



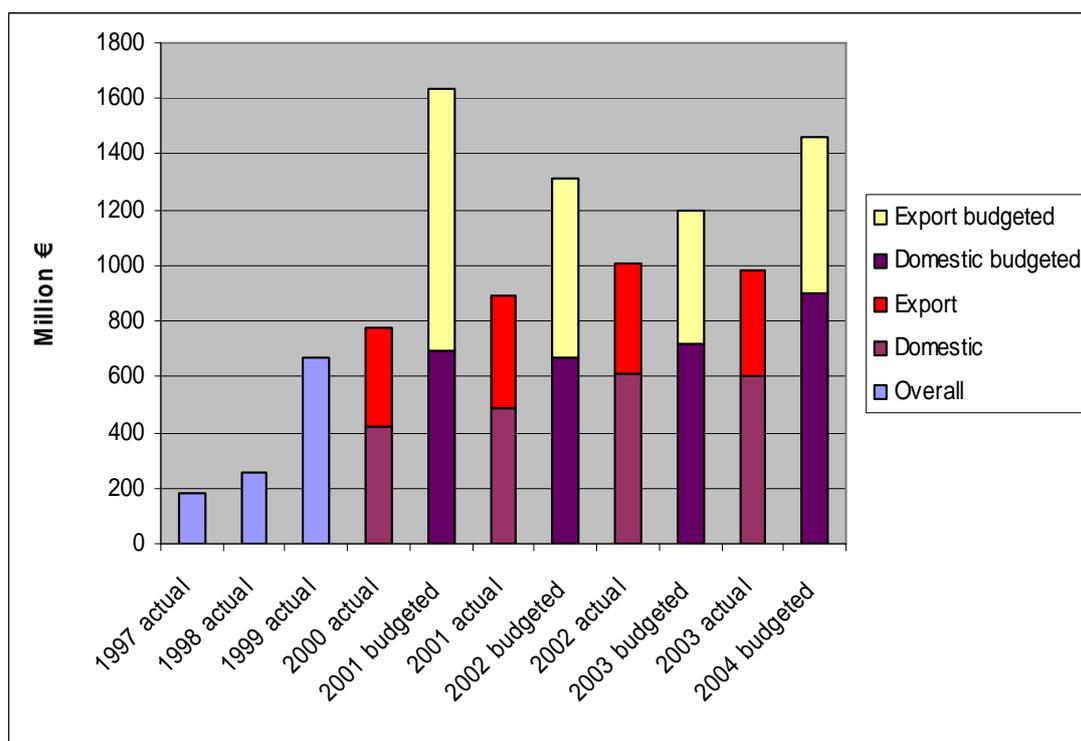
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# Finnish Software Product Business: Results from the National Software Industry Survey 2004

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## SUMMARY

In 2003, the Finnish software product industry generated approximately an overall revenue of 1 000 M Euros –of which 380 M Euros came from exports –and employed 12 000 professionals. The revenue of the industry remained at the same level than in the previous year. The amount of employees in the Finnish software product business increased 20 % from year 2002. In particularly, smaller companies' personnel increased. The future expectations of the companies are much more optimistic than one year ago. The profitability of the industry improved during 2003. Majority of the companies made close-to-zero profits, but 24 % of the companies had profitability over 15 % and a fifth (20 %) of the companies made losses (25 % in 2002). Development of the industry revenue is presented in the figure below.



