComm, an American company. In 1993, when Orckit already had a working HDSL prototype, they decided to do the first private placement, in which they raised \$2.2 million from private investors for 10 percent of the company.

When future prospects for ADSL technology were in doubt (1994-5) it was difficult for Orckit to raise money. Orckit was running out of money. At the beginning of 1995 Orckit approached Brooktree and convinced them to pay Orckit royalties of \$1.3

million in advance. Brooktree was dependent on Orckit with its HDSL chip and did not want to see Orckit go out of business. This down payment of the royalties from Brooktree saved Orckit from going out of business.

In September 1995, it started to be clear that ADSL technology is good for the Internet and Orckit was successful in finding more investors and raised \$7 million. In September 1996 Orckit raised \$40 million in NASDAQ giving it a market value of \$281 million. In June 1999 Orckit raised approximately \$53.5 million net in a follow-on offering. In October 1999, Orckit and Cayman Systems, an American company, were awarded \$2 million funding by the United States - Israel Science and Technology Foundation, for the developments of DSL products.

Hundreds of millions of dollars were needed for the development of the ADSL technology and the strategy was to raise this money all the time. Orckit expected to become profitable in 2001. In 1998, Izhak Tamir became concerned about whether Orckit would be able to raise sufficient money to support the strategy. In June 1998, Orckit had a second public offering on the NASDAQ at the time of the economic crisis in Asia. Orckit had difficulties in raising the money and it took two days to complete the public offering. Failure to raise the money would have meant that Orckit had to close its operations within a few months. Orckit raised \$46.8 million with a stock price of \$18 down from a \$20-\$21 that was predicted before the Asian crisis by the analysts, which would have raised \$60 million.

In 2002, Orckit stock reached a high of around \$90 with a market value of around \$2 billion. In March 2000, Orckit Communications started trading on the EASDAQ, in addition to the NASDAQ. EASDAQ is a pan-European stock market established in 1996. In March Orckit made a private offering of convertible subordinated notes and raised \$125 million.

In May 2002, Orckit Communications Ltd was listed on the Tel-Aviv Stock Exchange. The move seems to be a result of (1) substantial lower commissions in the Tel-Aviv Stock Exchange, (2) the changes at Orckit, which reduced its activity and transferred its efforts to Corrigent, could in the future endanger its listing on the NASDAQ.

In October 2002, Orckit decided on a merger of stocks in a ratio of 1 to 5 in order to keep its NASDAQ listing.

5.3.6 Competitive Edges

Following its export of R&D services phase, Orckit's strategy was to have a technological lead over its competitors. Without a very big technological advantage, it would not have been possible for Orckit to compete against large corporations. Large firms like Alcatel used their large financial resources against Orckit. Alcatel filed a suit against Orckit concerning patents and backed off only when Orckit counter sued with an anti-trust claim. However, Alcatel won the ADSL war. It is possible that if Orckit had had more money they could have beaten Alcatel.

As is the case in the other case studies, technological advantage is not the whole story. The leadership of the founders was a main factor behind the success of Orckit. This leadership was put to a test with the decision to exit the ADSL market and launch four new subsidiaries. The ability and courage of the founders to admit that their previous business model did not work and to decide to exit the ADSL market when their company was second only to Alcatel clearly saved them. Instead of going out of business, Orckit exited the market with considerable resources remaining in the company and invested its resources in its subsidiaries. During 2003, Corrigent Systems seems to be emerging as the next Orckit.

5.4 VCON Telecommunications Ltd

VCON Telecommunications Ltd (Euronext: IL0010830540) designs, develops, manufacture, and sells videoconferencing systems designed for a variety of networks, including those based on the Internet Protocol (IP). VCON started generating revenues from foreign markets since its inception in 1994. In 1998, VCON generated revenues in Europe, North America, Asia and other countries (see table 23). More than 93 percent of its revenues in 1998 were generated outside its domestic continent.

5.4.1 Founders and Method of Establishment

VCON started in 1993 as a project in Optibase, an Israeli company founded in 1990, which is a leader in MPEG codecs (encoding and streaming platforms). Optibase got a project from GTE, a large American telecommunication firm, to develop a video conferencing board for the PC. At that time, Optibase was short of cash and resources and there was a big debate in the company on accepting this project. Optibase started development work on the project but later decided that the products and markets for PC-based video conferencing solutions were different from those of Optibase. A month after releasing their first product, VCON was spun-off to Optibase's shareholders. Eight of Optibase's employees made the move to the newly established VCON in October 1994. Optibase shareholders obtained 50 percent of VCON's shares. Moti Gura, a co-founder, gave the new start-up a \$200,000 loan and received the remaining 50 percent of the shares. The loan was returned 18 months later.

From the interviews it seems that Moti Gura and Doron Herzlich are considered to be the founders of VCON. Both Moti Gura and Doron Herzlich were among the founders of Optibase and it seems that they were also the driving force in the establishment of VCON. Doron Herzlich earned a Bachelor of Science degree in Electrical Engineering from the Technion Institute of Technology in Haifa, Israel. In 1990, he co-founded Optibase, where he was executive vice president of research and development and later president and CEO. Optibase established the world's leading video and audio encoders/decoders for PCs. In 1994, Doron Herzlich co-founded VCON, and served as president and CEO. Both Optibase and VCON are traded

publicly. Doron Herzlich is currently (2003) a director in Mediagate, which is his third start-up, and which he co-founded in 1996.

Moti Gura was co-founder and former CEO of VCON Ltd. He received a bachelor's degree in electrical engineering and electronics from the Technion, Israel Institute of Technology, and a master's in sciences from the Recanati School of Business Administration at Tel Aviv University. Moti Gura has started several well-known Israeli Hi-Tech companies, including Fibronics, Adacom, VCON, and Optibase.

5.4.2 Products

Before the establishment of VCON, the cost of purchasing a video conferencing system was around \$80,000-\$100,000. Only large corporations or governments could buy such systems. VCON started in the desktop products, with a PC based video conferencing system. The heart of the system was a video conferencing card that was inserted into a standard PC. There was no need for this PC to be dedicated for video conferencing and it could be used for other tasks as well. VCON's much lower prices, in the hundreds of dollars range, also made it possible to sell these systems to smaller businesses. Since inception VCON's target customer segment comprised corporations, government, and educational institutions (enterprise segment). The consumer segment was never a target as the systems, even in the reduced price, were considered to be too expensive for home use.

Since 1997, VCON also moved to room systems developed for conference rooms. The move into the room systems was a result of VCON's management conclusion that the desktop market itself would not be enough to sustain the growth they wanted for the company. The room systems are stronger stand-alone systems. They contain additional functions such as a camera that moves by itself and identifies the speakers, a splitting screen which enables the user to talk with a few people at the same time, and so on. Since 2000, the desktop share has been declining and the room systems share growing. In 2002, around 50 percent of the revenues were from room systems, 35 percent from desktop systems, and 15 percent from software products.

Table 21 - VCON Product Categories		
	1999	2001
Networking (manufactured by third parties)	31%	24%
Desktop	36%	30%
Room	33%	41%
Source: VCON's annual reports		

Since inception the majority of VCON's R&D team has worked on developing software and only a small R&D group has worked on developing hardware. Since around 2000, as PC computers became faster, VCON also started to make pure software products, which are slowly producing a larger share in VCON's revenues. From the technology view point, by 1997, VCON had come out with dual mode products that had two connection options: ISDN and LAN (IP). In 2002, most of VCON's products were dual mode, except for a few that were only IP. VCON's management estimated that the IP market is going to explode. Everything will be on IP and no-one will use ISDN or switches. IP was viewed as the communication platform that would replace the existing communication platform, including telephones and cables. IP was not developed for transferring video and audio and this was where VCON's technology came in. VCON provides full solutions as well as subsystems.

5.4.3 Operations

The original concept of VCON was to provide low-cost PC-based video conferencing solutions. VCON's activities started with an R&D phase. The only activity at that time was R&D and it was all done in Israel. As soon as the first product was developed, marketing and sales activity began and VCON opened a subsidiary in the US. This was followed by the establishment of foreign subsidiaries in Germany (1996), in Spain (1997) and the UK (1997). The entry to target countries was at the beginning based on Moti Gura's connections from his previous business life. After making use of Moti Gura's connection, VCON started to go to trade shows and find distributors.

In February 1995, VCON signed a manufacturing and marketing agreement with IPC Corporation Ltd., a Singapore corporation, which was then the holder of more than 20 percent of VCON's shares. In the third quarter of 1996, the manufacturing agreement was terminated. According to Yaron Menczel, Chief Technology Officer, it was a disaster because VCON had small quantities and too many changes in the early stages of the product life cycle. The quality was also not satisfactory so VCON decided to manufacture themselves with subcontractors doing part of the manufacturing and in 1999 all product manufacturing (hardware) was subcontracted to an Israeli-based firm. Around 99 percent of the hardware components (in money terms) are imported. Some software is bought from international vendors for a one-time fee or royalties or a mix of both. In the 1999, 2000 and 2001 annual reports it is stated that VCON is purchasing certain important components from two major suppliers located in the US and Germany. It should be noted that only hardware components were imported or subcontracted. The software which was the core of the systems was installed by VCON.

1997 was a year of change at VCON. In addition to moving into room systems (see more details under products), VCON also moved into IP products and started distributing products under their own brand name. Until 1997, VCON tried the OEM route and failed. VCON had OEM agreements with companies such as Sony, Eriksson, Siemens, VSI, CLI, and Panasonic. According to Mike Clifford, Sales Director and part of the original eight Optibase's employees that formed VCON, the process of reaching OEM agreements was usually very long. Contacts were made through trade shows and by contacting the managements of large OEMs. During this period the expectations in VCON were that OEM agreement, with companies such as Sony, would result in big orders. Unfortunately this did not happen and order volumes were lower than expected.

The benefit of starting through OEMs was that it forced VCON to work harder and improve their products. This was particularly true with the Japanese strict and demanding OEM firms. Realizing that the OEM strategy had failed, VCON decided to move to distribution of branded products with less OEM. As early as 1998 VCON was selling under its own brand name in more than 40 countries. Around 80 percent

of VCON's revenues in 2002 originated from VCON branded products sold through three distribution channels: (1) traditional channels for video conferencing; (2) IP network equipment channels; and (3) audio/video integrators.

In 1998, VCON became the market share leader in business IP videoconferencing. In July 1998 Yair Shamir replaced Moti Gura, a co-founder and CEO since inception, as CEO of VCON. At the time VCON had around 150 employees. Yair Shamir, who joined VCON in 1997 as COO and president, was formerly Executive Vice President of Etgar, a large Israeli venture capital fund, the CEO of Elite Industries, one of Israel's largest food products companies, and Executive Vice President and General Manager of Scitex, an Israeli world leader in computer graphic systems.

In 2000 VCON reached sales of around \$36 million. In the fourth quarter of 2000, when the economic downturn started to affect many telecommunication firms, VCON sold around \$11 million. Unfortunately this record breaking sales quarter led VCON to the wrong conclusion that every thing is in crisis except video. On the basis of this conclusion, VCON did not downsize or take any other action to prepare the company for the telecom downturn. Thus the first quarter of 2001 found them not prepared for the sharp downturn in sales. Up to that point, VCON has been growing rapidly. The continuous growth and lack of experience, especially in economic downturns, contributed to the failure in identifying the problem on time. It took VCON around two quarters to understand the new reality. With previous annual sales of around \$36 million, VCON adapted its operations to annual sales of \$6 million. VCON started two rounds of downsizing in which they went down from 240 employees to 140 employees in addition to pay cuts. The need to increase profitability led to the following strategy:

1. Increasing software sales, which are more profitable than hardware.
2. Developing higher priced software products with more functions.
3. Targeting the service providers' market although in 2002 when you looked at the whole video conferencing market only around 10 percent of the sales was to service providers.

In 2002, the IP market was at full stop. The IP market is based on investments in networks. Companies purchase a video conferencing system when they are updating their existing network. Usually the video conferencing is bought as part of a bigger and much more expensive network system. In many cases, such investments are made when a company is growing. As a result of the global economic slowdown combined with technological and commercial problems there was a stop in investments. The video conferencing market was one small part of the global telecom downturn.

5.4.3.1 Subsidiaries

As soon as the first product was developed, marketing and sales activity began and a US subsidiary was opened. In 1996, a German subsidiary was established together with a local partner (50/50), Controlware Communication Systems GmbH. As this was the first subsidiary in Europe, VCON thought that it would be better to have a big partner from the telecommunication business in Germany. The German office took care only of the German market while the rest of Europe was handled from Israel. The joint venture with the German partner did not work out and they were bought out. Following the US and Germany (1996), subsidiaries were later opened also in Spain (1997), the UK (1997), and China (Beijing office opened December 1998).

During the years, VCON opened offices in ten countries outside of Israel: the US (6 locations), China (3 locations), Germany, France, Italy, Spain, the UK, Mexico, New Zealand and Japan (later closed). According to Jack Wakileh, Vice President for Finance, the strategy was to open a subsidiary in every market that reached annual sales that were over \$600,000-\$700,000 and showed repeated business. In other markets they worked through distributors. In every subsidiary, VCON's goal was to act as a local company in the local language with a local manager and local employees. Most subsidiaries functioned as autonomous sales, marketing, and support units in their own local market. As it was not possible to achieve sales without technical support, each subsidiary had to include a technical support function. VCON's strategy was developed in Israel, but the subsidiaries had some degree of freedom to do their own business development. VCON subsequently changed its organization and in 2002 VCON had a Vice President Europe in its German

subsidiary. The logistics for all European countries were managed from Germany, which meant that in Europe, VCON worked directly only with Germany. Like the Vice President of Sales, Americas, the VP Europe can also develop business activities, in other words find strategic partners.

	1996	1997	1998	1999	2000	2001
Revenues	5.213	9.484	17.073	27.077	36.154	26.645
Net Profit (Loss)	(3.839)	(5.025)	(6.62)	(9.195)	(6.539)	(11.525)
R&D net	2.016	2.444	3.59	4.694	5.081	3.639
Selling & Marketing	2.435	4.786	7.154	9.05	11.535	9.475
Source: VCON's annual reports						

5.4.3.1.1 Acquisitions

VCON has made only one acquisition; in 1999, they acquired PhoNet Communications, an Israeli company, for \$4.207 million (\$0.75 million in cash). With the acquisition of PhoNet Communications VCON (a) got additional functionality and benefits for its own products from the integration of selected PhoNet technologies, and (b) positioned itself as a provider of a complete business-networked multimedia solution over IP. VCON has also invested in some ventures of Moti Gura (e.g. Video Surfer Ltd in 1997, VirtuaLINK in 1999) and also in a company called Techimage. None of these unsuccessful investments were full acquisitions.

5.4.3.1.2 Joint Ventures

In 1996 a German subsidiary was established together with a local partner (50/50). The joint venture was unsuccessful and finally the German partner was bought out.

5.4.3.2 Strategic Alliances

According to Yaron Menczel, VCON tried to use alliances and joint ventures but most of their attempts failed. According to Mike Clifford, VCON have a number of existing alliances with manufacturers of complementary products. Yair Shachar, currently director in charge of Business Initiatives & Technologies, heads a team that aims to predict the technological direction and market demand in the next two years. The team also evaluates whether the company needs to develop new technologies or acquire them. A second task of this team is to initiate and manage projects that involve public money, such as European R&D projects or Israeli Magnet program projects. VCON took part in several European fifth R&D program projects. In addition to the money granted for the projects, it also helped VCON to cooperate with major European companies such as Siemens, Bosch, Nokia and Daimler Chrysler. This cooperation is an important source of learning for a company such as VCON. Yair Shachar, for example, learned about the different cultures of these companies, how they work, and what direction are they going in and so on. The projects can help to find new areas for applications. In one European project they developed a prototype for tenant services. The system was developed for homes for the aged where the video conferencing solution dramatically reduced maintenance costs. This was a market that VCON was not even aware of before the project. To VCON's surprise, they received an order for the system at the end of the project.

5.4.4 Markets

According to Mike Clifford, VCON entered Europe, the US and Asian markets at roughly the same time while Latin America and other countries were penetrated only later. The Israeli market was never a target market for VCON. The model before their eyes, as for many Israeli high-technology firms, was to achieve 60%-70% of their sales in the US. However VCON decided not to focus on the US market, as VCON's products were global by nature.

Table 23 - VCON Geographic Breakdown of Sales				
	1998	1999	2000	2001
Europe	42%	45%	34.9%	37.8%
US	26%	28%	34.5%	35.6%
Asia Pacific	25%	24%	26.8%	24.4%
Other	7%	3%	3.7%	2%
Source: VCON's annual reports				

Recognizing, however, the importance of the US market, VCON opened its first subsidiary in the US shortly after it was founded. Additional foreign subsidiaries were later opened in Germany (1996), in Spain (1997), and the UK (1997). Entry of target countries was at the beginning based on Moti Gura's connections from his previous business life. After making use of Moti Gura's connections, VCON started to go to trade shows and find distributors which led to entry into the UK (1997), China (Beijing office opened December 1998), and later also Japan, New Zealand, France, Italy, and Mexico.

VCON has been growing in existing markets and opening new markets continuously and in parallel. New products have also been developed. This parallel growth in area and products presented a challenge for VCON's management. When a firm develops its product range and its sales are growing in one geographical area, then it has time to analyze the market, decide where to position its products, and give guidelines to the R&D team. When VCON was expanding in different geographical areas they discovered that each area has its own characteristics. In different areas different products were leading sales. As different information came from different geographical areas, it became harder to decide which direction the company should head. Each of the regional managers focuses on its own market and as much as they are concerned VCON should focus its efforts on their region's needs. The American manager thinks that North America should represent around 80 percent of VCON's sales, which means that they should focus on North America market needs. The managers of Asia and Europe naturally want VCON to focus on their own regions. VCON tried to make every one happy. The downside of this strategy was that VCON

found itself in 2002 with around 20 products, which was considered to be too many. At this stage, VCON's management decided to change direction and focus.

5.4.5 Financing

In 1998, VCON raised \$7 million in a private placement and in November they made their IPO in the Paris Nouveau Marché and raised \$18 million for 21 percent of their share capital. The decision to choose France was made because at that time the situation in NASDAQ, following the Russian economic crisis, made the prospects for raising money slim. The new French stock exchange, with the thought of merging a few European stock exchanges into one pan-European stock exchange in the background, seemed to be attractive.

5.4.6 Competitive Edges

The video conferencing market has been under going a consolidation process. In 1999, according to VCON's annual report, the video conferencing industry was highly competitive and subject to rapid technological change. VCON competitors included British Tele-communications PLC, Fujitsu, Intel, Mitsubishi, PictureTel Corporation, Polycom, Sony, Tandberg, VTEL Corporation, and Zydacorn. In 2002 Polycom, an American company founded in 1990, had around 65 percent market share and the Norwegian firm Tandberg around 20 percent. VCON was in third place.

Tandberg, VCON's Norwegian competitor, with around a 20 percent market share, has only two products! Tandberg seems to be much more conservative and less entrepreneurial than VCON. Tandberg chose not to develop IP products and currently this decision has worked for them. This could drastically change, however, when the IP market comes back to life, as it certainly will. In desktop systems, VCON has an approximately 25 percent market share. The global telecommunication crisis caught VCON in the process of reducing the desktop share of sales and increasing the room systems sales share. In the desktop market, which is a niche market, VCON has a technological advantage and competitive prices.

In the room systems with IP the competition is starting to catch up with VCON's technological lead. VCON strategy for competing is:

- (1) Find markets where the big competitors are not represented.
- (2) Develop new products that will have the competitive edge of 'ease of use'.
- (3) Differentiation from competitors - distance learning is one example of an application in which VCON is leading. This means that customers choose a solution and manufacturer based on their product characteristics.
- (4) Developing vertical applications - video conferencing is considered horizontal and on this basis they develop specific applications. Security is one such application. A Finnish firm used VCON technology to develop an application that enables two users in a different location to play piano together.
- (5) Since 2001, VCON started with the concept of providing the customer with a solution, not a product. Many customers do not know what to do with video so you present them with a full solution to a problem.

VCON currently is in a niche market. The market is too small to attract companies such as Cisco Systems. Intel and Sony have indeed tried to enter the market. Intel, actually interested only in increasing their processors sales, exited after losing a considerable amount of money and Sony, in 2002, seemed to be on the way out. Sony came from a different line of business and failed to recognize the importance of the IP. For both Sony and Intel video conferencing was not a core or major business so it was easier for them to exit at the first market downturn.

VCON's founders are no longer with the company. However, the company culture and the different processes in the company were all created by the founders and so their spirit is still present. The entrepreneurial spirit certainly remains. The start-up family atmosphere combined with an Israeli determination and creativeness motivated employees to work around the clock and on holidays and come up with solutions. One of VCON's strengths was its flexibility and its ability to rapidly move from one product to another. Employees can come to the management with new ideas and a decision to invest in these new ideas can be reached rapidly without a long process of market research. While there are certainly disadvantages for shortcutting the market

research, it allows rapid development of new products. According to Yair Shachar, the number of products developed by VCON would usually be expected of a company five times VCON's size. The number of entrepreneurial initiatives is incredible. Some examples of new initiatives are

- (1) Adaptation of VCON's solution to security application.
- (2) Adaptation of VCON's technology for telephone companies

Table 24 - VCON Employees		
Year	1997	1998
Employees	113	172 129 in Israel (38.4% in R&D)
Source: VCON's annual report		

5.5 VocalTec Communications Ltd.

VocalTec Communication Ltd is a leading telecom equipment vendor offering next generation network (NGN) VoIP products for global carriers and local service providers. Established in 1989, VocalTec started its international operations in 1990. While revenues have been generated abroad since 1990, the early products of VocalTec had only limited success. The breakthrough of VocalTec came in 1995 with the development of the Internet Phone. In 1996, VocalTec had generated revenues in Europe, US, Asia, and other markets (see table 28). More than 82 percent of its revenues in 1996-2001 were generated outside its domestic continent.

5.5.1 Founders and Method of Establishment

VocalTec, a leading provider of VoIP (Voice over Internet Protocol) solutions, is widely recognized as the founder of VoIP. VocalTec was actually founded by Lior Haramati and Alon Cohen though the company really became international and moved to VoIP only when Dr. Elon Ganor and Ami Tal became involved. In order to provide a better understanding of the rapid globalization of VocalTec, it is necessary to begin with Dr. Elon Ganor's and Ami Tal's backgrounds.

Upon completing his medical degree from Tel-Aviv Medical School, Dr. Elon Ganor was asked by his father-in-law to join his international trading company in Panama. Initially refusing and eventually agreeing on a trial period of one year, Dr. Elon Ganor joined his father-in-law and brother-in-law, Ami Tal, in Panama where they established 'La Cresta International' in 1980. In 1984 they returned to Israel and started working from the Israeli office as well as from their offices in Panama, and Zurich. In 1985, Dr. Ganor informed his partners that he had no interest in the trading business and that he was interested in entering businesses in which he would have some added value. This meant medical or computer-related business. The choice of medical business is obvious given Dr. Ganor's background as a medical doctor. The choice of computer business was a result of Dr. Ganor's interest in computers since 1980. Dr. Ganor was an autodidact in computers and software and learned by himself to write computer programs. Ami Tal and his father, Dr. Ganor's father-in-law, remained in La Cresta's core business while Dr. Ganor started looking for new

businesses in the areas that were of interest to him. In 1987, he found his first project and established a company together with a group of Swedish scientists and other investors. The company, Viroval, developed an AIDS test that was licensed to a Swedish medical corporation.

In 1989, Dr. Ganor left Viroval and resumed his search for new businesses. In 1990 he met Lior Haramati and Alon Cohen, who founded VocalTec in 1989. Lior Haramati and Alon Cohen, who were working from home at the time, developed a PC sound card. VocalTec gave La Cresta worldwide marketing rights for the voice card and Dr. Ganor began to seek buyers for the product worldwide. Unfortunately, they were not successful with the voice card. In 1992 Mr. Ami Tal, an electrical engineer by training and a co-founder of La Cresta, joined Dr. Ganor in VocalTec. They decided to enter VocalTec as partners and started the search for an application with a promising global market potential.

VocalTec searched for an application based on digitization of voice. They came out with the 'Vocal Chat', which enabled transfer of an audio stream on LANs (Local Area Networks), but the demand for such a product was low. In 1993 they developed an application that enabled the user to add voice to text documents. They printed 1.5 million fliers, which were bundled with the 'Word Perfect' software package. Unfortunately out of the 1.5 million distributed fliers, they received only around 500 orders. At this stage, the Internet was gaining momentum and VocalTec decided to develop a solution that would enable transfer of voice via the Internet. That was not an easy task given the modem speeds and the limited capabilities of sound cards at the time, the end of 1994. In February 1995, VocalTec came out with the Internet Phone.

From its establishment in 1989 until 1990, when Dr. Ganor and La Cresta entered the picture, VocalTec was in its R&D stage. While Lior Haramati and Alon Cohen, the original founders, were technology oriented, Dr. Ganor and Ami Tal were clearly the driving force behind the business success of VocalTec. Both Dr. Ganor and Ami Tal had an international background. They had international business experience and spoke several foreign languages. Dr. Ganor spoke Hebrew, English, Spanish, German and French, while Ami Tal spoke Hebrew, English and Spanish. Given this background it is easy to understand why these founders were trying to build a global

company from the very start and had no interest in the domestic Israeli market. The vision and leadership of Dr. Ganor and Ami Tal brought a change of direction in the R&D efforts, which resulted in the creation of the Internet Phone.

5.5.2 Products

Dr. Ganor divides the telecommunication customers into three customer segments (1) consumer, (2) enterprise (businesses), and (3) carriers: incumbent carriers, ITSPs (Internet Telephony Service Providers), CLECs (Competitive Local Exchange Carriers), mobile operators, exchange carriers, and clearinghouses. With its Internet Phone software, introduced in February 1995, VocalTec started in the consumer segment and VocalTec's brand name became known among Internet users around the world. In September 1995, VocalTec introduced its Internet Wave product. The Internet Wave was a tool for broadcasting high quality audio over the Internet. With this product, VocalTec targeted the enterprise segment. In a press release of September 1995, we can see that companies such as Viacom, Virgin Interactive Entertainment Inc., and Sony Music Entertainment Inc. were considering the product. Enterprises were offered solutions for international calls, including a system that enables clients without a computer to place international calls through the Internet by using VocalTec's technology. In December 1996 VocalTec introduced Internet Phone with Video. In 1996 VocalTec also came out with products aimed at the carriers' segment.

	1996	1997	1998	1999	2000	2001
Consumer market	67%	49%	12%	5%		
Service providers / Turn Key solutions	17%	48%	59%	57%	54%	75%
Licenses, projects and support					44%	25%
Consulting and services			22%	35%	2%	
RADLinx products			7%	3%		
Source: VocalTec's annual reports						

In March 1997, VocalTec added critical performance and management features for its Internet telephony server software to form a complete end-to-end solution for voice, fax and data over IP networks. The solution was targeted at the enterprise market and ISPs (Internet Service Providers). In June 1997, VocalTec introduced a solution for audio and data (multimedia) conference calls over the Internet.

In August 1997, VocalTec released a new version of its Internet Phone software in an effort to create a worldwide network that would enable users to make cheap long distance phone calls through their PCs. The network enabled people with properly equipped PCs to make calls to standard phones, not just other PCs, for the price of a local call. However, users can use this service only by calling to cities where access providers have implemented VocalTec's technology. In order to create the network, VocalTec established a NextGen Telephony Partnership Program for ITSPs (Internet Telephony Service Providers).

In October 1997, VocalTec announced its new SURF&CALL software. SURF&CALL was a plug-in for Internet browsers and enabled users to call directly from an Internet site to the salesman or support center of the specific company. In 1998 VocalTec's sales included revenues from consulting and services to communication companies as part of their turnkey solutions. In previous years, VocalTec had no revenues from consulting and services. In 1999 revenues from consulting decreased as a result of less customization and more turnkey products and projects sales. During 1998, VocalTec sold complete end-to-end solutions for IP communications, including server gateway and client software. The turnkey solution in 1999 for ITSPs, clearinghouses, and exchange carriers affiliates included hardware and software.

In their 1998 annual report it is noted that "*some Service Provider customers requested full software-hardware Internet telephony solutions*". It is also noted that the hardware consists primarily of telephony boards purchased from third parties. In 2000, we can see VocalTec continuing its move to software-based solution. According to their 2000 annual report, VocalTec viewed itself as "*a leading provider*

of software driven solutions for deployment of next generation IP based international and long distance telephony platforms and related services". VocalTec typically licensed and sold their solutions to end users and distributors. Once purchased by VocalTec's end-user customers the solutions required installation. After installation, VocalTec also offered warranty and maintenance services to support their customers.

VocalTec sells systems that include hardware and software, but the hardware is standard-based and is purchased from outside suppliers. VocalTec manufacturing department had only seven employees out of the 150 employees in 2002.

5.5.3 Operations

In 1995, VocalTec came out with the Internet phone. One of their first considerations was whether they should sell hardware or a software solutions. Distribution of hardware requires distribution channels and the users must install the hardware in their computer. The software alternative had lower costs as it could be sold on a CD or downloaded from the Internet. An additional advantage of the software solution was that it eliminated the need for installing hardware in the end user's computer. As soon as they understood from the market input that the software solution was preferred, the R&D team was given the task of developing a software-based solution.

As soon as the Internet Phone was ready, they went to the US to launch a big PR campaign. The product was ready in February and in March Ami Tal moved to the US to manage VocalTec's American operations. As there was no money available for advertising, they approached the PR company that worked for 'Word Perfect'. During the period in which VocalTec worked in co-operation with 'Word Perfect', they also worked very closely with their PR firm. Building on these contacts they managed to get the PR firm to do the work for a very low retainer. The PR firm arranged a six-week road show, including meetings with analysts and reporters. During the road show, the software was demonstrated to a Wall Street Journal reporter and in February 1995 the Wall Street Journal published an extensive article on VocalTec and the Internet phone. The effect of this article was tremendous. Companies and reporters from around the globe approached VocalTec to learn about

the Internet Phone and the future of VoIP (Voice over IP). In the following months thousands of articles all around the world followed. Some of these articles were used as the basis for more articles years later. VocalTec became recognized as a global leader in VoIP and when reporters need to interview someone on the subject they still naturally approach VocalTec. The massive worldwide publicity helped VocalTec to find distributors around the world.

VocalTec started by selling the software through their Internet site for around \$70. At that time Internet sales were not widely used so a decision was made to sell the software on a CD as well. The Internet Phone was a consumer product that was sold in retail outlets. They started by searching and then reaching an agreement with an American distributor. When some time after reaching this distribution agreement they found out that the distributor was facing financial difficulties and was about to close its operation, they recruited employees from the distributor and started to distribute through their American office. VocalTec built a full distribution network in the US while other markets were being developed from the US.

Shortly after VocalTec successful IPO, in February 1996, the fight between Netscape and Microsoft started. The Internet phone was seen by the two adversaries as just another tool in the war and the competing Microsoft and Netscape products were given free to consumers. Six days before VocalTec's IPO, Netscape announced the development of a new standard for transferring audio and video over the Internet named LiveMedia. Toward this aim, Netscape acquired InSoft and entered into an alliance with Voxware. Two days after the IPO, IBM announced the development of competing software in its R&D center in Israel. VocalTec considered a few options including co-operation with computer firms and adding a telephone to the keyboard. The computer firms, however, were simply not interested as they estimated that the volumes would be too low. It was clearly impossible for small VocalTec to compete against two large companies, with much stronger brand names, that simply gave out their products free of charge. VocalTec also reached the conclusion that the Internet phone was merely an additional function in the Internet browsers or an interesting gimmick, but that most people use regular telephones.

They also understood the importance of VoIP technology, with the capability of transferring both data and voice over the same line, for the telecommunication industry. Fighting Microsoft and its free NetMeeting software was viewed by Dr. Ganor as driving fast in a tunnel while at the other side a large train is advancing toward you. Instead of crashing, VocalTec decided to change their business model. One alternative was to sell the company to Netscape, which at the time was interested in acquiring VocalTec. VocalTec chose not to sell out but targeted the enterprise and high-end (carriers) customer segments instead. Most of the efforts in 1996 were targeted in the enterprise segment, including the establishment of a distribution network.

The business model change in 1996 was a critical point in the company's life. At one point, VocalTec had around eighty firms competing against them. Most of them are out of business today and it is safe to assume that VocalTec would have gone in the same way had it not made the change. In 1996, around 50% of the revenues came from the enterprise market. VocalTec offered full solutions for international calls to enterprises, including a system that enables clients without a computer to place international calls through the Internet by using VocalTec's technology.

In March 1996, VocalTec licensed, from E-data Corporation, the worldwide use of a system for certain point-of-sale transactions involving purchase of digital data products over the Internet. During the same month, U.S. Robotics announced an agreement to bundle a demo version of the Internet Phone software with its PC-adaptable conference speaker phone. In June 1996, VocalTec licensed the use of audio compression software from DSP. In July an agreement was reached to bundle VocalTec's Internet Phone software with Packard Bell's new multimedia PCs. In the Agreement between the companies Packard Bell received an option to buy 2.5% of VocalTec's shares. In November 1996, a VoIP forum was established in order to create and drive rapid deployment of a set of standards for the compatibility of Internet telephony products. Among its founding members were VocalTec, Cisco Systems, Dialogic, and other industry leaders.

The main problem for VocalTec was that the VoIP market has not developed at the predicted rate. Dr. Ganor thought that the carriers would rapidly put the VoIP

technology to use, as it is a more efficient and cheaper way to transfer data and voice. This did not happen. Dr. Ganor decided to establish a company that would show the way and prove the business model for the carriers. Dr. Ganor, having to devote much of his time to the establishment of this new company named ITXC, decided to bring a new CEO to VocalTec. Doron Zinger, who was appointed as president in October 1997, was appointed to the additional post of CEO in October 1998. Mr. Zinger was formerly a senior vice president and chief operating officer at ECI Telecom Ltd., an Israeli company and a global provider of digital telecommunications and data transmissions systems.

In 1996, ITXC Corp. was established as a carrier that sold wholesale long distance voice services that are carried over the ITXC's own global VoIP network. ITXC was established to promote the use of VoIP technology. Dr. Ganor played a central role in ITXC establishment and was also a board member. He believes that by devoting his time to the establishment of ITXC, the recruitment of employees to VocaTec suffered. The selection of the CEO that replaced Dr. Ganor for that period did not turnout as good as was expected. Dr. Ganor believed that recruiting a CEO for a start-up from the industry does not always work out. The cases of Apple and Check Point were used by Dr. Ganor to support this claim. Check Point, possibly the most successful Israeli Born Global firm, is managed by its founder. Steve Jobs the co-founder of Apple was pushed out of the company in 1985 and was asked to return in 1997. In retrospect Dr. Ganor believes that it was a mistake to leave his post in VocalTec for the establishment of ITXC, and in November 1999 he returned to the post of CEO.

After the end of 1996, VocalTec attempted to enter the high-end (carriers) customer segment. The first national telecommunication carrier to use VocalTec's VoIP technology was Telecom Finland in December 1996. In January 1997 Dacom in South Korea was the second, Telecom New-Zealand also in January was the third and Taiwan Telecommunication Network Services Co. in May was the fourth national communication company to offer Internet telephony based on VocalTec's products. Most of these deals, however, were for testing and field trials and did not represent a change in existing infrastructure.

In January 1997, as the enterprise customer segment was growing and becoming strategically important for VocalTec, a VAR (Value Added Resellers) program was launched in order to expand its business-based Internet telephony. In 1998-9, VocalTec's products for the enterprise customer segment were distributed through a combination of direct sales to telecommunication service providers, strategic partners and alliances, VARs and international dealers and agents. VocalTec's products for the consumer market were sold through distributors, retail channels, direct sales over the Internet, and through bundled OEM agreements. In March 1998, VocalTec and Fujitsu signed a worldwide distribution agreement aimed at the enterprise customer segment.

In December 1998, Nokia signed an agreement to acquire Vienna Systems, a privately held Internet Protocol (IP) telephony company, based in Ontario, Canada, for a price of approximately \$90 million. Vienna Systems, founded in 1996, was one of VocalTec's competitors and according to Forrester Research, the only IP telecommunication equipment provider to increase its market share in 1997.

In 1999, China Telecom purchased a full turnkey solution for a nationwide IP telephony trial network from VocalTec. During the same year, deals were also signed with Deutsche Telekom and Bell Atlantic. However, during the year it became clear that large incumbent carriers were slow to deploy VoIP and that many of them demanded extensive customization even for trial and pilot programs. At the same time alternative carriers were moving aggressively to deploy VoIP solutions in order to offer low priced calls. VocalTec decided to focus on what they termed 'the next generation service providers' including ITSPs (Internet Telephony Service Providers), CLECs (Competitive Local Exchange Carriers), mobile operators, exchange carriers, and clearinghouses.

VocalTec's 1999 annual report states that until 1999 the company was developing solutions for every customer segment including consumers, enterprises, and high-end. During 1999, some of VocalTec's competitors rapidly increased their sales by focusing on specific market segments with turnkey solutions. VocalTec used the help of some outside experts and decided to discontinue product development aimed at serving the enterprise market directly. VocalTec also started shifting its marketing

efforts from the incumbent telecoms to alternative carriers including Internet Telephony Service Providers (ITSPs), clearinghouses, and Competitive Local Exchange Carriers (CLECs). It was also decided that large incumbents, like Deutsche Telekom, would continue to be served, but the broad-based customization would be discontinued in favor of more application-specific relationships that would result in standard products. In 2000, VocalTec stopped selling its Internet Phone products to the consumer customer segment.

In 1999, VocalTec decided to organize the company into three separate operating teams that would focus on three key market opportunities

- (a) The IP Telephony Products group headquartered in Israel.
- (b) Surf&Call Network Services, an e-commerce application service provider based in the US. Surf&Call has been spun-off as an independent privately held company in April 2002. (www.surfandcall.net)
- (c) TrulyGlobal, Inc was established as a wholly-owned subsidiary, creating a consumer communications portal with its headquarters in the US. TrulyGlobal offered consumers web-based Internet telephony services. In June 2001, VocalTec announced that it was closing TrulyGlobal down.

The worldwide economic slump, the tragedy of 11th September 2001, and the Enron case affected the telecom industry. The growth in all sectors of the telecommunication industry decreased. Many telecom providers sustained significant economic losses and have been forced to reduce capital expenditure. These carriers canceled or delayed capacity upgrades, network expansion and implementation of new technologies. The downturn in capital markets together with the decrease in economic growth also precluded the establishment of new carriers. The result of these trends was a sharp reduction in the market demand for VocalTec's product. There seems to be a wide consensus in the telecom industry concerning the migration to IP technology. The question is no longer 'will it happen?', but rather 'when will it happen?'. For companies such as VocalTec, the delay was devastating. While the market demand and revenues sharply decreased, VocalTec had to continue to invest in R&D and marketing in order to position themselves for the future.