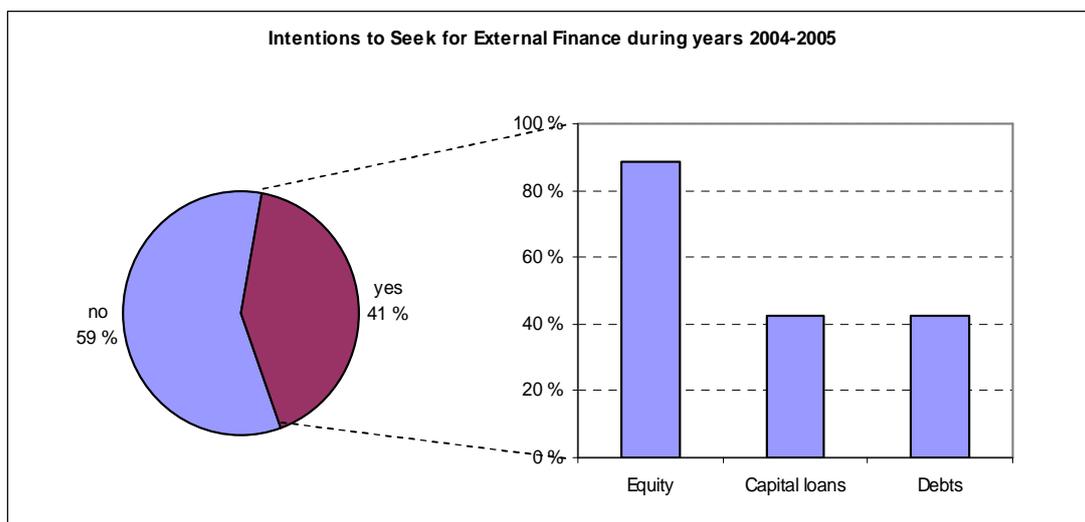
This report contains the findings of the seventh national software industry survey, which was jointly performed by the Software Business and Engineering Institute and the Institute of Strategy and International Business at Helsinki University of Technology in March - May 2004. The main objective of the study was to provide basic information about the Finnish software product industry. The research was commissioned by the Centre of Expertise for Software Product Business in co-ordination with Ministry of Trade and Industry, Economic Development Centre for Uusimaa and National Technology Agency.

The focus of the survey was on *software product companies*, i.e., companies that sell software products they themselves design, implement, and maintain. The survey was carried out as an email-questionnaire, and reached 196 software product companies, which represents about 18 % of the estimated 1100 existing Finnish software product companies. As the largest companies were systematically approached, the responding companies generated over 60 % of the total sales and over 80 % of the total exports of the industry.

The industry is relatively young compared to the traditional Finnish industries and most companies are small – 65 % of the respondents had revenue from software product business below 1 M Euros in 2003. Only 34 companies generated revenue over 3 M Euros from the software product business. The youth of the industry is evidenced by the low degree of productization, the high product development costs, and the moderate profitability.

On the average, founders and their family members own 70 % of the Finish software product companies, with only minor foreign and external ownership. Lack of risk capital was seen as a major barrier for the emergence of new companies, especially by the young companies, with 57 % of the 0-2 year-old companies indicating so. A few years ago the weakened venture capital situation decreased the product development investments of the young companies in particular. In the current financial situation, an increasing number of young companies have financed their R&D by operations and customer projects. This can put the productization aims in jeopardy. This has emphasized the role of public funding in the role of financing companies in the early product development phase. In 2003 we have observed small positive signs of development in growth orientation, use of external finance and availability of financing. The share of software ventures planning to seek external finance within the next two years came up to 41 % from 30 % in 2002. This is a consequence of increased growth prospects and higher confidence in the availability of external financing. One positive signal in the availability of external financing was the increasing share of VC ownership from 3 % in 2002 to 7 % in 2003.

Despite the positive signs in financing, the current financing situation is causing significant product development reduction and reduction in internationalization attempts of the existing companies. Therefore, it is crucial factor for the success of Finnish software product industry that the most promising companies could find the financing they need. Companies' intentions to seek external finance during 2004 and 2005 are presented in the figure below.



50 % of the respondents had some international operations. The most important export countries were Sweden, the U.S.A., and Germany. Even though there are many international companies in the sector, there is a gap between initial foreign sales and full internationalization, as 63 % of internationalized companies had less than 25 % of their revenues from abroad and as only 18 % of internationalized companies had more than 75 % of revenues from abroad

Year 2003 was quite challenging for larger Finnish software product companies. Especially foreign sales were problematic for the larger companies. On the other hand, smaller companies increased their personnel and revenues from software product business. These smaller companies increased also their R&D investments. In addition, smaller companies planned to increase their personnel in software product business on average 20 % in 2004. We mentioned in this annually implemented survey a year ago that Finnish software product companies have been able to adjust to the weakened economic situation and that the downturn of the economy forced companies to improve their processes and efficiency. We also mentioned that as companies are rather small, their capability to modify business operations in a short-term in order to keep the business running is relatively good. Now these capabilities and improvements seem to offer competitive advantage and success in internationalization.

The study brought up some issues that are critical in developing the industry. These central topics are raising the degree of productization and mastering product management, financing, networking, business understanding and internationalization.

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# 1 INTRODUCTION

## 1.1 Background

The worldwide packaged software market was approximately 200 billion Euros and it is expected to reach 224 billion Euros in 2005 (EITO 2004). It is the fastest growing market of the IT sector, and it is estimated to account for nearly a quarter of all IT spending by 2006 (IDC 2003a). The U.S. software market is the largest market for the software, responsible for almost 50 % of the world markets.

Western Europe's software market was approximately 64.75 billion Euros in 2003 and it is forecasted to grow significantly, from a 2000 level of 56.7 billion Euros to 72.1 billion Euros in 2005. The Western European packaged software market also employed approximately 1.1 million people through direct employment, upstream operations (manufacturing and logistics), and downstream operations (reselling, training, and consulting).

According to EITO's report in 2004, the Western European ICT investments are expected to show a more positive dynamic compared to the past two years, with growth driven by demand for infrastructure software, outsourcing services and telecommunication services. The software product markets grew by 2.1 % in 2003 and are expected to grow by 4.6 % in 2004 (EITO 2004). Software products had a 10.9 % share of the whole ICT market in 2003.

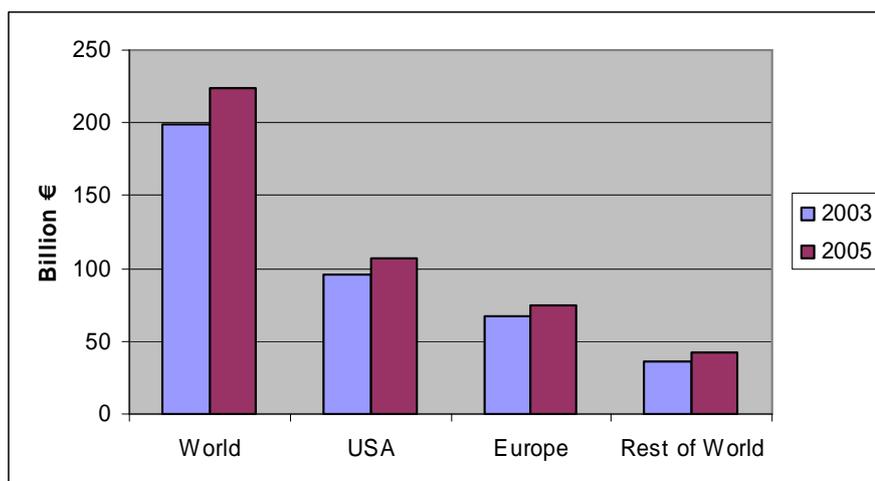


Figure 1. World Software Product Market Growth in 2003 and Growth Estimate of 2005 (EITO 2004)

In Finland, the software industry has grown rapidly during the 1990's. The total revenue for 1999 has been estimated at 1.6 billion Euros (Nukari and Forsell 1999). European companies have lagged behind the U.S. firms in the packaged software segment, due, e.g., to small and diverse home markets, low degree of productization and internationalization, and weak links to universities (Malerba and Torrisi 1996). This seems to be true also for Finnish companies. The trend, however, seems to be towards greater degrees of both productization and internationalization, i.e., from custom software developed for local markets towards mass-market software intended for international distribution.