	1994	1995	1996	1997	1998	1999	2000	2001
Net sales	0.38	2.47	8.495	15.683	24.65	26.615	42.041	28.413
Net profit (loss)	~(1.3)	(1.4)	(7.16)	(7.68)	(23.181)	(28.386)	28.836	(31.783)
R&D net			3.2	5.5	11.192	13.157	11.27	11.039
Marketing and Selling net			9.7	13.449	18.509	27.171	26.372	24.716

Source: VocalTec's annual reports

Dr. Ganor believes that Israeli technology-intensive firms must sell under their own brand name and not OEM. The rationale behind this is that Israel does not have the manufacturing capabilities and production volumes of countries such as Taiwan or China. Israel technology-intensive industries are knowledge industries and they need to own the knowledge as well as the brand. In its 2001 annual report, VocalTec describes its market as intensely competitive and rapidly evolving. VocalTec's principal competitors include Cisco Systems Inc., Alcatel, Avaya/Lucent Technologies Inc., Siemens, and Nortel Networks Corporation.

	Total employees	R&D	Marketing & Sales	General & Administrative
1999	253	94	89	70
2000	380	142	152	86
2001	256	99	110	47

- Of the 2001 256 employees 187 were based in Israel, 31 in the US, 27 in Asia Pacific and 11 in Europe.
- During 2001 VocalTec eliminated 140 positions as part of their restructuring plans.

Source: VocalTec's annual reports

5.5.3.1 Subsidiaries

The Internet Telephone was ready in February 1995 and in March Ami Tal moved to the US and established VocalTec's first foreign subsidiary in order to manage VocalTec's American operations. The UK subsidiary, VocalTec UK Ltd., was opened in the second quarter of 1996 following the acquisition of Insitu. In 1998, a subsidiary was opened in Japan.

In the 1998 annual report we can see that VocalTec had four subsidiaries outside of Israel: the US, the UK, Japan and Germany. In 1999 a Hong Kong subsidiary and a representative office in China were added. In the 2000 annual report we can see the addition of wholly owned subsidiaries in Italy, France, Romania, Spain, Sweden, Australia, and Singapore. In 2001 the Romanian office is no longer in the list. In 2002 an office was opened in India. Currently, in 2003, VocalTec has one subsidiary in Europe – Germany, two in the US – one of which acts as the headquarters for North America and the other for South America, and one in Hong Kong - for Asia Pacific with offices in China, India and Singapore.

5.5.3.1.1 Acquisitions

In 1996, VocalTec acquired Insitu Inc., an American software producer of conference & trade software for collaborative computing. The acquisition expanded VocalTec's product line and provided a technology framework for future multimedia business and commercial Internet/intranet products. The acquisition cost was \$1.3 million in shares. In 1999, the UK subsidiary (formerly part of Insitu) was liquidated.

In April 1998, VocalTec acquired RADLinx Ltd., an Israeli corporation, a leader in standards-based real time fax over Internet. The \$ 7.7 million, in shares, acquisition expanded VocalTec's product line and increased its sales and marketing team.

5.5.3.1.2 Joint Ventures

In 1996, ITXC Corp. was established with the seed money of \$0.5 million coming from VocalTec. Later additional venture capital came from Intel, Chase Capital, and others. VocalTec held around 20 percent of ITXC. The thought behind the

establishment of ITXC was similar to the Intel model. Intel invests money in development of applications that require more processing power in order to increase demand for their CPUs. ITXC was established to promote the use of VoIP technology and in that regard it certainly was a success. ITXC became a model for other carriers and an important customer for VocalTec. As a result of ITXC activity, new competing companies, which also purchased equipment from VocalTec, were established.

ITXC has been traded on the NASDAQ since October 1999. In addition to its role in promoting the use of VoIP technology, ITXC also became a key financial factor for VocalTec, which gradually sold most of its holdings in ITXC in order to boost their cash positions. This was especially important after the second half of 2001 when VocalTec's revenues fell sharply and the global telecommunication slowdown started to be felt. VocalTec's 1999 annual report states that VocalTec's holdings in ITXC Corp. were valued at \$418 million in September 1999 while VocalTec's costs in ITXC were only \$3.4 million. ITXC reached revenues of \$268.4 million in 2002, representing growth of 55 percent on 2001. ITXC currently (2003) estimates that it ranks among the top 10 carriers in the world, based on minutes of international calling, and carries approximately 20 percent of all such calls transported on the Internet.

5.5.3.2 Strategic Alliances

In 1997 VocalTec established a NextGen Telephony Partnership Program for ITSPs (Internet Telephony Service Providers). ITSPs using VocalTec products and joining the program could offer their customers cheap long distance calls to all destinations covered by other ITSPs in the program. In August the service was available to 22 cities outside of the US and to 8 US cities. Users through the Internet site could purchase the PC software for \$50. By March 1998 the number of ITSPs in the program has more than doubled.

It was understood that small VocalTec needed a strategic partner. Dr. Ganor illustrated his thoughts on this issue with the following story: You want to get to the Promised Land and in order to get there you need to cross the Sinai desert. In order to

cross the Sinai desert you must cross some rivers and every time you need to cross you look for a boat that will carry you to the other side. The boat owner also needs to get something out of this. He will charge you for it or if you have some sort of fuel for his motor he may try to take over the fuel source. This means that you will have to build the deal from the start so that you will know when you arrive on the other side of the river and how you can separate and go your own way; otherwise he might take control over you.

The decision on your major strategic partner is clearly a decision that can ‘make or break’ a company. In December 1997, VocalTec established a major strategic relationship with Deutsche Telekom AG. In the agreement between the companies Deutsche Telekom was to purchase more than \$30 million of VocalTec products, services and support and acquire 21.1% of VocalTec. The companies also agreed on strategic co-operation. At that time Deutsche Telekom was Europe’s largest telecommunication company and the third largest carrier in the world. There was a lot of public criticism on this deal. Many thought that VocalTec should have entered into a strategic alliance with a telecommunication equipment vendor such as Siemens, Nortel, or Alcatel. One of the reasons behind this way of thinking was that these companies might acquire you later on, which will give the founders a comfortable exit. However, Dr. Ganor and Ami Tal were not looking for an exit. Dr. Ganor’s rationale for choosing Deutsche Telekom was as follows: in the ‘food chain’ Deutsche Telekom is buying from telecommunication equipment vendors. This means that Deutsche Telekom defines its own needs and the telecommunication vendors must develop their products according to these needs. Thus it is better to work directly with Deutsche Telekom.

Most of VocalTec competitors decided on strategic alliances with the telecommunication equipment vendors and went out of business without providing any comfortable exit for their founders. Dr. Ganor thought that telecommunication equipment vendors had an interest in working with companies such as VocalTec when they sought a certain advanced technology and are looking for a shortcut. As soon as they reach an agreement with a company such as VocalTec, they immediately have the technology and have some time to catch up technologically. In the following two

to three years they might buy the technology supplier or they might be successful in developing the technology themselves and no longer have a need for them.

In addition to the major alliance with Deutsche Telekom, VocalTec established other strategic alliances with vendors that had expertise in specific areas as billing solutions and security. In September 1998, VocalTec and Amdocs, an Israeli corporation and a major international provider of customer care and billing solutions to the telecommunication industry, announced a joint co-operation agreement. Through the agreement Amdocs's customer care and billing solutions were to be integrated into VocalTec's IP solutions for carriers and service providers. The Amdocs - VocalTec alliance was part of VocalTec's strategy to deliver a complete IP communication solution that enables carriers and service providers to quickly deploy new competitive offerings.

VocalTec also developed close partnership-style arrangements with major customers. VocalTec relationship with Dacom, a major South Korean telecommunication company, started in 1996 and in December 1998 Dacom launched a Phone-to-home service using VocalTec's products. In December 1999 VocalTec and Huawei Technologies Co. Ltd. announced a joint development, marketing, and sales agreement to deliver IP telephony solutions to Internet service providers, Internet telephony service providers, and carriers throughout China, Hong Kong, and Taiwan. At the same time VocalTec also opened an office in Beijing in order to serve existing customers such as Huawei and China Telecom, as well as to facilitate sales and service activities to service providers and carriers throughout the region.

In 1996 VocalTec entered into an alliance with Dialogic, an American corporation, to jointly develop hardware and software for telephony servers working in computer data networks. In 1997 VocalTec and Motorola entered into a strategic alliance. In the agreement between the companies: 1) Motorola received the rights to distribute VocalTec's products, and 2) The new network and integration of systems for transfer of audio on IP developed by Motorola will be based on VocalTec's technology.

In July 1997 VocalTec and AT&T reached an agreement in which AT&T will cooperate with VocalTec and ITCX to supply Internet telephony services and connect

exchanges and ISPs (Internet Service Providers). In February 1998, VocalTec and ECI Telecom Ltd., an Israeli corporation and a major provider of integrated network solutions for the international telecommunication market, announced a comprehensive joint development and marketing agreement. The R&D and marketing joint venture was aimed at the carriers' customer segment. In June 1998, VocalTec and Digital Equipment Corporation announced a strategic alliance in which VocalTec's product would be integrated into Digital's communication industry solutions. The strategic alliance was to market end-to-end, carrier grade, IP communication solutions worldwide starting with the US market and Europe.

In June 1998, VocalTec announced an alliance with Lucent. The alliance with Lucent, one of VocalTec's major competitors, was part of VocalTec's competitive cooperation strategy. The goal in this strategy was to increase the IP telecommunication market for the benefit of all the players in the market. The VocalTec - Lucent alliance was to develop standards in order to allow interoperability between their IP telephony solutions. In November 1998, a similar agreement was reached with another major competitor – Cisco Systems. During this period an article in *Globs*, an Israeli daily financial newspaper, reported that Cisco Systems was offering VocalTec \$130 million to acquire control of the company. In September 1999 VocalTec and Cisco Systems announced a joint development, marketing and sales agreement to deliver IP telephony solutions to Internet service providers (ISPs), Internet telephony service providers (ITSPs), and carriers. In October 1999, VocalTec and Cisco Systems won a project to provide an end-to-end solution for handling pre-and post-paid VoIP calling services for Bell Atlantic, one of the premier carriers in North America.

In October 2001 VocalTec introduced an alliance program to provide VocalTec's service providers customers a rich selection of application and components. Congruency, IP unity, LongBoard, and Pactolus joined the program. The above-described alliances are not a full list of VocalTec's alliances. VocalTec made many other alliances with companies such as Kagoor Networks, CosmoCom, and Mediatrix. The alliances described were chosen because of their importance or as representative of VocalTec's other alliances.

5.5.4 Markets

Dr. Ganor views the North American market as the key market for technology firms. He illustrated the reasoning behind this view with the following observations:

- (a) Announcements of new technologies and strategies are made in North American exhibitions and not European.
- (b) Computer technology is clearly American-dominated.
- (c) Israeli technology start-ups that focused on the European markets eventually face American competitors. As the American market is the bigger market and as it is the market where things are happening, vs. the 'me too' attitude in Europe, most of these companies lose the competition.

Dr. Ganor admits that these observations do not hold for cellular technology, but they clearly hold for computer technology. Hence VocalTec opened an office in the US in 1993 while in Israel they were still working from their home. All the PR and marketing activities were done in the US market. For years, VocalTec invested their entire PR budget in the US, based on Dr. Ganor's view that the rest of the world follows what happens in the US. This strategy seems to have worked, as VocalTec did become known around the world. Only in the last few years VocalTec began having also local PR projects in certain target countries such as India.

Since 2000 with the fall in NASDAQ, the ISP and alternative carrier's purchases have fallen sharply. The incumbent carriers and the Third World countries have become the new target markets. The reason behind targeting the Third World countries is that the developed countries have an existing telecommunication infrastructure that covers almost all of the population. Carriers in these countries are currently using the existing infrastructure and avoiding any new investments. In the Third World countries large parts of the population are not covered by the existing telecommunication infrastructure. As these countries need to invest in order to cover an increasing share of the population, the choice of IP solutions becomes attractive.

	1996	1997	1998	1999	2000	2001
North America	57%	70%	32%	13%	20%	33%
Europe	11%	18%	54%	63%	43%	38%
Asia Pacific	24%	9%	9%	21%	19%	23%
Other	8%	3%	5%	3%	18%	6%

Source: VocalTec's annual reports

5.5.5 Financing

In 1993, by using their personal contacts, Dr. Ganor and Ami Tal convinced two Israeli funds (Mofet and Dovrat-Sharm) to invest in VocalTec. The investment facilitated the development of an application that enabled the user to add voice to text documents. In 1996, VocalTec was widely known by Internet users around the world. VocalTec decided that they needed to raise money before attempting an IPO in the NASDAQ. Dr. Ganor and Ami Tal managed to persuade 'Discount Investments' to invest in VocalTec and in February 1996 VocalTec raised \$33.25 million with an IPO in the NASDAQ. The market value of VocalTec at the IPO was \$162 million.

In December 1997, Deutsche Telekom selected VocalTec for global Internet telephony deployment and acquired 21.1 percent in VocalTec for \$48.3 million. In January 2000 the North American subsidiary of VocalTec established a \$25 million revolving credit facility. Funds were to be used for working capital in support of general corporate purposes. The credit facility was secured by shares of ITXC shares (traded in NASDAQ) and financed by Bank Leumi U.S.A and Bank Hapoalim B.M. (both Israeli banks). In March 2000 VocalTec sold part of its holdings in ITXC and realized a net after-tax gain of \$48.7 million.

5.5.6 Competitive Edges

VocalTec managed an early rapid globalization process mostly because of the leadership of Dr. Ganor with the assistance of Ami Tal. The entrepreneurial and innovative start-up had a clear plan targeted at building a large MNE. The high adaptability and flexibility of the company and the ability to change its business

model in time prevented the company from going out of business more than once. The family entrepreneurial atmosphere in VocalTec creates high motivation and determination among the company's employees. The creation of ITXC is an indication of innovative leadership. ITXC was established in order to promote the use of VoIP technology and in that regard it certainly was a success. ITXC also became a key financial factor for VocalTec, which gradually sold most of their holdings in ITXC in order to boost their cash positions.

6 Cross – Case Analysis and Conclusions

6.1 Global Strategy from Inception

While traditional manufacturing companies usually started with their domestic market and slowly moved first to markets with short business distances, Born Globals decide to initiate business operations across the globe at inception. In all the Born Global cases in this research, international operations started from inception or after completion of the R&D work on their first product. The business operations of these Born Globals usually start on more than one continent simultaneously. The interviews with the founders combined with a study of the industry and country context revealed that Israeli technology-intensive Born Globals chose a global strategy from inception because of a) the global orientation of the founders, b) the global nature of the product and industry, c) the small domestic market, d) the short product life cycle and rapidly changing technology, and e) the peripheral location of Israel (unlike Canada or Austria, for example, Israel has no significant neighbor markets for these products).

The founders had a key role in shaping the global vision of the companies since inception. In Emblaze, the founders realized that during their army service they had developed skills in multimedia development that gave them a competitive edge in the global market. They decided to use this competitive edge and build an international business. They started by targeting large firms in the US and through these companies achieved global sales. In BATM, Dr. Marom realized that he had developed competitive capabilities in telecommunication through his academic work and decided to use these capabilities to build an international business. In Orckit, Izhak Tamir realized that the experience gained through his work in ComStream combined with his engineering capabilities gave him a competitive edge. He started with R&D subcontracting projects for the US-based ComStream and other foreign companies. VCON's R&D work started in Optibase, which is another Israeli technology-intensive Born Global. In the R&D stage, the people at Optibase involved in the project aimed at the global market. When the R&D for the first prototype was completed and Optibase decided to spin-off VCON, these people left Optibase and joined VCON. Mr. Moti Gura, one of the main founders behind VCON, was also one of the founders of Optibase and clearly had no interest in the Israeli market. In VocalTec, the firm

gained its global vision when Dr. Ganor and Ami Tal joined the company. Dr. Ganor and Ami Tal, who due to their prior international business experience had no interest in the small Israeli domestic market, gave the company its new direction.

This finding compares well with other research. The global vision of the founders was recognized as probably the most important characteristic associated with the success of Born Globals (Oviatt & McDougall, 1995). The make-up of the founders and early management was found to be the most important factor determining attitudes toward global market opportunity (Roberts & Senturia, 1996). The attitudes and mental maps of the entrepreneur probably have a high explanatory power when trying to understand the internationalization patterns of Born Globals (Madsen & Servais, 1997). The decision maker's global orientation is an important factor explaining why some firms are Born Globals, while others are born locals (Moen, 2002). Firms with managers who have more world-oriented mindsets (geocentric) were found to be more likely to enter international markets quickly (Kobrin, 1994). Managers of Born Global firms were found to have a significantly higher level of global orientation than managers of gradual globalizing firms (Harveston, Kedia, & Davis, 2000). A proactive managerial push is significant for beginning international market activities in high-technology firms within the first year (Roberts & Senturia, 1996).

Many researchers view the international experience of the founders and prior international personal networks as a key to the establishment and success of Born Globals (Harveston, Kedia, & Davis, 2000; Madsen & Servais, 1997; Oviatt & McDougall, 1995). McDougall et al. (1994) argue that the founders of Born Globals are more alert to the prospects of combining resources from different national markets because of the competencies that they have developed from their earlier activities (McDougall, Shane, & Oviatt, 1994). Bilkey found that firms are more likely to export when managers have lived or worked abroad (Bilkey, 1978). Harveston et al. (2000) found that managers of Born Global firms had significantly more extensive international experience than managers of gradually globalizing firms (Harveston, Kedia, & Davis, 2000).

While at Orckit, VocalTec and VCON the founders did have some international experience, in BATM and Emblaze the founders had no international experience. Mr. Naftali Shani of Emblaze did have some limited international experience, but nothing close to what was needed in such a company. VocalTec's Dr. Elon Ganor and Ami Tal did have international business experience, but not in telecommunications or other similar industry. When analyzing the strategic mistakes of the founders it seems that they are directly linked to a lack of international business experience. However, these mistakes can be regarded as the price that these young companies must pay for their early and rapid globalization.

Emblaze, BATM and VocalTec had no prior international personal networks. In VocalTec's case prior international connections did exist, though they were not related to the telecommunication industry and were thus of little use to VocalTec. In VCON, certain personal international networks did exist prior to the establishment of VCON, but their significance is not clear. In Orckit, prior international connections did play a role, especially in the R&D subcontracting phase.

It is interesting to note that four out of the five case companies are still managed by their founders. Only VCON has a CEO, Yair Shamir, who is not a founder. It seems that the international experience of the founders and prior connections to international networks might be less important than the personal traits and global visions of the founders. This conclusion is also supported by the cases of many well known global firms that have been established by entrepreneurs with no prior business experience and without any personal networks. Steve Jobs who co-founded Apple Computer Corporation in 1976, with Steve Wozniak, had no international business experience or personal networks at the time. After leaving college in 1974, Jobs went to work for Atari in designing computer games. Several months later Jobs left his work in Atari and traveled to India. Upon returning from India he persuaded Wozniak to work with him in building a personal computer. Apple I was designed in Job's bedroom and the prototype was built in Job's family garage. Apple I was introduced to the market in April 1976.

Other similar examples are Dell and Microsoft. In 1983 Michael S. Dell began conducting business out of his room at the University of Texas in Austin, selling

custom-made PCs and components. A year later, he founded Dell and dropped out of university. Bill Gates left Harvard University in his junior year and co-founded Microsoft in 1975 when he was 20 years old with no international business experience or contacts. Examples can be found in non high-tech industries as well. In 1976 in Brighton, England with 12,000 pounds to her credit, Anita Roddick a 33 year-old housewife, opened a store to support herself and 2 children. Currently Body Shop has over 1,900 outlets in 50 countries.

It should be noted that the founders of the case study companies were business-oriented. While some start-up founders seem to be more focused on the technology itself, these founders aimed at developing an international business. Technology was developed in accord with predicted market demand. The case of VocalTec seems to illustrate this point. VocalTec's original founders were technology-oriented. The PC voice card which they have developed had no real market demand and the company was going nowhere. When Dr. Elon Ganor and Ami Tal joined the company they brought the business orientation. The future growth of the Internet and the market for VoIP technology were recognized. The move to the development of the Internet Phone and VoIP technology made the globalization of VocalTec possible.

The personal traits of founders are very important. Many of them have founded more than one Born Global firm. Moti Gura of VCON was also a founder of Optibase, Fibronics, and Adacom. Doron Herzlich of VCON also founded Optibase and Mediagate. Dr. Ganor of VocalTec has been behind the establishment of Viroval and ITXC. Izhak Tamir of Orckit established Corrigent systems, Spediant, Siliquent Technologies, and Tetis. This seems to suggest that certain characteristics of these international entrepreneurs give them the capabilities necessary for the establishment of Born Global firms. These international entrepreneurs spot opportunities, are innovative, proactive, and risk-taking across national borders, in order to create value in their organization.

However, the decision to go global from inception is not only related to the founder's global vision and characteristics. The high degree of internationalization is not always a strategic objective for the founders, but can be something necessary. The phenomenon of Born Global firms must be studied within the context of the specific

industry and its degree of internationalization (Rasmussen, Madsen, & Evangelista, 2001). In certain industries the prospects for establishing a domestic-oriented firm simply do not exist because of the high degree of industry globalization. The telecommunication industry examined in this study is global by nature. There are accepted international telecommunications standards that allow companies to develop global standard products. Though in some areas, as in cellular phones, there are a few accepted standards (e.g. for cellular- GSM, TDMA, CDMA) it is still possible to develop standard products that can be used on all existing platforms.

Similar to other technology-intensive industries, the telecommunication industry tends to have high R&D costs. Telecommunication products are global by nature and tend to have a short life cycle. One domestic market, especially a small one like the Israeli or Finnish markets, cannot justify the high R&D investment of these companies. Even a developed continent, such as Europe or North America, is not sufficient by itself in this industry, hence the need to go global rapidly and in an early stage. The short life cycles of telecommunication products simply does not permit a slow incremental process of internationalization. The peripheral location of Israel, with no neighboring countries with significant sales potential, forces Israeli technology-intensive Born Globals to start global activities on other continents since inception.

Looking at the conceptual framework (see figure 10) developed in this study we can identify the following factors behind the decision to go global from inception:

1. Founders characteristics
2. Industry characteristics
3. Home country characteristics

6.2 POM Strategies and Patterns

After the decision to go global from inception, the next step is actually starting the early rapid globalization process. This study examined the POM (products, operations, and markets) globalization strategies of Israeli technology-intensive Born Global firms, how they deviate from those of the traditionally internationalized companies, and identified the strategy patterns. Luostarinen's POM framework (Luostarinen, 1970, 1979) and partly his extended POM \$ICA (products, operations, markets, price, intermediate, customer, and advertisement) framework (Luostarinen & Gabrielsson, 2004) has been used as an analytical tool as well as a representation of the traditional POM strategies of manufacturing companies.

6.2.1 Product Strategy

Luostarinen (see table 6) developed a classification of products into four categories: physical goods, services, know-how, and systems (Luostarinen, 1979). While Luostarinen studied manufacturing companies, the case companies in this study are knowledge companies (see conceptual framework in chapter 4). During the data analysis process it became evident that the patterns and stages used to describe the product process in traditional manufacturing firms did not fit the non-manufacturing firms of the case study. Building on Luostarinen's framework the term system will be used here to describe a package of goods and services. The term services include pre-sale support, after-sale support, and installation. The term know-how will not be used to describe the product pattern as (1) all the products of the case companies include know-how, and (2) know-how, which is not included in the products or services, is not sold by these companies. In this study software products will be considered as goods and not as know-how. The products of the case study firms' are typically a combination of physical goods, know-how, and service. What seems to change is the mixture of these three elements.

In at least three out of the five case companies we can see a move towards more software (know-how) and less hardware. In BATM, the software component in the products has become more dramatic. Since around 2000, VCON has also had pure software products, which are slowly beginning to contribute the bigger part of

VCON's revenues. VocalTec is also moving to software-based solutions and views itself as "*a leading provider of software-driven solutions for deployment of next generation IP based international and long distance telephony platforms and related services*" (VocalTec's annual report, 2000). More software and less hardware means less dependency on outside suppliers, lower logistical costs, lower product costs, and higher profits margins. Whenever possible, software-based solutions are clearly more attractive to technology-intensive Born Globals than hardware products.

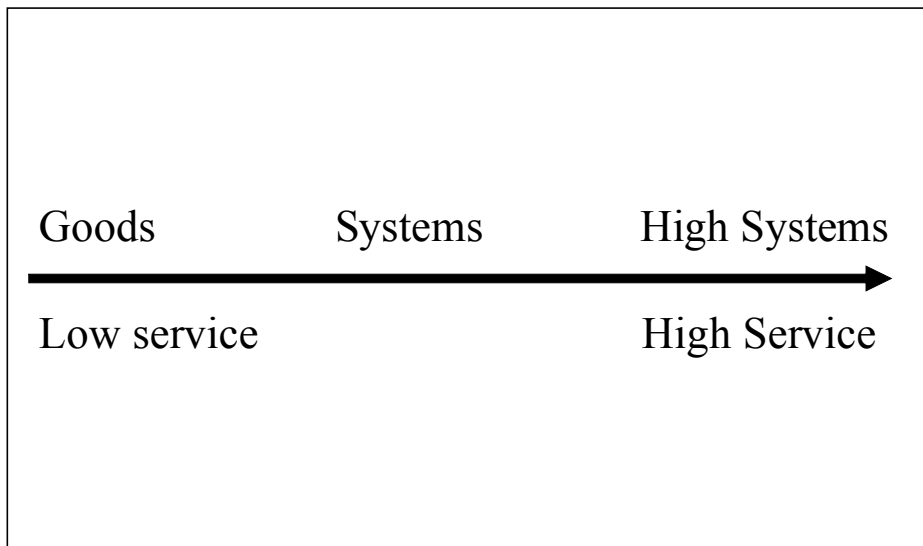
BATM started with products for LAN. These products included software and hardware. At that point very little pre-sale and after-sale support was needed. When BATM moved toward WAN and IP products for larger high-end enterprises the amount of pre-sale and after-sale support demanded by the customers increased significantly. Emblaze started with a simple software package sold in retail outlets for consumers and small businesses. Early products needed no pre-sale support or installation and very little after-sale support. As Emblaze moved to more sophisticated solutions for the enterprise customer market and finally to the high-end customer markets (telecom service providers and the cellular phone market) pre-sale and installation services became necessary. After-sale support demanded by the customers has also increased significantly.

Orckit needed pre-sale and after-sale support since their first HDSL product. With the development of the heavier ADSL solutions, the amount of support demanded by customers increased. VCON's first desktop products needed very little after-sale support and no pre-sale or installation services. Later more advanced IP solutions also required pre-sale support and installation. The after-sale support demanded by the customers of the more advanced complete solutions also increased significantly. VocalTec started with its Internet Phone that required no pre-sale support or installation and very little after-sale support. Later, when VocalTec developed more sophisticated complete solutions for the enterprise customer market and high-end customers, the pre-sale, after-sale and installation services demanded by the customers have increased significantly.

Thus, in all the case companies, we see a pattern of moving from goods (software or software and hardware) to systems which also include services. As the amount of

services included in the systems seems to increase as products become more sophisticated and complete end-to-end solutions, the term **high-systems** will be used to describe a package of goods and services in which the services demanded by the customers are relatively higher. We can then describe a product pattern of (1) goods, (2) systems, and (3) high-systems. During this product pattern the physical element of the product mix tends to decrease while the know-how and service elements increase.

Figure 12 – Product Patterns



6.2.2 Customer Strategy

During the interviews, the subject of customer segmentation always came up as an important strategic decision. Although this study originally aimed at focusing on the POM strategies only, it soon became evident that the customer strategy must be added to the conceptual framework. To best describe the product pattern which emerged from the empirical work, it was necessary to examine the target customers (customer segmentation). The potential telecommunication customers segments found in this

study can be divided into (1) consumer and SOHO (Small Offices and Home Offices), (2) enterprise, and (3) high-end. Enterprise segments consist of organizations that purchase specific kinds of products for the purpose of using them to produce other products, to resell, or to facilitate the organization's operations. High-end companies demand products of high technological quality, high reliability, and excellent service (pre-sale and after-sale technical support, and installation). While the Consumer and SOHO customer segments are characterized by large volumes and low prices, the high-end segment is characterized by low volumes and high prices. High-end customers in the telecommunication industry include incumbent carriers, ITSPs (Internet Telephony Service Providers), CLECs (Competitive Local Exchange Carriers), mobile operators, mobile phone manufacturers, exchange carriers, and clearing houses.

BATM started with the enterprise segment and has been moving towards the high-end segment. From targeting any company that had a LAN (local Area Network) in its early stages, BATM moved to target mainly telecommunication service providers. Following its initial export of R&D services, Emblaze moved to the export of products targeting the consumer and SOHO customer segments. The next stage for Emblaze was a move to the enterprise segment by targeting Internet site builders followed by a third stage move to high-end customers by targeting Internet Service Providers (ISPs) and major Internet sites. The fourth stage for Emblaze was to move even higher in the high-end customer segment and target telecommunication service providers and mobile phones manufacturers.

VCON started with the lower side of the enterprise segment and has been moving into targeting larger customers inside the enterprise customer segment. VocalTec started in the Consumer and SOHO segment with its Internet phone in 1995. In 1996 they were already targeting the enterprise segment and in 1996 they came out with their first product aimed at the high-end (carriers) customer segment. In 2000 VocalTec had no sales to the Consumer and SOHO segment. After its initial export of R&D services phase, Orckit actually started in the high-end segment and remained in it while moving in the product characteristics to a more complicated product. They started by developing the chip base, then the whole chip, followed by a box (HDSL) and finally a system (ADSL). The fact that Orckit could target the high-end segment directly after

the preliminary export of R&D services phase can be explained by the knowledge, experience, and personal contacts developed during the preliminary stage.

Two of the companies, Orckit and Emblaze, had a preliminary stage in which they performed R&D work for foreign companies. In both cases this stage was before the companies developed their own promising technology. In this preliminary stage the only active sales and marketing activity of these companies was in locating foreign firms wishing to outsource R&D work suitable to their competitive advantage. No active marketing and sales activities for the R&D product were performed at this stage by Orckit and Emblaze. Thus this stage is considered to be a preliminary stage only, in which the companies have no target customer segment.

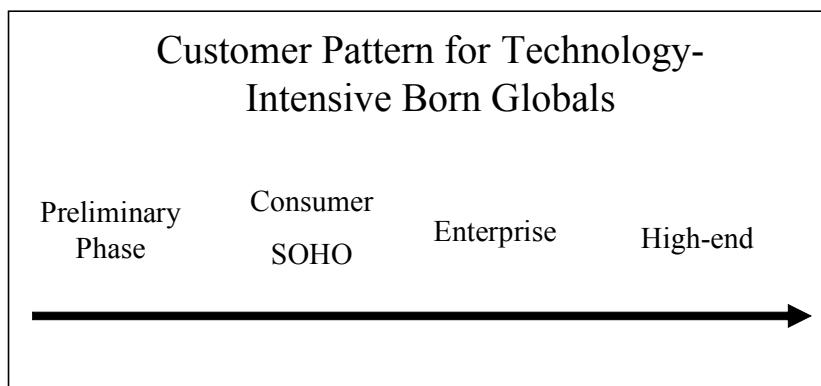
When using the target customer segments as a tool to analyze the product development over time, it becomes clear that all of the case companies are moving in the same direction. Most of the companies started with the enterprise segment and all of them aim at the high-end segment (see figures 13, 14). However, Emblaze and VocalTec started with the Consumer/SOHO customer segment. Targeting the Consumer/SOHO segment means targeting millions of potential customers around the globe. Young companies with limited resources cannot build their own global distribution network and global brand name alone and usually have to rely on local distributors and/or OEM deals. In order to be able to sell to the consumer/SOHO segments, the products must be affordable to consumers and small offices; this means low profit margins. Low profit margins means that sales of large volumes are required to achieve profitability. This is especially true in industries with high R&D costs such as the telecommunication industry. The marketing expenses for the Consumer/SOHO segments, when selling under its own brand name, are considerably higher than the marketing expenses for the enterprise or high-end segments. The combination of high R&D costs, high marketing costs, low profit margins, and the relatively long time it takes to build a global brand name and reach a sufficiently high volume of sales make it very difficult for young Born Globals to succeed in this customer segment. Israeli technology-intensive Born Globals rarely attempt to target the consumer segment and those few which have attempted failed.

The enterprise segment on the other hand usually represents thousands of potential buyers around the world. Marketing costs are considerably lower than in the Consumer/SOHO segment and the prices of the products are higher. Higher profit margins with lower marketing costs makes this market more attractive to Born Globals than the Consumer/SOHO segment. However, thousands of potential customers around the globe still mean that these young companies cannot handle the sales and marketing activities alone. Use of distributors (though a different type of distributors than in the Consumer/SOHO segment), and VARs is common among Born Globals targeting this segment. The high-end segment usually means that the companies have hundreds of potential customers around the globe. Thus the companies can handle marketing and sales operations alone if they so choose. The marketing expenses in the high-end segment are lower than in the enterprise segment and the profit margins are much higher. This makes the high-end segment the most attractive segment for technology-intensive Born Globals. Niche-driven, direct marketing of high-end customers is less expensive and more profitable for these companies.

In spite of this, out of the five case companies only Orckit started in the high-end segment. There seem to be three reasons for not starting at the high-end segment

- 1) Young Born Global firms simply do not have a complete end-to-end solution, with mature, high quality and reliable technology, which is necessary in targeting the high-end segment.
- 2) Young Born Global firms lack the track record in the enterprise segment which seems to be necessary in order to enter the high-end segment.
- 3) A belief of the founders that they could succeed in the Consumer/SOHO or enterprise segment. A success in these segments can indeed turn a young Born Global into a large established global player. However, the difficulties of succeeding in these segments, and especially in the Consumer/SOHO segment, seem to be underestimated.

Figure 13 – Customer Pattern



This finding is in line with Kohn’s claim that the tendency to focus on producer (industrial) goods is linked to the limited resources of small firms. According to Kohn, only large firms are able to absorb the costs of making the product and marketing modifications necessary in consumer products adaptation to local markets. Small firms investing in foreign markets tend to be technology-intensive and rely on R&D-based technological advantages (Kohn, 1997). This is also in line with Aharoni’s finding that small businesses are at their best when they sell to a small number of sophisticated customers who buy quality, or to customers who demand frequent changes to a specialized product and are willing to pay a price premium (Aharoni, 1994).

The move in target customer segments also represents a change in the products as well as in the business model. As companies ‘climb the food chain’ (using their own words), they move towards heavier, more complicated end-to-end solutions. When moving from the consumer/SOHO segment to the enterprise segment, and from the enterprise to the high-end segment, the products change accordingly. The products become more complete, end-to-end, solutions, their price is rising, and more service is needed. As the customer segments and product characteristic change so do the distribution channels, as was previously described.

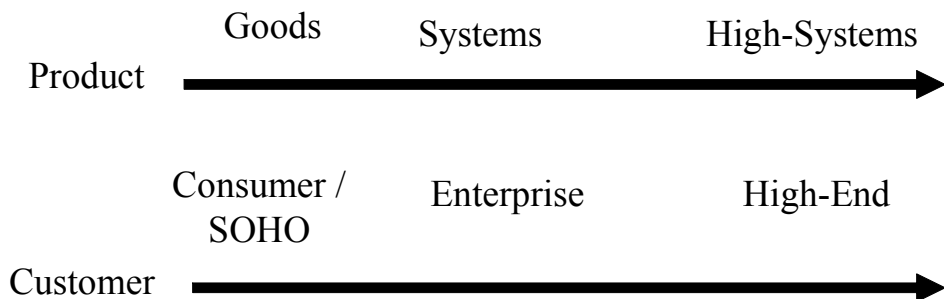
Figure 14 - Case companies Customer pattern

	Preliminary Stage	Consumer / SOHO	Enterprise	High-End
BATM			—————→	
Emblaze	—————→			
Orckit	————→			————→
VCON			————→	
VocalTec		————→		

* Emblaze and VocalTec had a preliminary stage in which they have been doing R&D work for foreign companies. In this preliminary stage no marketing activities of the R&D product has been carried out by the firms.

Figure 15 – Product and Customer Patterns

Product and Customer Patterns



6.2.3 Operations Strategy

6.2.3.1 Operation Modes Pattern

The research done by Luostarinen since the late 1960s found that 98 percent of the 997 Finnish firms studied started their international operations using non-investment marketing operation modes (NIMOS). 64 percent of the firms used direct-investing marketing operations modes (DIMOS) as their second stage operation mode (Luostarinen, 1970, 1979). The third operation mode was usually non-investment production operations (NIPOS) while the last stage was direct-investment production operations (DIPOS).

The classification into these four categories (NIMOS, DIMOS, NIPOS, DIPOS) suited the manufacturing companies studied in 1968 and 1976. By using these four categories, Luostarinen was able to find a clear pattern of operation modes utilization (Luostarinen, 1970, 1979). The analysis of the operation modes used by the case companies in this study revealed that this classification is not best suited to knowledge companies. It should be noted that knowledge companies have dramatically increased in number since the beginning of the 1980s. This increase is mainly linked to technological developments in information technology and communication. Thus when the original research by Luostarinen took place in the late 1960s and 1970s the vast majority of the Finnish international firms were manufacturing firms. The 1968 and 1976 studies were repeated by Luostarinen and his research team in 1983, 1990, and 1997. The data was also collected by the FIBO (Finland's International Business Operations) research program at the Helsinki School of Economics. These repeated findings confirmed Luostarinen's original findings on manufacturing companies. However, Luostarinen's research was not intended to study knowledge firms which are the focus of his Born Global research project and of this study which is part of that project.

Three main differences have been identified between the operation modes of manufacturing companies, represented by Luostarinen's findings, and those of knowledge firms, represented by the case firms:

- a) Luostarinen divided the operations into marketing and production operations. As has been previously covered, most of the knowledge firms in this study do not manufacture.
- b) Some of the marketing operations that were used by the manufacturing firms are not used by knowledge firms.
- c) Some operation modes that are used by knowledge firms do not fit the marketing or manufacturing categories.

According to Luostarinen's POM framework, the production operations classification (table 7), does not seem suitable to technology-intensive Born Globals. Franchising and co-production are not used by any of the case firms in this study. Licensing by itself was not used in the context of production. However, a company can license the use of its software to a customer, or license the use of complementary software from another company. Operations termed by the companies as turnkey operations mainly include installation, and pre-sale and after-sale technical support. Plants are not built and put into operation. These 'turnkey' operations of the Born Global firms in this study are typically a complete end-to-end solution of one function representing just a small fraction of the total system. Thus according to the definition in subchapter 6.2.1, these 'turnkey' projects are considered in this study to be sales of systems.

The case firms did not use contract manufacturing. Contract manufacturing refers to the manufacturing of the final product by a foreign producer. VCON did use contract manufacturing to produce the hardware, but the main part of VCON's systems was the software, which was installed by VCON. None of the case firms had its final product produced by a foreign manufacturer. International subcontracting is rarely used as it refers to the production of a part of the final product. This means the production of parts according to the specification given by the contractor. Subcontracting does not refer to the purchase of standard components when no adaptation is made for the buyer. The case companies in this study mostly purchase standard components from foreign suppliers. In many cases, long-term purchasing agreements are made in order to insure the supply of components. The import of components is in line with the inward process described in the Helsinki Holistic model (see subchapter 2.3.5).