The Finnish software product industry does not have any industrial classification code of its own, making even basic statistics unavailable. To alleviate this problem, the Center of Expertise for Software Product Business, has initiated a series of national software industry surveys. Previous studies have been carried out in 1997 and 1999-2003. This report contains the findings of the seventh national software business survey, conducted by the Software Business and Engineering Institute and the Institute for Strategy and International Business at the Helsinki University of Technology. The research was commissioned by the Center of Expertise for Software Product Business in coordination with Ministry of Trade and Industry, Employment and Economic Development Centre for Uusimaa and National Technology Agency Tekes.

## 1.2 Software Products and Software Product Business

The offerings of the software industry can be roughly divided into three categories: software products, customer tailored software (or customized software), and embedded software, as shown in Figure 2 below (Nukari and Forsell 1999). In this study, we are interested in *software products* as a product category that is distinct from embedded or integrated software, on the one hand, and customer tailored software, on the other. We do this by examining the *object of trade* and the *degree of customization*.

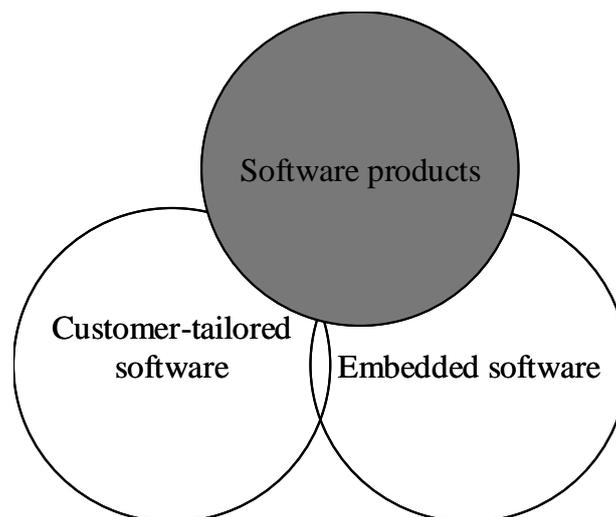


Figure 2. Types of Software Products (Nukari and Forsell 1999)

### 1.2.1 Object of Trade

Software products are traded on their own, not as part of other products. Although software product business often includes other things, such as installation, training, and even customization, the main object being traded is software.

Embedded software, on the other hand, consists of software that is built into other products, such as cellular phones, refrigerators, paper machines, or television sets, and not sold separately. Though embedded software has several characteristics of pure software products (developed once, sold in many identical copies, high development costs, and low manufacturing costs), it is excluded from this study.

### 1.2.2 Degree of Productization

Software can be prefabricated, developed specifically to the needs of each customer, or both. This dimension, the degree of productization, is crucial for differentiating between

software product and project business. The spectrum of productization ranges from standard “packaged” software products that are delivered “as is”, i.e. without any changes to a large number of customers, to customer tailored software, i.e. software that is developed according to the needs and specifications of individual customers. Figure 3 illustrates this spectrum and shows the positioning of software products within it.

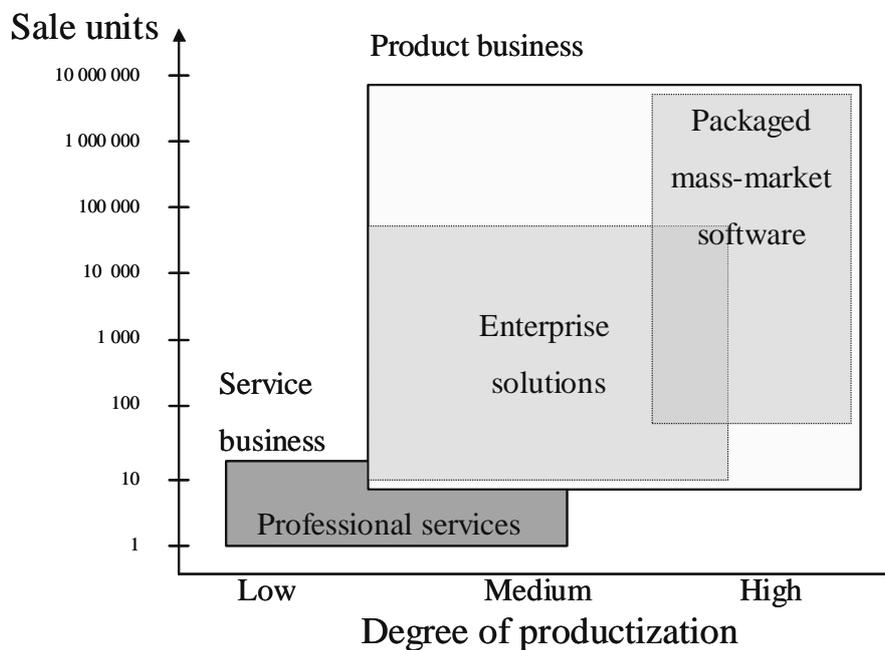


Figure 3. Software Product and Service Business (Hoch et al. 1999)

Productization means standardization of the elements in the offering. The term productization includes several technological elements from the very early stages of designing a product (i.e., managing requirements, selection of technological platforms, design of product architecture etc.) to the commercial elements of selling and distributing the product (i.e. delivery channels, positioning of the product / company and after sales activities). Some of the key elements influencing the degree of productization are product market, concepts, benefits, positioning, requirements, features, specifications, delivery channel, marketing, selling, and packaging (adapted from Cooper 2000).

Pure software products are highly productized and often referred to as packed, mass-market, or shrink-wrap software. These kinds of products are delivered to a large number of customers in exactly the same format – without any customer tailoring. In this case, the product development and order-delivery processes are completely separated. Software products of this kind can be sold to millions of customers because of close to zero marginal costs – there are hardly any traditional production costs. For example, the costs of the first CD containing the Microsoft Windows 95 operating system were above \$1 billion. The cost of the second CD was less than \$3 (Hoch et al. 1999). Typical examples of packaged software products include word processing packages, spreadsheets, some business software, and operating systems.

In the enterprise solutions business, there is almost certainly at least some customization needed in order to integrate the software to the customers’ other information systems, and infrastructure. This also puts certain limits to the number of customers; the number of customers is in the hundreds or thousands rather than in millions. Installation projects take months or years, instead of hours or minutes required by mass-market products. Still, the business is based on pre-developed software products, making it a

highly productized business. In many cases, the customization is made by changing program parameters, requiring no changes to the actual product.

At the low end of the productization spectrum, still belonging to software product business, we have situations in which the customization is done by changing the code of the software product on a customer specific basis. Here, the distinguishing feature is that the amount of work going into customer-specific tailoring is small compared to the whole effort of developing the product.

Customized software consists of software developed to the specifications and needs of single customers. This business is often based on selling projects, not software, and has many characteristics of a service industry. Although synergies exist between product and service businesses, extending the business beyond company's dominant position is very challenging as these sectors differ significantly. There is strong evidence that majority of the service companies have failed their product business initiatives. Main differences between the product and service businesses are listed in Table 1 (Nambisan 2001).

Table 1. Comparing Product and Service Business Companies on Five Key Issues (Nambisan 2001)

Key issue	Software product companies	Software service companies
<i>Intellectual property rights</i>	Very important	Less Important
<i>Product complementarity</i>	Very important	Less Important
<i>Returns from scale</i>	A fixed-cost structure allows for higher returns from scale	A variable-cost structure makes increased returns from scale rare
<i>Abstracting knowledge and integrating technology</i>	The company must be able to gather generic product knowledge so that the product can be used in a variety of contexts.	Knowing clients' idiosyncrasies is more important than the knowledge abstraction.
	Architecture level technology integration is important for the smooth running of the end product	Companies rely upon data-interface-based technology integration: the primary emphasis is on development efficiency
<i>Connections with users</i>	Companies have long-term relationships: typically the users are technologically sophisticated	Companies have project-driven relationships: typically, the users are technologically unsophisticated