Production investment operations were rarely used by the case companies. The companies might have minority investments in a foreign manufacturer of hardware components, as has been done by BATM, but they do not establish majority or fully owned manufacturing subsidiaries. The investment done by BATM is rare and was also based on marketing considerations in Asia as well as on production considerations. The case companies in this study are not likely to ever establish their own manufacturing subsidiaries, as they typically do not manufacture hardware. The hardware and manufacturing costs, especially in products for the enterprise and high-end customer segments, represent a relatively small part of the product's price. Thus there is no real advantage in establishing a foreign manufacturing subsidiary. The relatively small number of the products, especially in the high-end market, also leads to the reliance on standard components and avoidance of hardware manufacturing. As to establishing assembly subsidiaries, none of the case companies used this mode of operation and they are not likely to do so in the future. Assembly operations do not require a lot of human resources and can easily be performed in one location. There is no real advantage in locating the assembly operation in a foreign country or splitting it into a few locations. On the other hand, there is some advantage in locating the assembly near the R&D operations.

Looking in the NIMOS operations (Non-Investment Marketing Operations) identified by Luostarinen we can see service and know-how exports. In two of the case companies the preliminary phase in which they have performed R&D work for foreign firms can be seen as export of R&D services. Excluding the preliminary phase in these two case firms neither of these operation modes has been used by any of the case firms in this study. Service, excluding the preliminary stage, is sold in combination with the product, but is not offered separately to products of other companies. R&D subcontracting does not exactly fit the traditional classification, as it is not a production operation and not a marketing operation. R&D subcontracting differs from know-how export, which refers to manufacturing companies gaining knowledge over the years and later selling the knowledge. In R&D subcontracting, the companies do not sell any previous knowledge gained through their operation. Thus in this study R&D subcontracting will be considered as export of R&D services. Export of R&D services is considered in this study to be only a preliminary operation mode. The technology-intensive Born Global companies in this study did not transfer

any know-how. As know-how is the main asset of technology-intensive Born Globals, it does not seem likely that they will export this knowledge in the near future.

All the case firms in this study started with non-investment operations. The first operations mode used in all cases was export. In two cases (Orckit and Emblaze), export of R&D services was a preliminary stage, though not necessarily intended as such at the time. Both companies abandoned the export of R&D services as soon as they developed their own technological innovation. Starting with non-investment operations is in accord with the Helsinki model (Luostarinen, 1970, Luostarinen, 1979) and with research on small high-technology UK firms that found that 90.2 percent of the firms had a marketing/distribution foreign link at their first stage of internationalization (Jones, 2001).

The most common operation modes found in this study were export, import (typically of standard components), subsidiary operations (technical support: pre-sale, installation, and after-sale; sales promotion, business development, and sales offices), cooperative operations (strategic alliances, including non-equity joint ventures, for distribution, marketing, expanding product line, and development of international standards), and acquisitions (majority and minority). When establishing foreign subsidiaries all case firms started by establishing a greenfield subsidiary. Other subsidiary establishment modes as acquisitions and equity joint ventures were used only after establishing at least one greenfield subsidiary.

In order to identify a pattern of operation modes this study examined the first time in which each operation mode was used in each company (figure 16). In the graphic representation each timeline arrow starts with the name of the company and its year of establishment.

Looking at the timelines and the data a few things become evident:

- (a) International operations start on inception or as soon as the first products are developed.
- (b) Companies tend to start with export followed by the establishment of subsidiaries. First subsidiaries tend to be greenfields.

- (c) Equity joint ventures are rare and are not significant to the companies' success. For Emblaze, the joint Venture proved to be of little importance and for VCON, the joint venture subsidiary arrangement did not work.

From figure 17 we can see a general pattern emerging concerning the use of operation modes by technology-intensive Born Globals. In certain cases, companies have a preliminary stage in which they do not handle any marketing or sales operations of their R&D product. In these preliminary stages the companies simply perform R&D work for foreign companies. Most companies start their international operations with export and possibly import of standard components (NIMOS) followed by the establishment of greenfield subsidiaries (DIMOS). This is followed by acquisitions (minority or majority) (DIMOS), international strategic alliances, and equity joint ventures (co-operative operations). The order in which these last three operations modes are used can change. It is also evident that not all the firms use all of these operation modes. Equity joint ventures in particular seem to be seldom used.

These findings are in accord with the findings of Israeli knowledge-intensive Born Globals research (Hashai & Almor, 2004). Hashai & Almor (2004) found that Born Global firms started using exports, then established greenfield marketing subsidiaries, and finally engaged in more advanced operation methods as mergers and acquisitions.

Figure 16 - Case companies Operation modes

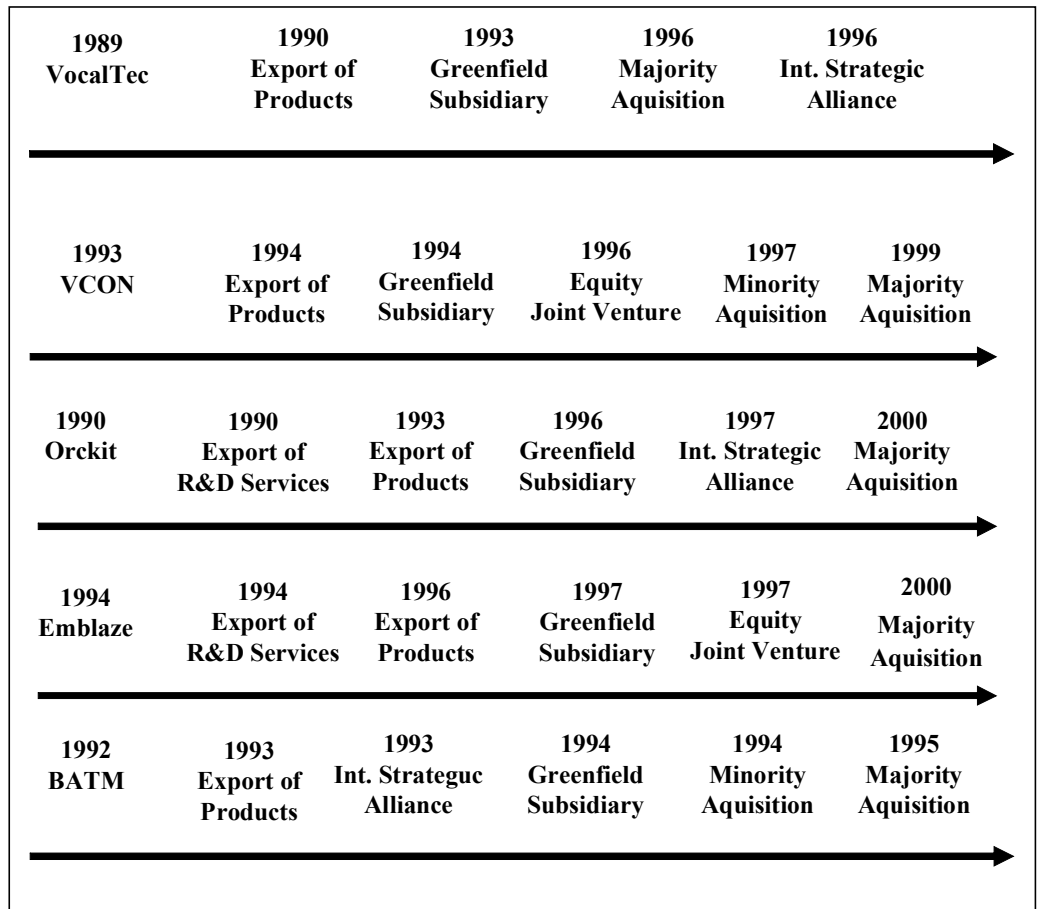
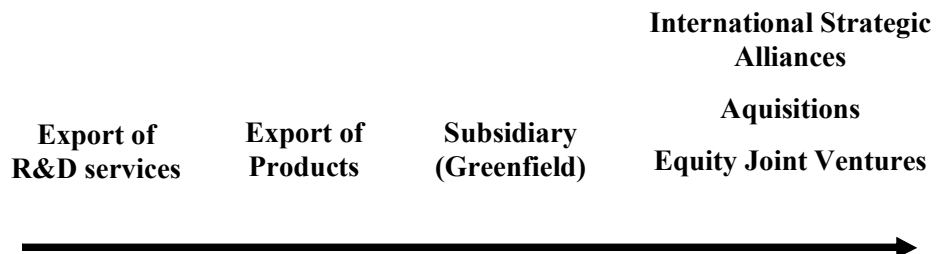


Figure 17 shows the general trend of operation modes utilization shown by analysis of the case firms in this research.

Figure 17 - Operation modes pattern



6.2.3.2 Establishment Pattern

All first foreign subsidiaries of the case firms in this study were greenfields. The move from export to greenfield subsidiaries can be seen as a move from NIMOS (Non Investment Marketing Operations) to DIMOS (Direct Investment Marketing Operations), which is in accordance with Luostarinen's Helsinki Model. Technical support (pre-sale support, installation, and after-sale support) is the most common function of these greenfield subsidiaries especially when targeting the enterprise and high-end customers segments. While not exactly a marketing activity it could be viewed as a marketing support activity.

VocalTec established a greenfield marketing subsidiary in the US in 1993 and opened its UK subsidiary in 1996 after the acquisition of Insitu. Insitu was acquired in order to expand VocaTec's product line and provide a technology framework for future multimedia business and commercial Internet/intranet products. BATM established a UK greenfield subsidiary in 1994 to market BATM's products in Europe and provide services to foreign customers. In 2000, BATM acquired Telco Systems, which serves as their US subsidiary. Emblaze established its first foreign subsidiary in the US in 1997. The subsidiary was established to enable Emblaze to achieve higher sales in a short time, while maintaining full control over all distribution channels. Emblaze and Orckit have not used acquisitions to establish foreign subsidiaries. VCON opened a subsidiary in the US for marketing and sales in 1994 as soon as the first product was developed. This was later followed in 1996 by the establishment of a German subsidiary together with a local partner. Such joint venture establishment of a sales foreign subsidiary is rare and it failed. The establishment of the German subsidiary was followed with the establishment of greenfield subsidiaries in Spain and in the UK.

These findings are in line with the research by Hashai and Almor, which found that 80 percent of the Born Globals established their first foreign subsidiary as a greenfield. In the fifth subsidiary only around 50 percent of the foreign subsidiaries were greenfield (Hashai & Almor, 2003).

The logic behind the operations pattern in Luostarinen's Helsinki model is still relevant. Companies start with non-investment modes of operations and later when they gain resources and experience, start using direct-investment operations as well. However, the move to direct-investment operations is rapid. The first direct-investment by the case companies was carried out 1-6 years from establishment (see figure 16). When analyzing the direct-investments of the case studies companies it became evident that companies usually start with greenfield subsidiaries followed later by acquisitions and equity joint ventures (rarely). Early stage acquisitions tend to differ from later stage acquisitions in (1) their importance for the acquiring company, (2) the acquisition sum, and (3) the success rates.

BATM's first direct-investment was made in 1994 in establishing a UK greenfield subsidiary. During 1994 to 1998 BATM made some small minority and majority acquisitions in B.T.T, BAT-NET, CONNECTronix, and Shiron Satellite Communications (1996) Ltd. The amount of money invested in these acquisitions has been rising and the last investment in Shiron Satellite Communications (1996) Ltd in 1997 amounted to \$2 million. None of these early investments was very successful. Two later acquisitions in 1999 and 2000 proved to be highly significant for BATM. In 1999, BATM acquired NetWiz for around \$2 million. Through the acquisition of NetWiz, BATM gained entry into the EU R&D program and the technology developed in NetWiz helped to move BATM from infrastructure products to IP products. Analysis of the data reveals that NetWiz technology was highly significant in BATM's sales following the acquisition. In 2000, BATM acquired Telco Systems for \$326 million. The acquisition tripled BATM's revenues and contributed 76 percent of its revenues in 2000.

VocalTec's first direct-investment was in establishing a US greenfield subsidiary in 1993. In 1996 VocalTec acquired Insitu Inc. for \$1.3 million in shares. The acquisition expanded VocaTec's product line and provided a technology framework for future multimedia business and commercial Internet/intranet products. The acquisition of Insitu was not highly successful. In April 1998 VocalTec acquired RADLinx Ltd. for \$7.7 million, in shares. The acquisition expanded VocalTec's product line and increased its sales and marketing team. If we exclude the greenfield

investments and focus on the equity investments, we see an increase in the amount of the equity-investment made over time and a higher degree of success.

VCON's first direct-investment was in establishing a US greenfield subsidiary in 1994. VCON's early acquisitions were made in some ventures of Moti Gura, a co-founder of VCON, (e.g Video Surfer Ltd in 1997, VirtuaLINK in 1999) and also in a company named Techimage. All these early acquisitions were relatively small and were not successful. In 1999 VCON acquired PhoNet Communications for \$4.207 million. With the integration of PhoNet technologies, VCON positioned itself as a provider of a complete business networked multimedia solution over IP. Once more we see early small unsuccessful acquisitions followed over time by bigger acquisitions with greater success.

Emblaze made its first direct-investment in establishing a US greenfield subsidiary in 1997. Acquisitions were made to assist growth through mergers and acquisition activity. Emblaze's first three acquisitions were in 2000. The first acquisition was Orca, an Israeli start-up, obtained for \$33 million through a share swap. Orca developed a content management engine for interactive television, with an option of including work opposite a database, e-commerce tool, and video broadcast on demand. The second acquisition was Zapex Research Ltd for \$27 million through a share swap. Zapex helped Emblaze develop the second generation of Emblaze's cellular chip. Zapex Research Ltd was later renamed Emblaze Semiconductor Ltd. The third direct investment was of \$5 million in Tornado Development, a US company and a leading developer of Unified Messaging solutions. In 2001 Emblaze acquired 19.8% in AlphaCell wireless 2001 Ltd, a provider of fully tailored rich-media handsets for segmented target markets. The cost of the acquisition was \$6.4 million. In 2002 Emblaze acquired UcnGO 2000 Ltd. and UcnGO INC for \$3.6 million. The degree of success of these acquisitions is hard to evaluate. However, During 2002 Orca Interactive Ltd., Emblaze Semiconductor Ltd. (Zapex), and AlphaCell Wireless Ltd., were active subsidiaries of Emblaze. In the case of Emblaze there is no clear development pattern of its acquisitions and most acquisitions represent relatively small sums of investment in young companies.

6.3 Market Strategy

The Finnish manufacturing companies in the 1970s tended to start their international outward operations with countries that had a very small business distance to their domestic market. The first target countries tended to be the neighboring Scandinavian countries followed by Western Europe and Russia (a neighboring country). In the third stage, Finnish firms tended to target South and Eastern Europe. Only in the fourth stage did Finnish companies target the North American market. This step-by-step and country-by-country process took time. As the North American market was usually targeted only in the fourth stage, it took quite a long time for these companies to start business operations outside their continent. Asia and developing markets were targeted only in the last stage.

Analysis of the case companies in this study reveals that the concept of business distance (Luostarinen, 1970, 1979) or psychic distance (Johanson & Vahlne, 1977; Johanson & Wiedersheim-Paul, 1975) has become much less relevant. Decisions on target markets are based on (1) market potential, and (2) the resources needed to enter the target market. The term *business potential* will be defined as

$$\text{Business Potential} = \frac{\text{Market Potential}}{\text{Required Resources for Entry}}$$

Technology-intensive Born Globals tend to enter markets in accord with their business potential. The concept of a key market should also be taken into account. In the telecommunication industry, the US market is a key market. All case companies recognized that. Entry into a key market is done as soon as possible given the firms limited resources. In some cases, especially in the high-end customer segment, firms may have to target first one or two smaller markets in order to demonstrate their capabilities. This is due to the fact that large companies from high potential markets tend not to purchase high-end products before their capabilities and reliability is proven and demonstrated in another country.

This finding is in line with other research which found that psychic distance has become much less relevant due to globalization, development of global

communication and transportation infrastructures, and markets becoming increasingly homogeneous (Czinkota & Ursic, 1987; Nordström, 1991). Empirical evidence from 187 small software firms in Finland, Ireland and Norway also found that market selection decisions of these firms were not, necessarily, influenced by psychic distance factors (Bell, 1995).

A study of 53 Israeli Born Globals found that the firms entered the US and the EU earlier than South-East Asia (Hashai & Almor, 2004). Assuming that the US and EU are psychically close to Israel can lead to the conclusion that psychically close markets are penetrated before psychically distant markets. However, viewing the EU as one homogeneous market might be misleading. A look at Hofstede's dimensions of cultural scales (table 29) reveals the cultural differences between the EU countries. It is important to note that none of the managers in this study's case companies viewed the EU market as one homogeneous market. It can be argued that the Israeli companies entered the EU and the US before South-East Asia because at that time the EU and the US had a larger business potential than Asia. According to this study's view, when the Asian business potential becomes larger than those of the EU and the US, we can expect that Born Global firms will choose to enter Asia first.

Technology-intensive Born Globals cannot afford a slow step-by-step and country-by-country globalization process. In addition to the global nature of the industry, high R&D costs, and shorter product life-cycles Israel's periferic location forces Israeli technology-intensive Born Globals to start business operations outside its domestic continent. Unlike European or Canadian and Mexican firms Israeli technology-intensive firms have no significant neighboring potential markets for their products. All the case companies in this study started with the European and North American markets more or less simultaneously followed later by Asian markets and finally other markets.

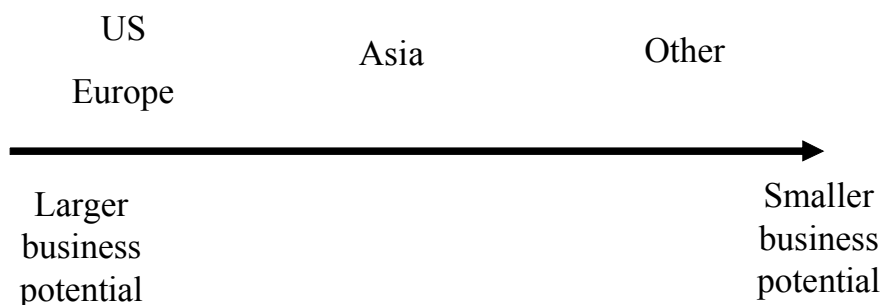
Table 29 – Hofstede’s Dimension of Culture Scales

	Power Distance	Individualism	Uncertainty Avoidance	Masculinity
Israel	13	54	81	47
Germany	35	67	65	66
Austria	11	55	70	79
Belgium	65	75	94	54
France	68	71	86	43
Italy	50	76	75	70
Great Britain	35	89	35	66
Finland	33	63	59	26
Spain	57	51	86	42
Portugal	63	27	104	31
Netherlands	38	80	53	14

Source: www.geert-hofstede.com/hofstede_dimensions.php

Figure 18 - Market Pattern

Market Pattern of Israeli Technology-Intensive Born Globals



All the case companies realized the key role of the North American market in the telecommunications industry. The difference between the firms was that while some decided to focus their main efforts on the North American market since inception, others concluded that entry to the North American market required too many resources at that stage. These companies focused their main efforts in the first phase on Europe. The geographic market pattern as presented in figure 18 shows the main geographical markets in which the companies focused their marketing and sales efforts. Companies focusing their main marketing and sales efforts on the North American or European market or both can have also sales in Asia and other markets. Indeed in most cases business was done in all these three continents relatively soon after inception.