## 2 THE FINNISH SOFTWARE PRODUCT INDUSTRY: CURRENT SITUATION AND FUTURE PROSPECT

### 2.1 Review of the Research on the Finnish Software Product Industry

The Finnish software product industry has not been thoroughly studied, as is the case in many other countries, including the U.S. Seppänen et al. (2001) studied software industry research in the U.S. and suggested two main reasons for lack of research in this area. First, software product industry was found to be so complex that defining and setting the frames for the industry is extremely hard, if not impossible. Second, it could be argued that there is no such industry as a software product industry. The second argument assumes that software does not differ from other information products and, therefore, there is no need to study software separately from. Consequently, the number of studies related directly on software product industry is very limited.

There is a currently published research performed jointly by the Universities of Oulu and Jyväskylä focusing on the strategic development evaluation of the entire software industry (Tyrväinen, Warsta and Seppänen, 2004). The study addresses the current situation and the future prospects of the entire Finnish software industry.

The two main analyses of the Finnish software product industry that have been conducted are Autere et al. (1999) and Nukari & Forssell (1999). Autere et al. analyzed the state and growth potential of the Finnish software product industry and the problems it faces. They listed financing as a major problem in addition to commercial services such as PR, marketing, law, and education of professionals in the fields of software engineers, product management specialists, and international sales experts. They also pointed out the importance of clustering and networking between the companies in the industry. In addition, Autere et al. pointed out that companies should have a standardized software product or components that can be copied and reproduced with low, close-to-zero marginal costs.

Information about the fundamentals of the industry has been provided by software industry surveys between 1997 and 2004. However, already in the late 1980's ATK-kustannuksen vuosikirja (Tiihonen, 1988) provided statistical information about the whole software and hardware cluster in Finland. Moreover, the software product industry has been included as part of the whole software or IT industry in several studies (e.g. Toivonen 2002).

Rajala et al. (2001) carried out a study on the business models of the software industry. They identified four different elements of the business model: the product development approach, the revenue logic, the marketing and sales model, and the service and implementation model.

Sallinen (2002) studied different supplier types and the development of supplier firms in the context of the Finnish ICT cluster. She identified firms of five different types: resource firms, resource firm with supporting projects and products, software product firm, software product firm with supporting projects and a system house.

The empirical studies in Finland focusing specifically on the size and demographics of software products business started 1995. A Finnish venture capital company SFK collected information about software exports among the Finnish software companies

through a questionnaire survey. SFK reported that the exports then were about 75 million Euros. More systematic approach to collect data from the industry started in 1997 when Culminatium Oy (Helsinki Centre of Expertise), Tietotekniikan liitto and Helsinki University of Technology conducted their first study in the field.

In 1997 it was found that the exports of the industry were 83 million Euros and the revenue from software products were 185 million Euros. The reason why the reported exports grew annually below 5% 1995-1997 might have been because ICL/Fujitsu reorganized their operations during that time and reduced software exports from Finland. Since 1997, Helsinki University of Technology and Centres of Expertise have produced the survey annually. The financing has mainly come from the National Technology Agency Tekes and the Ministry of Trade and Industry.

## 2.2 Implementation of the Survey

The data was gathered by a questionnaire, which was sent to 2480 companies in March – May 2004. We received a total of 275 responses, of which 196 were in software product business. According to professional estimates, there were approximately 1 100 software product companies in Finland in the year 2003. Thus, we reached 18 % of the industry with the survey. Therefore, we believe, that the results represent fairly well the whole industry. However, some of the companies didn't answer to all questions of the survey. Therefore, we give the number of answers for each questions reported in this paper. In addition, we systematically approached larger companies in order to estimate volumes at the industry level. Methods of the survey are more briefly explained in the appendix.