Emblaze focused on the North American market since inception starting with its preliminary phase of export of R&D services. After developing the Emblaze technology Emblaze signed a global distribution agreement with Symantec, a US corporation and in 1997 established their first greenfield subsidiary in the US. Through its US subsidiary, Emblaze established its own independent distribution network in the US. The European and Asian markets on the other hand were handled through the use of local distributors. Thus while targeting North American, European and Asian markets at a very early stage, the main effort and resources were toward the North American market.

In BATM, while the importance of the North American market was recognized from inception, the founder and CEO concluded that at that point they simply lacked sufficient resources needed to penetrate the market. However, BATM reached an OEM agreement and cooperation with IBM, an American corporation, in 1993, through its German office. IBM was actually the first customer targeted by BATM as soon as their products were ready. Through IBM, BATM products were sold under the IBM logo across the world. In 1994 BATM established its first greenfield subsidiary in the UK. Until 1999, most of BATM's revenues were from Europe while in the North American market BATM sold its products through distributors and OEM agreements. Only after raising around \$300 million during 1999-2000 did the focus of effort move to the North American market.

Orckit started their preliminary stage of export of R&D services in the North American market. This was due to prior personal connections of Orckit's founders. With their HDSL product, which was developed with General DataCom, Orckit's main marketing efforts were in Europe as General DataCom had the marketing rights in the US. In the ADSL product, the North American market was handled through an OEM agreement with Fujitsu. Thus while taking care of the North America through distribution agreements the main marketing and sales efforts of Orckit were in Europe.

In VocalTec, the focus was clearly on the North American market. Recognizing the importance of the North American market VocalTec established its first greenfield subsidiary in the US in 1993. PR (Public Relations) activities were carried out only in the North American market, excluding a few cases in recent years. VCON similarly established a greenfield US subsidiary as soon as their first product development was completed.

Looking at the data we see that three out of the five case companies established their first greenfield subsidiary in the US. Orckit, due to its agreement with General DataCom and BATM due to its conclusion that they lack sufficient resources, started by investing more resources in the European market. All of the case companies recognized that 60 to 70 percent of their revenues, according to data on other older companies in the telecommunication industry, should come from the North American market. VocalTec and Emblaze acted accordingly from inception by investing most of their efforts in the North American market. This was also true, though with a lesser degree, for VCON.

When analyzing the market strategy of technology-intensive Born Global we should note also the speed in which these companies enter new markets. BATM was established in 1922. In 1997 it had generated revenues in Europe, America, Africa and Asia. In 1997, Emblaze founded in 1994 had generated revenues in North America, Europe, and Asia. In 1997, Orckit founded in 1990 had generated revenues in Europe, America, and Asia. In 1998, VCON founded in 1994 had generated revenues in Europe, America, and Asia. In 1996, Vocal established in 1989 had generated revenues in Europe America, and Asia. In the case of VocalTec the relative delay is

due to the development of the Internet Phone only in 1996. Thus all the case companies have generated revenues in all the three significant continents outside their own domestic continent within 7 years from inception.

6.4 Sales Promotion Strategy

The cases of Emblaze and VocalTec are clear indications of the importance of launch events and media coverage. For Emblaze, the impact of the demonstration in MILIA in 1996 was tremendous and generated around 400 news articles around the world. For VocalTec it was a North American 1995 road show in which its technology was demonstrated to a Wall Street Journal reporter. This resulted in a Wall Street Journal extensive article on VocalTec and the Internet phone. The effect of this article was tremendous. Companies and reporters from around the globe approached VocalTec to learn about the Internet Phone and the future of VoIP (Voice over IP). In the following months thousands of articles all around the world followed.

The topic of launch events, road shows and key media coverage seem not to be researched in connection with the Born Global phenomenon. However as these two cases clearly illustrate, media coverage, especially by key media such as the Wall Street Journal, generated by launch events or road shows can be essential for the rapid globalization process of these companies. A classic example of a successful launch event was the introduction of the Apple Macintosh at the 1984 Super Bowl. A more recent example is the launch of InfoGate by IFN in March 2000. IFN used a satellite press conference at which executives demonstrated the product to reporters all over the world. The launch event served not only to build awareness for the new product, but also to gain credibility with strategic financial partners and to demonstrate its product and success to investors from Citygroup (Krauss, 2000).

6.5 Competitive Edges

All of the case companies created a significant technological advantage over their larger established competitors. These companies were clearly entrepreneurial in spirit. They were innovative, flexible, and highly motivated. The leadership and vision of the founders and the entrepreneurial spirit they created in the companies were clearly a key success factor for these companies. This finding compares well with other research. The global vision, attitudes, and mental maps of the founders and early management have been widely recognized as a key factor for Born Globals (Oviatt & McDougall, 1995; Roberts & Senturia, 1996; Madsen & Servais, 1997; Moen, 2002; Kobrin, 1994; Harveston, Kedia, & Davis, 2000). This study also emphasized the business orientation of the founders as an important factor behind the early rapid globalization of technology-intensive Born Globals.

The case companies included in this study placed greater importance on product innovation, quality, and service, and have often been first to market an innovative valuable product. VocalTec developed the Internet Phone and became a world leader in VoIP. Emblaze was a pioneer in broadcasting video, audio, and animations over the Internet. VCON changed the video conferencing market by introducing low cost systems. This finding is in accord with other research (Oviatt & McDougall, 1995; McDougall, Oviatt, & Shrader, 2003).

A factor that seems to have been relatively neglected by previous research is the choice of a foreign IPO in order to finance the early rapid globalization of these Born Globals. The choice of a foreign IPO in order to finance growth enables the companies not only to raise sufficient funds and achieve higher evaluations but also to signal, through the IPO, that they are of high quality and thus attain investors and customers recognition (Blass & Yafeh, 1998). It can be argued that a choice of a foreign IPO for a technology-intensive Born Global, in its start-up phase, can create a competitive edge for these companies.

6.6 The PCOM Framework

Based on the previous described patterns a new PCOM (Products, Customers, Operations, and Markets) framework has been developed. The new PCOM framework is a major contribution of this study. Though the original intention was to study the POM strategies it became evident during the interviews and data collection process that in order to explain the globalization patterns of the case companies, the customer strategy must also be examined. The customer segment pattern identified in this study of movement towards high-end customers seems to be important for the success of technology-intensive Born Globals. The identification of the Born Global's customer strategy pattern and its key role in the globalization process of technology-intensive Born Globals is a novel finding of this study.

In order to describe the product strategy pattern of technology-intensive firms, the term system has been redefined, and the term **high-systems** was added (see previous subchapter on Product Strategy). As to the operation modes, Luostarinen's original framework (Luostarinen, 1970, 1979) was adjusted to fit **knowledge firms**. Some of the firms started with export of R&D service as a preliminary phase. In this preliminary phase, the firms did not perform any active marketing and sales activities of their R&D product. As soon as the companies develop their own technological innovation they tend to start their own marketing and sales operation with export followed by establishing a greenfield subsidiary. Subsidiaries are mostly established for support and sales activities. None of the case companies established a manufacturing subsidiary. The order of later used operation modes is not completely clear, as it is different among the case companies. It is important to note not only the order of use of operation modes but also the speed in which the companies move to use new operation modes. Export operation started from inception or since the first product development was completed. Greenfield subsidiaries were established 1-6 years from inception. Acquisitions have been carried out 2-10 years from inception. Looking at figure 16 we can see the wide variety of operation modes used by the case companies in a relatively short time.

As to markets strategy, the country-by-country slow process of geographic expansion according to 'business distance' or 'psychic distance' is less relevant. Though a

pattern of market penetration is presented, the study does not claim that this pattern always holds or that this pattern will not change. It is important to understand the reasons behind the pattern as was described in the previous market strategy section. The concept of **business potential** has been introduced to explain the order of market entry. Market patterns of new technology-intensive Born Global firms are expected to change over time according to changes in the business potential of markets.

PCOM Strategy patterns of Israeli technology-intensive Born Globals have been identified. These patterns have been shown to differ from those of traditional firms as can be seen in the Finnish research from the 1970s. The globalization process of the technological-intensive Born Globals can be illustrated in the following figures:

Figure 19 - Born Globals Preliminary Phase

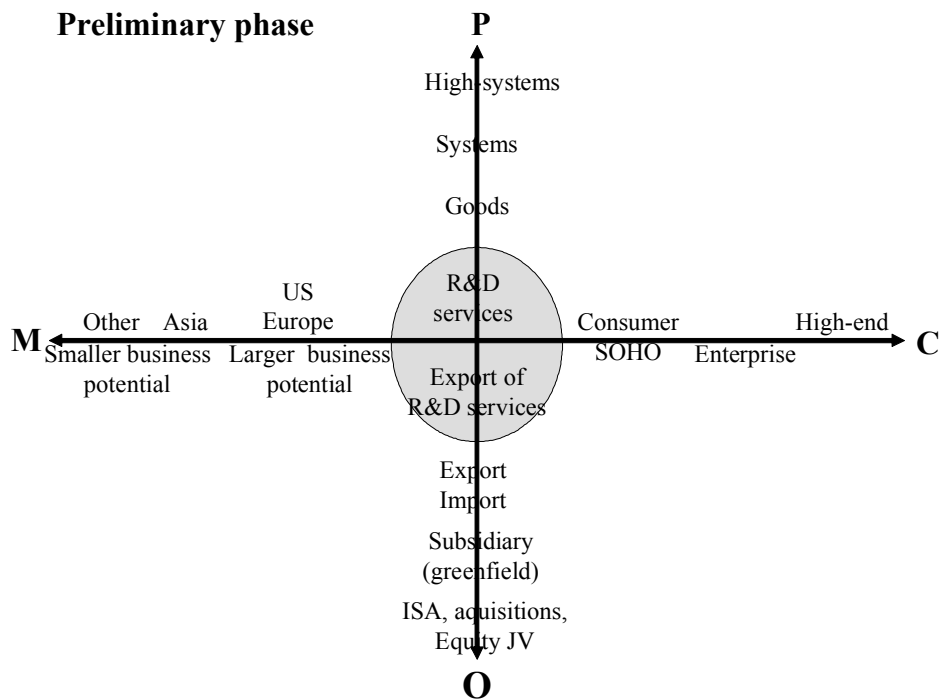


Figure 20 - Born Global First Phase

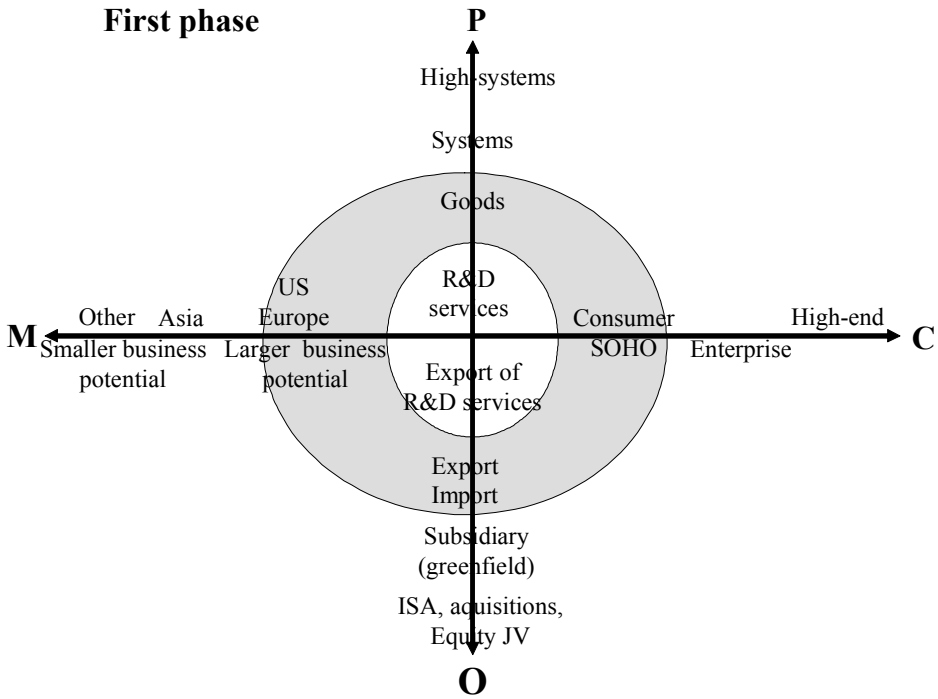


Figure 21 - Born Global Second Phase

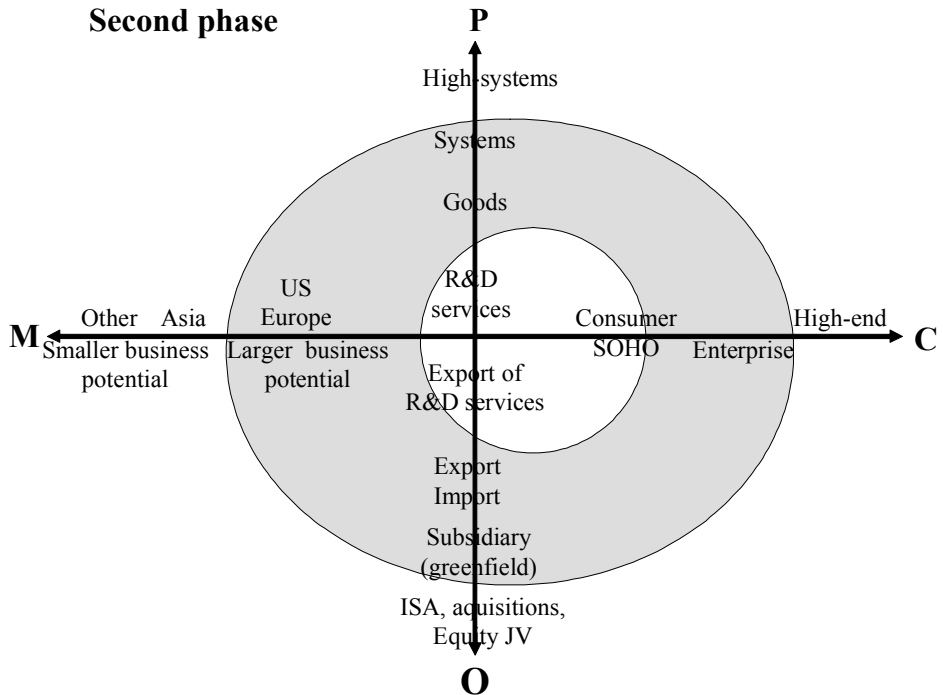


Figure 22 - Born Global Third Phase

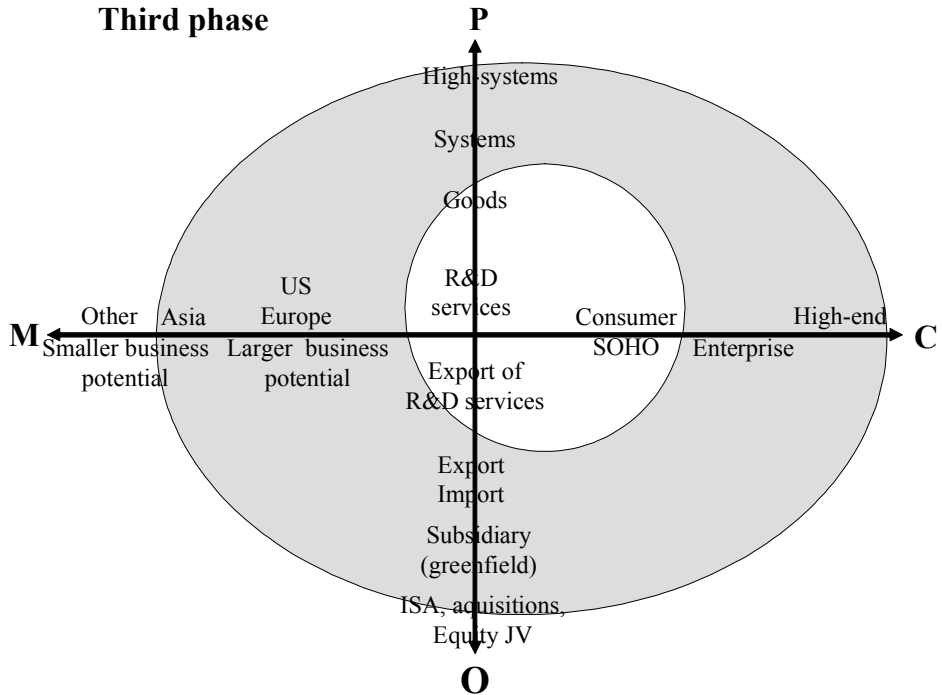
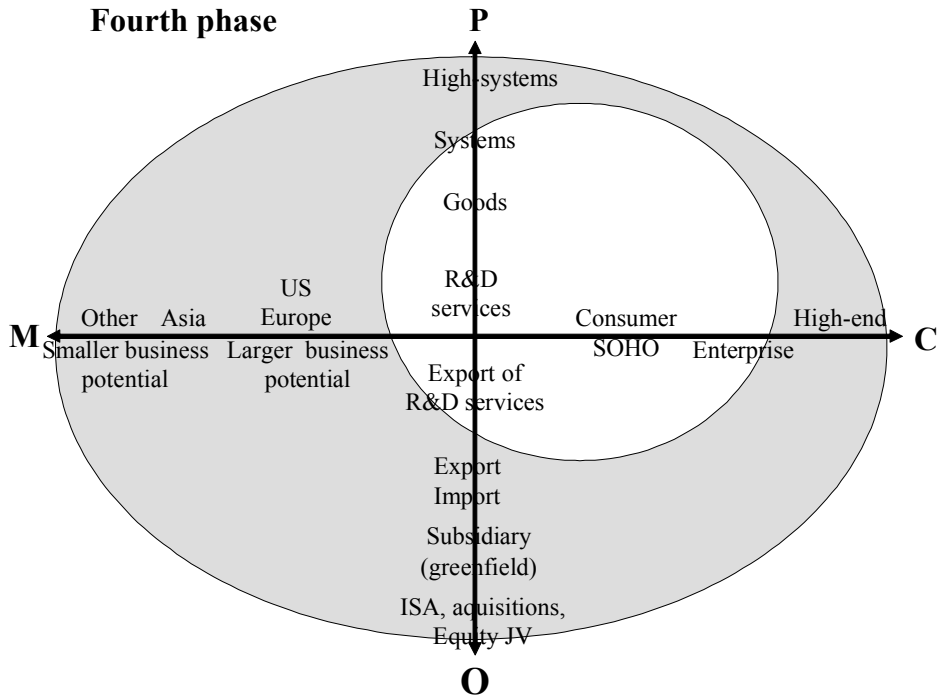


Figure 23 - Born Global Fourth Phase



The division into different phases is for illustration purposes only. The illustrations are used to show the directions in which these companies go in their globalization process. Technology-intensive Born Globals do not always follow the exact illustrated order. In the preliminary phase (figure 19), companies perform R&D work for foreign customers. The companies perform no marketing and sales activity for their R&D product in this phase. Not all companies start in this phase. In fact, three out of the five companies in this study skipped this phase entirely.

The first phase (figure 20) shows how technology-intensive Born Globals tend to start with export operations to North America and Europe (representing the highest business potential at the time) while targeting the consumer and SOHO customer segments. All the case companies started with an export operation that mainly targeted the North American and European geographical markets. Most companies, however, seem to skip this phase and avoid the consumer and SOHO customer segments. When entering this phase or more advance phases, the companies that started in the preliminary stage begin closing down their R&D subcontracting work. In this phase, companies do not target the enterprise or high-end segments and typically have not made any acquisitions or significant strategic alliances. In most cases in the beginning of this phase no foreign subsidiaries have been established. The products at this phase are classified in this study as goods. The category of goods includes products (hardware and software) with very limited service level, if at all (see subchapter 6.2.1).

The second phase, as shown in figure 21, shows companies targeting the enterprise customer segment and moving out of the consumer and SOHO segments while targeting mainly the North American and European geographical markets. At this stage, greenfield subsidiaries are established. High-end customers are still not targeted and acquisitions or significant strategic alliances have typically not been carried out. At this phase the products are classified in this study as systems. Systems are products that include service (pre-sale, installation, and after sale), for more details see subchapter 6.2.1.

In the third phase (figure 22), companies have already exited the consumer and SOHO customer segments and also started targeting high-end customers in addition to the

enterprise segment. The products are systems and high-systems. At this phase the firms tend to stop sales of goods with low or no service. They start to put more efforts into developing their business in Asia in addition to their existing efforts in North America and Europe. This does not mean that prior to this phase no business was done in Asia. The geographical market patterns show an expansion in marketing and sales effort. While some business could have been done in Asia and other countries in the first phase, very little marketing, sales efforts, and resources have previously been dedicated to this region. At this phase greenfield subsidiaries have been established. Strategic alliance and acquisitions are typically used at this phase.

In the fourth phase (figure 23), the companies focus on high-end customers and move out of the enterprise segment, while using all relevant operation modes including export, import, greenfields, acquisitions and strategic alliances. At this phase, the companies target all significant potential markets. The products are high-systems while sales of systems are reduced or stopped. There are no sales of goods (according to the classification used in this study) at this phase.

6.7 The Finnish Born Globals

In recent years high-technology has gained a more and more important role in the Finnish economy. Finland is now widely known for its advances in Internet and communications technologies, and names like Nokia and Linux are known worldwide. According to the Institute for Management Development (IMD) world competitiveness yearbook for 2003, Finland is ranked 1, meaning that it is the most competitive country among countries with population of less than 20 million. According to the World Economic Forum (WEF) Finland was ranked second best, for 2002, after the US, in growth competitiveness and first in 2001 competitiveness. Finland has more Internet nodes, cell phones, and electronic banking transactions per capita than any nation in the world. According to Forbes “...*Finland has become one of the most attractive countries in Europe for American investors. Much of the reason for Finland's economic attractiveness is its reputation for developing cutting-edge technology in the wireless, IT and biotech sectors*” (2002).

Finland's competitiveness and its advanced high-tech industry was an understandable reason to start a large, three-year Born Globals project at the Helsinki School of Economics of which this study is a part.

Finland is similar to Israel in many aspects as can be seen in the inter-country comparison table (table 30). These similarities made it appropriate to compare Israeli and Finnish research findings on Born Globals.

Table 30 - Inter-country comparison		
	Israel	Finland
Population size (2000)	6.2 m	5.1 m
Investment in civilian R&D as % of GDP (2000)	4.2%	3.2%
Expenditure on civilian R&D per capita (PPP US\$) 2000	892	722
Peripheral location	Yes	Yes
GDP per capita (PPP US\$) 2001	19,790	24,430
Life expectancy at birth (years) 2001	78.9	77.8
IMD world competitiveness ranking 2001	13	4
High-Tech exports \$Billion , 2002	9	9.7
Sources: The central bureau of statistics in Israel, Statistics Finland, TEKES, Ministry of Industry & Trade in Israel, United Nations Development programme		

When comparing findings of a Born Global studies special attention must be given to the definition of Born Global used in each specific research and the selection criteria used in the empirical work. Maccarini et al. (2003) defined Born Global firms as firms which started selling abroad within 3 years of their birth (Maccarini, Scabini, & Zucchella, 2003). Pulkkinen & Larimo used the following selection criteria: (1) international sales three years after establishment at least 25% of total sales, (2) growth tendency in international sales, thus being at least 50% of total sales in 2001,

and (3) sufficient number of foreign countries in which the company has sales (at least six countries) (Pulkkinen & Larimo, 2003).

The definitions and selection criteria used in this study are much stricter than the above definitions and selection criteria. Comparing the findings of Born Global studies using such different definitions and selection criteria is similar to comparing oranges and apples. Too broad definitions of Born Globals can prevent any comparative use of certain research studies (Rasmussen & Madsen, 2002).

The problem is not confined to the degree and speed of globalization. The question of the company's origin is also critical in understanding the phenomenon and in comparing findings. As an example let's take Vaasa Control Oy, established in 1993. Vaasa Control Oy develops, manufactures and markets frequency converters for various industrial applications. The company was founded following a decision by ABB to move its frequency converter production from Vaasa (located in the west coast of Finland) to Helsinki. ABB's managers and engineers wished to stay in Vaasa and decided to leave ABB and establish their own company. In the case of Vaasa Control, a group of people left an existing company and took the business with them. This is not comparable to a company that started from scratch.

A study of 89 Finnish Born Global firms (Luostarinen & Gabrielsson, 2002) suggests that Born Global firms be divided into different categories based on their development stage:

- a) Mature stage Born Globals – sell over 50% of their sales outside the domestic continent. Out of the 89 firms studied only 22 firms fulfilled this criterion. Only five companies had over 75% of sales outside of the domestic continent.
- b) Growth stage Born Globals - sell over 25% of their sales outside the domestic continent.
- c) Development stage Born Globals - sell below 25% of their sales outside the domestic continent, but above 50% outside the domestic market.
- d) Starting stage Born Globals - sell below 25% of their sales outside the domestic continent, but between 25% to 50% outside the domestic market
- e) Entry stage Born Globals – International and global sales below 25%.
- f) Domestic and R&D stage Born Globals.

As this study examined only mature stage Born Globals, all of them with over 75% of revenues generated outside the domestic continent, the findings can be compared only to similar studies of mature stage Born Globals. The Finnish research (Luostarinen & Gabrielsson, 2002) examined five mature stage Finnish Born Globals in the following businesses:

(a) radiation detectors and related products; (b) software and application service provider; (c) Internet security software; (d) gas detection systems; and (e) quality control systems. The findings were as follows:

Product strategy:

- The product business idea was very focused on a niche segment or /and the technology was new for the world with practically no viable competition.
- The product strategy pattern of traditional firms as found in earlier Finnish research did not always hold. The process of starting with physical goods and then progressing to services, know-how, and systems was accelerated or some categories were introduced simultaneously, or in reverse order, or even jumped over.

The Finnish product strategy findings are in line with this study's findings. VCON, VocalTec, and Emblaze (since the development of the Emblaze technology) had indeed introduced new innovations. All the case companies focused on a niche segment of the industry. The Finnish research found that the traditional product stages pattern no longer holds. This study concluded that due to the different nature of the case company (knowledge-intensive vs. manufacturing), the traditional product pattern, which was originally developed for manufacturing companies, was no longer suitable. This study found that by looking at the target customer segment, which is directly linked to the products characteristics, a clear pattern does emerge. Based on this realization, the PCOM framework was developed.

Operation Strategy

The Finnish research found that companies started with non-investment operations before moving to direct-investment operations. That is in line with this study's findings (see figures 16, 17). All the case companies started with non-investment operations (R&D subcontracting and export) and then moved to direct-investment operations (greenfield subsidiaries, and acquisitions).

Market Strategy

The Finnish research found that the market strategy followed the traditional stages, but faster. Usually Europe (the domestic continent for Finnish firms) was entered first. North American and/or Asian markets were entered within 1-4 years of the establishment of the company. In the market strategy it seems that the Finnish Born Globals differ from the Israeli Born Globals. The Israeli technology-intensive Born Globals might focus most of their effort on the European or North American market, but they tend to enter both markets more or less simultaneously. The Israeli Born Globals also seem to globalize more rapidly than the Finnish Born Globals. The difference might be explained in the specific location and situation of Israel compared with Finland. While Finnish companies have the European countries, which represent a high buying potential, as their neighboring countries and/or on their domestic continent, this is not the case with Israel. Israel's neighboring countries do not represent any significant buying potential for the technology-intensive start-ups examined in this study. Thus Israeli technology-intensive start-ups are forced to enter foreign continents since establishment. An additional contributing factor is that all the Israeli telecommunication firms in this study identified the North American market as the lead market in their industry. The founders of these companies realized that in order to succeed they must be successful in the North American market.

Marketing Strategy

Business-to-business segments were found to be more important to Finnish Born Globals than business-to-consumers segments. That is inline with this study's finding that companies that started in the consumer/SOHO segments moved to the enterprise segment and finally to the high-end customer segment.

Financing

A study on the financing of Finnish born internationals and Born Globals examined the financing of nine mature stage Born Global companies (Gabrielsson, Sasi, & Darling, 2004). Some of the companies received domestic venture capital from private domestic companies. A few of the companies used international venture capital companies, but none used global venture capital. The lack of global venture capital seemed to be compensated by partnering with global companies like Nokia or IBM. Two companies gained financing by an IPO at the Helsinki Stock Exchange. None of the companies was listed on foreign stock exchange. Two companies gained financing through advanced payments and revenue flows.

Finnish technology-intensive Born Globals clearly differ from the Israeli companies in two aspects:

- (b) Use of IPOs – only two of the nine Finnish companies examined used IPO to raise money while it seems that almost all Israeli technology-intensive Born Globals aim at an IPO.
- (c) The choice of IPO location. While most successful and innovative Israeli companies chose to raise money in foreign stock exchanges, Finnish companies tend to use the Helsinki Stock Exchange. While raising money in the Helsinki Stock Exchange will probably leave a bigger share of the company in the hands of the founders, these companies lose the global recognition that they could receive by choosing NASDAQ or the London Stock Exchange, for example.

Both Israeli and Finnish governments support technology-intensive start-ups. However, judging from the number of technology-intensive start-ups and number of foreign IPOs of these start-ups it seems that the Israeli policies have been a bit more successful than the Finnish policies. SITRA (Finnish National Fund for Research and Development) and LTT Research Ltd. have jointly studied how to attract foreign investments into early-stage Finnish technology companies (Cardwell, Mäkelä, Jokinen, & Kumpulainen, 1999). The research used Israel as a case from which Finland can learn. A developed venture capital market with a substantial number of foreign investors is indeed important for technology-intensive start-ups. The

availability of venture capital and international venture capitalist firms in Israel clearly supports the rapid and early globalization of Israeli technology-intensive start-ups. During the 1990s accounting, law, and venture capital firms in Israel gained knowledge regarding the US law and accounting regulations, and the IPO process in NASDAQ. The availability of sufficient venture capital combined with this knowledge and experience is part of Israel's country characteristics which are behind the early rapid globalization process of Israeli technology-intensive Born Globals.

Often when the topic of the high number of Israeli IPOs in NASDAQ is discussed the issue of the connection between Israel and the Jewish diaspora in North America is raised. This study found no connection between the IPOs and the Jewish diaspora in North America. The difference between the Israeli and Finnish Born Global firms seem to be similar to the difference between other European countries and US firms. While the average age of firms going public in Continental Europe is 40 years in the US many startup companies go public to finance their expansion (Pagano, Panetta, & Zingales, 1998). The Italian research found that European companies do not go public to finance growth, but rather to pay debt after a period of high investment and growth.

In contrast, newly listed companies in the US feature phenomenal growth (Pagano, Panetta, & Zingales, 1998). The US exchanges attract high-tech and export-oriented companies that expand rapidly without significant leveraging (Pagano, Roell, & Zechner, 2002). An Israeli study found that in local IPOs (in Tel-Aviv Stock Exchange) founders can typically retain a large amount of shares, often in the excess of 50 percent, which is much higher than the equity stake of founders in US IPO's (Blass & Yafeh, 1998). In F-secure a Finnish Born Global founded in 1988 that has been listed on the Helsinki Stock Exchange since November 1999, the founder Mr. Risto Siilasmaa still held 48.29 percent of the equity in 2002. Thus the difference between domestic and US IPOs seems to hold for Finland as well. This means that the decision on an IPO and its location is linked to the home country's and founders' characteristics.

6.8 Theoretical Contributions

Research on Born Globals, as have been shown in the literature review, mainly focused on (a) explaining the recent emergence of Born Global firms, (b) characteristics of Born Global firms, (c) limitations of existing internationalization theory and development of new research approaches, and (d) key success factors. Research on the globalization processes and strategies has mainly focused on large MNCs from large countries. This study examined the globalization process and strategies of Born Globals from SMOPECs.

The study used a **holistic** view, which was developed on the basis of Luostarinen's framework (Luostarinen, 1970, Luostarinen, 1979), and argued that four groups of factors should be examined when researching the globalization strategies of technology-intensive Born Globals: macro (industry), meso (country), micro (company), and milli-micro (founders) factors. Research on the globalization process of Born Globals is in its early stage and most of it seems to use only some of these factors in their analysis. Based on this holistic view, a conceptual framework has been developed. The conceptual framework explains (a) the factors behind the early rapid globalization process of technology-intensive Born Globals, and (b) the PCOM strategies of technology-intensive Born Globals.

Luostarinen's POM framework was used in order to compare the globalization process of traditional manufacturing firms with the early rapid globalization process of technology-intensive Born Globals. The study found that technology-intensive Born Global firms clearly differ in their globalization process from traditional manufacturing firms. The study emphasized the different characteristics of traditional manufacturing firms and technology-intensive Born Globals which have been termed **knowledge companies**. The knowledge company concept was developed to explain the difference in globalization process.

The characteristics of the founders and the home country were found to have significant influence on the globalization process of technology-intensive Born Globals. The study found that the global vision and business orientation of the founders plays a key role in shaping the globalization strategies of technology-

intensive Born Globals. The characteristics of the home country are divided in two groups of factors 1) country entrepreneurship enabling degree, and 2) home country's comparative advantages. The study uses the term '**country entrepreneurship enabling degree**' which includes availability of financing options (including existing knowledge and experience in foreign IPO process), governmental support, and local legislation and regulations.

Based on Luostarinen's POM and POM \$ICA frameworks, a new **PCOM framework** has been developed. The new PCOM framework describes the direction in which these companies move in their globalization process regarding: product, customer, operation, and market strategies. Product classification terms used by Luostarinen (1979) were redefined and a new classification of **high-systems** has been added. A novel result of this study is related to the identification of the **customer strategy pattern**. Literature dealing with customer strategy or customer segmentation patterns of Born Globals is scarce. Prior literature mainly indicated that small businesses tend to focus on industrial goods (Kohn, 1997) and are at their best when they sell to a small number of sophisticated customers (Ahroni 1994). The operations strategy pattern was identified as starting with NIMOS (Non-Investment Marketing Operations), continuing with DIMOS (Direct-Investment Marketing Operations), and finally co-operative operations are used. Market strategy pattern was explained by the introduction of the **business potential** concept.

Finally the study found similarities and differences between Israeli and Finnish technology-intensive Born Globals. Both Israeli and Finnish Born Global firms

- 1) Differ in their globalization process from traditional manufacturing firms.
- 2) Introduce new innovations and/or focus on a niche segment.
- 3) Start with non-investment operation modes and then advance to direct-investment operation modes.

Israeli technology-intensive Born Globals seem to differ from the Finnish technology-intensive Born Global in:

- 1) Speed of globalization: Israeli technology-intensive Born Globals tend to globalize more rapidly than Finnish similar firms.

- 2) Financing: Israeli technology-intensive start-ups aim at a foreign IPO from inception while only a few Finnish similar firms use IPO at all (domestic or foreign).

The similarities between the Finnish and Israeli Born Globals strengthen the findings of this research. The differences in market patterns and financing have been explained by the difference in meso (country) and milli-micro (founders) factors.

6.9 Managerial Implications

Perhaps the most significant managerial implication is related to the customer strategy. Managers of technology-intensive Born Globals must realize from inception that their target customer segment is the high-end segment. The consumer/SOHO segment must be avoided. It may be impossible for most companies to start with the high-end customer segment, due to the lack of complete end-to-end solutions and the track record which are demanded by high-end firms. However, aiming from inception at the high-end market can lead to a more efficient use of company resources. Managers should not underestimate the difficulties and resources needed in entering the consumer/SOHO customer segment, and in the move from one target customer segment to another.

In regard to the products, it seems that a move to products that include less hardware and more software, know-how, and service is preferable. Technology-intensive Born Globals should target global geographical markets simultaneously while focusing most of their resources on the highest business potential markets and key markets. The importance of sales promotion strategy for young start-ups was emphasized. Young innovative start-ups with limited resources should make good use of sales promotion methods (e.g. launch event, PR, and road shows) that are significantly less costly than advertising and can yield significant global recognition.

Managers of technology-intensive Born Globals should consider an IPO in order to finance growth at an early stage and not in order to pay debt in a later stage. An

Italian study found that going public also enables companies to borrow more cheaply (Pagano, Panetta, & Zingales, 1998). Managers should also consider the location of the IPO, taking into account not only the amount of equity that they can maintain but also issues such as global recognition and certification of quality as well as higher valuations. Israeli founders of technology-intensive Born Globals tend to prefer foreign IPOs because of these benefits. While foreign IPOs usually mean that the founders have to give up a larger share of their companies, they seem to be able to keep control over them. The founders of all the case companies in this study retain control over their companies although they hold less than 50 percent of the shares. The faster speed of globalization of the Israeli Born Globals compared to the Finnish Born Globals might not have been achieved without the use of foreign IPOs.

Policy makers in SMOPEC countries can learn from the Israeli governmental policies regarding financing of technology-intensive start-ups. Israel has created the second most active venture capital market in the world and one of the largest centers in the world for start-up enterprise with over 2,500 start-ups in 2003 (over 3,000 start-ups in 2000). A special emphasize has been given in this study to the founders' characteristics and the fact that many founders have established more than one Born Global firm. The ability of policy makers to identify and/or train such entrepreneurs can be highly important for the local economy.

6.10 Suggestions for Future Research

The study identified a clear customer pattern. Though the move of small technology-intensive firms towards high-end customer segments is not limited to this study's case companies there seems to be a lack of research on the topic. It would be interesting to extend this study to other industries as well.

The role of strategic alliances in the globalization of Born Global firms should be further studies. Strategic alliances can be critical for technology-intensive Born Globals. VocalTec had a major strategic relationship with Deutsche Telekom AG. Orckit's strategy was built on joint ventures and alliances. For BATM the strategic alliances with IBM and 3M seem to have had a big impact.

The financing strategy of Born Globals should also be studied further. The following are some questions for further research:

- Should technology-intensive Born Globals use IPOs to finance growth, as Israeli Born Globals do, or should they use IPOs only in a later stage in order to repay debt, as European firms seem to do?
- If IPOs are to be used to finance growth how can this be achieved?
- How should the IPO location be chosen?
- Should venture capital be used or avoided?
- If venture capital is to be used should an international venture capital firm be preferred?
- What is the importance of a locally developed venture capital industry?
- What is the importance of local knowledge and experience in achieving foreign IPOs?

The issue of financing is also directly connected to the home country's characteristics in general and the country's entrepreneurship enabling degree in particular. The subject of entrepreneurship enabling environment should also be studied further. The large number of Israeli technology-intensive companies traded in foreign stock exchanges could not have been achieved without the creation of a high degree of entrepreneurship enabling environment in Israel. The developed venture capital market and the knowledge and experience gained by law, accounting, and venture capital firms in Israel concerning foreign IPOs had a key role in the high number of foreign IPOs.

The role of the founders should be further studied. Four out of the five Born Globals included in this study are still currently managed by the founders. The case of Steve Jobs and Apple Computer Corporation as well as that of Gil Shwed and Check Point seem to suggest that the visionary founder's role in the development of the company is not limited to its early phase. Jobs, the visionary entrepreneur who co-founded Apple, returned to Apple in 1996 after being ousted a decade earlier and has led the firm's successful resuscitation. Gil Shwed was 25 years old when he and two colleagues started Check Point Software in 1993. Gil Shwed is still Chairman and Chief Executive Officer of Check Point Software Technologies Ltd. (NASDAQ:

CHKP), the worldwide leader in secure enterprise networking and perhaps the most successful Israeli Born Global with revenues of \$427 million in 2002.