## 2.3 Regional Distribution of the Companies

Over half of the companies (54 %) were located in the Uusimaa province. Pirkanmaa, Pohjois-Pohjanmaa and Keski-Suomi were other provinces that were home for at least ten companies. Together these four provinces hosted 78 % of the responding companies. Regional distribution could indicate the reasons for centralization of companies: five provinces of highest amount of companies have both a university providing high-level technological education and technology centers in the population centre. Major relative change in the amount of companies compared to the previous year was in the Pohjois-Pohjanmaa province, where the amount of companies answering to the survey was 14 in 2003 and it was only 7 in 2002. The location of the companies is presented in Table 2.

Table 2. Location of Software Product Companies by Provinces Answering the Survey (n=191)

Province	Amount of companies
Uusimaa	104
Pirkanmaa	20
Pohjois-Pohjanmaa	14
Keski-Suomi	11
Varsinais-Suomi	9
Etelä-Savo	4
Satakunta	4
Kanta-Häme	3
Keski-Pohjanmaa	3
Pohjois-Savo	3
Päijät-Häme	3
Itä-Uusimaa	2
Etelä-Karjala	2
Etelä-Pohjanmaa	2
Kymenlaakso	2
Pohjanmaa	2
Pohjois-Karjala	2
Kainuu	1
Ahvenanmaa	0
Lappi	0
Total	191

The company revenue from their own software product business and the distribution of provinces is depicted in Table 3. The difference in the amount of companies to the previous table is due to 28 companies did not revealing their revenue for the year 2003. It is also noticeable that 74 % of the companies with a revenue exceeding 3 million Euros from their own software product business are located in the Uusimaa area. The relatively large amount companies with over 3 million Euros revenue companies is explained by the fact that these companies were systematically contacted if they had not responded to the mail questionnaire. This was done to estimate the industry volumes more precisely.

Table 3. Provinces of the Software Product Companies by Software Product Business Revenue (n=163)

Province	Revenue from companies' own software product business in 2003 (million Euros)					Total
	<0.2	0.2-0.99	1-1.99	2-2.99	3-	
Uusimaa	26	25	10	1	25	87
Pirkanmaa	5	4	2	2	4	17
Pohjois-Pohjanmaa	2	5	2		4	13
Keski-Suomi	4	4	1		1	10
Varsinais-Suomi	4	2	1	1		8
Etelä-Savo	3	1				4
Satakunta	1	1	1			3
Kanta-Häme	2	1				3
Keski-Pohjanmaa	1	1				2
Pohjois-Savo	3					3
Päijät-Häme		1				1
Itä-Uusimaa	1	1				2
Etelä-Karjala	1					1
Etelä-Pohjanmaa	2					2
Kymenlaakso		1		1		2
Pohjanmaa		1		1		2
Pohjois-Karjala		2				2
Kainuu	1					1
Ahvenanmaa						0
Lappi						0
<b>Total</b>	<b>56</b>	<b>50</b>	<b>17</b>	<b>6</b>	<b>34</b>	<b>163</b>

When analyzing the location of the respondents, it is noticeable that software companies are located very close to technology centers. Even despite good infrastructure for telecommuting – thanks to well working communication networks – software product companies are still mostly located in the largest cities. The 7 most popular cities, listed in Table 4, hosted 145 companies, which is 76 % of all respondents. Most popular cities were same as in the previous year's survey.

Table 4. Most Popular Software Business Cities

City	Number of companies
Helsinki	56
Espoo	36
Tampere	18
Oulu	12
Jyväskylä	10
Turku	7
Vantaa	6
<b>Total</b>	<b>145</b>

Table 5 presents the software product business revenue in these seven most popular cities. Table also shows that larger companies are mostly located in technology centers and in major cities. The differences in company numbers compared to Table 5 are because of the companies with unknown revenue.