Finally, perhaps the biggest question for future research on technology-intensive Born Globals is “how can small technology-intensive Born Globals from SMOPECs develop into large MNEs?”

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Appendices

Appendix 1

Interviews

Henk Pieper, Sales Manager Europe, BATM, 21.4.2002

Eli Reifman, Co-Founder, CEO, Emblaze 22.4.2002

Hugo Goldman, CFO, VocalTec, 22.4.2002

Dr. Zvi Marom- Founder, CEO, BATM, 24.4.2002

Tzuri Daboosh – Co-Founder, Non-Executive Director, Emblaze, 25.4.2002

Jack Wakileh, VP Finance, VCON, 5.11.2002

Ami Tal, Co-Founder, Director and Executive Vice President of Global Sales,
VocalTec, 6.11.2002

Elon Ganor, Co-Founder, CEO and Chairman of the Board, VocalTec, 10.11.2002

Izhak Tamir – Founder, President, Orckit, 11.11.2002

Yair Shachar, Director Business Initiatives & Technologies, VCON, 12.11.2002

Yair Maor, Director Marketing & Customer Care, Orckit, 11.11.2002

E-Mail interviews

Mike Clifford, Sales Director, Central Region, VCON, February 2003

* Mike Clifford is one of the eight employees that moved from Optibase to VCON

Yaron Menczel, Chief Technology Officer, VCON, February 2003

Annual Reports

BATM 1998-2002

Emblaze 1996-2002

Orckit 1998-2002

VCON 1998-2002

VocalTec 1998-2002

Press and Press Releases

BATM 1996-2002

EMBLAZE 1996-2002

Orckit 1996-2002

VCON 1998-2002

VocalTec 1995-2002

Appendix 2

Case Study Questions

1. Background information:
 - Details of respondent, date and place
 - Company background: name, field of business, year of establishment, ownership (family? part of a larger concern?)
2. Establishment of the firm:
 - Who were the founders?
 - What is the founders' background?
 - Why did you (founders) establish the company?
 - Why did you target global markets from inception?
3. Describe you company globalization process since establishment:
 - In what order did you enter target markets and why?
 - Modes of operation used?
 - Marketing and Distribution channels?
4. Products characteristics- describe the different products the company introduced since inception.
5. Foreign Subsidiaries:
 - Where did you establish foreign subsidiaries?
 - What type of foreign subsidiaries did you establish?
 - Why did you establish foreign subsidiaries?
 - Did you establish greenfield subsidiaries or have you used acquisition and joint ventures?

6. Strategic Alliances and Joint Ventures:

- What is your strategy concerning strategic alliances and joint ventures?
- What were your main strategic alliances and joint ventures?
- What were the reasons behind establishing these alliances and joint ventures?
- What types of alliances and/or joint ventures did you enter into?
- How was your alliance or joint venture partner selected?

7. Manufacturing :

- Do you sell hardware products or pure software solutions?
- Are you manufacturing or assembling any hardware?
- Are you importing standard components?
- Do you use contract manufacturing?

8. What is your competitive advantage? How can you compete against large MNEs?

Appendix 3 – Israeli firms traded in foreign stock exchanges 2002

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
1	ACS-Tech80	ACSEF	1985	1997	Misc. Capital Goods	Electronics		Formerly known as ACS Electronics Ltd. In October 1999, ACS
2	Aladdin Knowledge Systems	ALDN	1985	1993	Software & Programming	Software		Electronics and Technology 80 merged complimentary strengths to form ACS-Tech80
3	Alvation	ALVR	2001	2001	Computer Services	Telecommunications		Created through the merger of BreezeCOM and Floware in 2001
4	Amdocs	DOX	1982	1998	Software & Programming	Telecommunications +Software		telecommunications, energy, high technology, real estate, leisure time and capital markets and other holdings
5	Ampal-American Israel Corporation	AMPL	1942	1985	Misc. Financial Services	A holding company		
6	Applied Materials	AMAT	1967	1972	Semiconductors	Semiconductors		
7	Arel Communications and Software	ARLC	1982	1994	Software & Programming	Telecommunications +Software		
8	Astra Technologies	STH FP	1993	1997	Software & Programming	Investment Company		An investment company
9	Attunity	ATTU	1988	1992	Software & Programming	Software		Formerly, ISG International Software Group, changed it's name on 7/ 2000
10	Audio Codes	AUDC	1993	1999	Communications equipment	Telecommunications		

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
11	AVT	VSJ GR	1992	2000		Electronics		
12	B.O.S. Better OnLine Solutions	BOSC	1990	1996	Computer Peripherals	Telecommunications		Less than 5% investment in R&D
13	BackWeb Technologies	BWEB	1996	1999	Software & Programming	Software		
14	Baran Group	BRAN	1979	2002	Construction Services	Consulting		Less than 5% investment in R&D
15	BATM	BVC LN	1992	1996	Information Technology	Telecommunications		
16	Blue Square-Israel	BSI	1940	1996	hardware	Food		No Investment in R&D
17	BVR Systems	BVRS	1998	1998	Retail	Electronics	part of the Elisra Group and a spin off of BVR	Less than 5% investment in R&D, though in year 2002 - 5/5% , only due to a decrease in sales
18	BVR Technologies	BVRT	1986	1991	Computer Services			Fully-integrated broadcast and Web-cast graphics solutions through Vizrt; broadband access technology through Corema; integrated silicon and software Bluetooth solutions for smart networking appliances through BrightCom Techno
19	Camtek	CAMT CARDG	1987	2000	Computer Services Scientific & Technical Instruments	A holding company Electronics	Subsidiary of Prior-Tech	
20	Card Guard	SW	1990	1999		Medical Equipment		
21	Carmel Container Systems	KML	1983	1992	Containers & Packaging Communications			
22	Ceragon Networks Check Point Software	CRNT	1996	2000	equipment	Telecommunications		
23	Technologies	CHKP	1993	1996	Software & Programming	Software		
24	Cimatron	CIMT	1982	1996	Software & Programming	Software Medical Equipment & Supplies		
25	CMT Medical Technologies	CMD FP	1981	1999	Communications Services	Software		
26	Commtouch Software	CTCH	1991	1999				

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
27	CompuGen	CGEN	1993	2000	Bio-Technology & Drugs Communications	Biochemistry		
28	Converse Technology	CMVT	1984	1986	equipment	Telecommunications		
29	Creo	CREO	1983	1999	Misc. Capital Goods	Electronics		
30	Crystal Systems Solutions	CRYS	1987	1997	Software & Programming	Software		
31	Data Systems & Software	DSSI	1979	1992	Computer Services	Software		
32	Delta 3	DDDC	1996	1999	Communications Services	Telecommunications manufacturer of boutique-quality apparel for the mass market		No Investment in R&D
33	Delta Gallil Industries	DELT	1975	1999	Apparel / Accessories	Telecommunications		
34	Dmatek	DTK LN	1990	1995	Communications equipment	Telecommunications		
35	DSP Group	DSPG	1987	1994	Software & Programming	Electronics		
36	E-Sim	ESIM	1990	1998	Communications equipment	Software		Former name : Emultek Ltd.
37	ECI Telecom	ECIL	1961	1982	Communications Services	Telecommunications		was formerly a wholly-owned subsidiary of ECI Telecom.
38	ECTel	ECTX	1990	1999	Computer Hardware	Telecommunications Software + Electronics		
39	Efi - Electronics For Imaging	EFII	1989	1992	Medical Equipment & Supplies	Electronics & Real estate		holding and investment company
40	Elbit Medical Imaging	EMITF	1982	1996	Aerospace & Defense	Electronics		
41	Elbit Systems	ESLT	1966	1996	Scientific & Technical Instruments	optical and computer-vision technologies		
42	Elbit Vision Systems	EVSN	1991	1998	Electronic instruments & Control	Telecommunications + Electronics	Subsidiary of Elbit	
43	Electric Fuel	ARTX	1990	1994			Subsidiary of Arotech	

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
44	Electrochemical Industries	EIL	1952	1989	Chemical Manufacturing	Chemicals	1996 spin-off of Frutarom Industries	No Investment in R&D
45	Electronics Line	EIC GR	1982	2000	Medical Equipment & Supplies	Telecommunications		Less than 5% investment in R&D
46	Elron Electronic Industries	ELRN	1962	1990	Hotels & Motels	Electronics + Medical Hotels, Bio-technology		
47	Eiscint	ELT	1969	1987	Electronic instruments & Control Software & Computer Services	Electronics	daughter company of Formula	Hotel and real estate According to CFO, they develop separate R&D cost as in a High-tech company
48	Eitek	ELTK	1970	1997				
49	Emblaze	BLZ LN	1994	1997			The Company is part of the Engel Group	Formaly Emblaze Systems
50	Engel General Developers	ENGEF	1975	1998	Construction services	Real estate		
51	Equity One	EQY	1992	1998	Real Estate operations	Real estate		Real estate investment trust
52	Formula Systems	FORTY	1985	1997	Software & Programming	Telecommunications		Holding and managing company
53	Fundtech	FNDT	1993	1998	Software & Programming	Software		
54	G. Willi-Food International	WILCF	1994	1997	Communications equipment	Food		No Investment in R&D
55	Gilat Satellite Networks	GILTF	1987	1993	Medical Equipment & Supplies	Telecommunications		
56	Given Imaging	GIVN	1998	2001	Communications equipment	Medical +Electronics		
57	Harmonic	HLIT	1988	1995	Communications equipment	Telecommunications		
58	Healthcare Technologies	HCTL	1988	1995	Bio-Technology & Drugs	Bio- Technology		A Holding company
59	I.I.S - Intelligent Information Systems	IISLF	1980	1986	Computer Peripherals	Software		A holding company
60	I.T. International Theatres Ltd.	ITIT ES	1929	1999	Security Systems & Services	Leisure - Theatres	ICTS technologies is it's subsidiary	
61	ICTS International	ICTS	1982	1996	Computer Services	Internet provider	Controlled by Eurocom	No Investment in R&D
62	Internet Gold - Golden Lines	IGLD	1992	1999	Oil & Gas operations	Exploration of oil and gas		
63	Isramco	ISRL	1982	1995	Software & Programming	Software		No Investment in R&D
64	Jacada	JCDA	1990	1999				

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
63	Isramco	ISRL	1982	1995	Oil & Gas operations	Exploration of oil and gas		No Investment in R&D
64	Jacada	JCDA	1990	1999	Software & Programming	Software		The company is at a developing stage - No revenues
65	Keryx Biopharmaceuticals	KERX	1998	2000	Bio-Technology & Drugs	Biopharmaceutical Telecommunications + electronics and variant fields		A holding company
66	Koor	KOR	1944	1995	Chemical Manufacturing	Telecommunications		Held by Liraz an Israeli holding company.
67	Lan Optics	LNOP	1990	1992	Computer Networks	Software		Acquisition of ESC Medical Systems & Coherent Medical Group
68	Level 8	LVEL	1994	1995	Software & Programming	Laser based products		
69	Lumenis	LUME	2001	2001	Medical Equipment & Supplies	Electronics		
70	M-Systems	FLSH	1989	1993	Computer Storage Devices	Software		
71	Magal Security Systems	MAGS	1984	1993	Security Systems & Services	Software		
72	Magic	MGIC	1984	1991	Software & Programming	Software		
73	Matav-Cable Systems Media	MATV	1987	2000	Broadcasting & Cable TV	Telecommunications		
74	Medis Technologies	MDTL	1992	2000	Misc. Financial Services	Electronics		No Investment in R&D
75	Medivision	MEDV	1993	2000		Medical Equipment & Supplies		
76	Mentergy	MNTEE	1981	1997	Computer Services	E-learning		Formerly Gilat Communications - a North American e-learning subsidiary whose e-learning products and services are developed and distributed by The LearnLink Live e-Learning division and The Allen Communication Learning Services division
77	MER Telemanagement Solutions	MTSL	1996	1997	Communications equipment	Telecommunications		
78	Mercury Interactive Corporation	MERQ	1989	1993	Software & Programming	Software		
79	Metalink	MTLK	1992	2000	Semiconductors	Telecommunications		
80	MIND C.T.I.	MNDO	1995	2000	Software & Programming	Software		

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
81	NDS Group	NDS	1989	1999	Communications equipment	Software		
82	Net Manage	NETM	1990	1993	Software & Programming Communications	Software		
83	Netro Corporation	NTRO	1994	1999	equipment	Telecommunications		
84	Nexus Telocation Systems	NXUS	1991	1994	Communications Services & Electronic instruments & Control	Telecommunications		
85	Nice	NICE	1986	1991		Telecommunications		
86	Nova Measuring Instruments	NVMI	1993	2000	Semiconductors	Semiconductures		
87	NUR Macroprinters	NURM	1991	1995	Misc. Capital Goods	Electronics	microprocessor-based contactless smart card Solutions	
88	On Track Inovation - OTI	OTIV	1990	1999	Semiconductors Communications	Semiconductores		
89	Optibase	OBAS	1990	1999	equipment	Telecommunications		
90	Orad	OHT GR	1993	1999		Software+ Telecom		Member of Ormat Group
91	Orbit FR	ORFR	1985	1997	Scientific & Technical Instruments	Electronics		
92	Orbotech	ORBK	1981	1990	Scientific & Technical Instruments	Electronics		
93	Orckit	ORCT	1990	1996	Communications equipment	Telecommunications + Electronics		
94	Oridion	ORIDN SW	1987	2000		Medical Equipment		
95	ParthusCeva	PCVA	2002	2003	Semiconductors	Electronics		ParthusCeva was formed through the combination of Parthus Technologies plc, a leading provider of platform-level IP, and Ceva, formerly the DSP licensing division of DSP Group
96	Partner	PTNR	1997	1999	Communications Services	Telecommunications		No Investment in R&D
97	Payton planar magnetics	PAY BB	1992	1998		Electronics		
98	Pharmos	PARS	1990	1992	Bio-Technology & Drugs	Bio-pharmaceutical		

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
99	Pilat Media	PGB LN	2002	2003	Software	Software		Demerger from Pilat Technologies
100	Pilat Technologies	PIA LN	1974	1999		Support Services		
101	Precise Software	PRSE	1991	2000	Software & Programming Electronic instruments & Control	Software - IT	Member of RAD group	
102	Rada	RADIF	1970	1985		Electronics	Member of RAD group	
103	RadCom	RDCM	1991	1997	Computer Peripherals	Telecommunications	Member of RAD group	
104	RadView	RDVW	1993	2000	Software & Programming	Telecommunications - software	Member of RAD group	
105	RadVision	RVSN	1992	2000	Communications equipment	Telecommunications +Software	Member of RAD group	
106	RadWare	RDWR	1997	1999	Computer Networks Communications	Telecommunications	Member of RAD group	
107	Rit	RITT	1989	1997	equipment	Telecommunications		
108	Ritalix	RTLX	1982	1998	Software & Programming	Telecommunications software - food industry		
109	RoboGroup	ROBO	1982	1995	Misc. Capital Goods	Education+Electronic s	formerly Eshed Robotec (1982) a holding company since the mid of 1999, all it's contact details are wrong spin off from Optibase	solutions for educational markets in the fields of technology and science
110	RoboMatix	RBMXF	1999	2000		Variant Business		
111	Sapiens	SPNS	1990	1998		IT Solutions		
112	Savient Pharmaceuticals	SVNT	1980	1985	Bio-Technology & Drugs	Biopharmaceutical		
113	Scanvec-Amiable	SVECF	1988	1995		Software		Formerly, Bio-Technology General Corp
114	Scitex	SCIX	1968	1990		Electronics and Internet Imagery		No offices in Israel, the top management is Israeli
115	Selector	SLC LN	1990	1996		Internet		

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
116	Silicom	SILCF	1987	1994		Telecommunications +Software	Member of RAD group	
117	Supercom	SPRC	1988	1999		Data Security		
118	Taro Pharmaceutical	TARO	1950	1961		Pharmaceutical		
119	TAT	TATTF	1969	1993		Aerospace & Defense Engineering + Machinery		Electronics and others, less than 5% investment in R&D
120	Technoplast	TNP LN	1951	1997	manufacturing process management (MPM). Global manufacturers utilize MPM solutions			invests 0% in R&D
121	Tecnomatix	TCNO	1983	1993		Software		Less than 5% in 2002
122	SHL Telemedicine	SHLTL	1987	2000		Medical products manufacturer of boutique-quality apparel		invests 0% in R&D
123	Tefron	TFR	1990	1997	Apparel / Accessories Communications			
124	Terayon	TERN	1993	1998	equipment	Telecommunications		
125	Teva	TEVA	1945	1982	Bio-Technology & Drugs	Biotechnology		
126	Tioga Technologies	TIGA	2000	2000	Semiconductors	Telecommunications + Software		Former Silicon Value, Daughter company of Orckit Communications
127	Top Image System	TIISA	1991	1996	Software & Programming	Software		
128	Tower Semiconductors	TSEM	1993	1994	Software & Programming	Electronics		
129	TTI	TTIL	1992	1996	Software & Programming	Software		
130	TTR Technologies	TTRE	1994	1997	Software & Programming	Software		
131	Ulticom	ULCM	1974	2000	Software & Programming	Telecommunications	Fully owned subsidiary of Converse Inc.	The company was incorporated in New Jersey under the name, Dale Gesek McWilliams & Sheridan, later known as DGM&S Telecom. The company changed its name to Ulticom in May 1999. In 1996, the

	Name of Company	Symbol	Year of establishment	Year of IPO	Industry according to the different markets	Industry	Spin off/ Subsidiary	Comments
132	Unitronics	UNITB	1989	1999		Electronics		
133	Valor Computerized Systems	BB VCR GR	1992	2000	Software & Programming	Software Telecommunication Equipment		
134	Vcon	VOF GR	1994	1998		Telecommunications + Software	Subsidiary of Comverse	
135	Verint Systems	VRNT	1994	2002	Software & Programming	Electronics + Software		Started as InSpec Validation Systems, renamed Verinty in March 1997
136	Verity	VRST	1996	2001	Software & Programming	Software integrated mobile and Web-based software applications		Started as Relational Technology Systems and changed it's name in 1995
137	ViryaNet	VRYA	1988	2000	Software & Programming Medical Equipment & Supplies			
138	Visionix	VSX GR	1994	2000				
139	VIZ - RT	VIZ GR	1994	1999		Software		
140	VocalTec Communications	VOCL	1989	1996	Computer Networks	Telecommunications		
141	VYYO	VYYO	1996	2000	Communication Equipment	Telecommunications		Peak Broadcast Systems merged with RTZ in 2000 to form VIZ RT
142	Wizcom Technologies	WZM GR	1995	1999		Electronics		
143	XTL Biopharmaceuticals	XTL LN	1993	2000	Pharmaceutical			
144	Zoran	ZRAN	1983	1995	Semiconductores	Electronics + Software		

Appendix 4

Acquisition of Israeli high-tech firms in foreign stock exchanges		
Year	Name of companies	Number
1990	Israel Electronics,	1
1991		0
1992	Optrotech,	1
1993		0
1994	InterPharm,	1
1995	Lan-Net, Fibronics,	2
1996		0
1997	Opal,	1
1998	Laiser industries, Teledata	2
1999	AdioSoft, DSPC, New Dimention, Wiztech, Tadiran Telecommunications,Z.A.G, Oshap, Memco,	8
2000	OptiSystems, Accord, Axent (or Accent),	3
2001	Galileo, Forsoft,	2
2002	Indigo, Innoveda,	2

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