Table 5. Location of the Companies by City and Software Business Revenue

City	Revenue from companies' own software product business in 2002 (million Euros)					Total
	<0.2	0.2-0.99	1-1.99	2-2.99	3-	
Helsinki	11	13	4	1	18	47
Espoo	12	9	3		6	30
Tampere	4	3	2	2	4	15
Oulu	2	5	1		3	11
Jyväskylä	2	4	1		1	8
Turku	2	2	1	1		6
Vantaa	1	2	2		1	6
Total	34	38	14	4	33	123

A possible explanation for the concentrated location of the companies is that the importance of technology centers and universities, which often enable networking and supporting services, is high for the software product companies.

## 2.4 Age of the Software Product Companies

The age of the software product companies varies a lot. Even though the Finnish software product industry is regarded as a relatively new industry, the oldest companies in the business are more than three decades old. On the other hand, there is a large number of companies founded in the late 1980's - early 1990's and also several companies that have been founded after 1995. The average company age was 11.3 years (12.2 in 2002), and the median age was 10 years (11 in 2002). However, according to industry experts, the distribution of the companies in this sample is probably biased. There are at least two explanations for this. First, the targeted focus on the largest companies (that often are old) skews the distribution. Moreover, in this survey, the start-up companies were not very well reached for reasons not well known. One reason is that it is likely that start-up companies can be classified after numerous industry classifications, especially if they are spin-offs of a parent company. Nevertheless, according to the industry experts, the number of young companies should be larger. Regardless of possible bias in the companies' age distribution, it is interesting to compare this distribution to the previous year's distribution. The share of young companies (age under 3 years) is 7% and it was 4% in 2002, whereas it was 13% in 2001. This is most likely due to smaller number of new start-ups in the last years (Toivonen 2003). Age distribution of software companies is depicted in Figure 4.

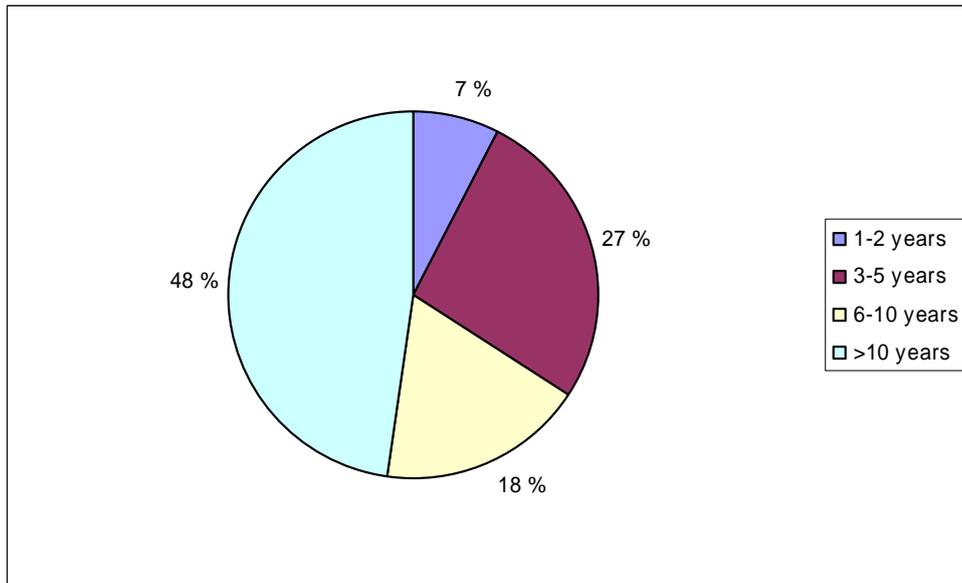


Figure 4. Age Distribution of Software Product Companies (n=188)

As can be seen in Figure 5, 12% (11% in 2002 and 21% in 2001) of the companies have been in the software product business for less than three years. Despite the relatively large amount of young companies, 69 % of companies had been in the software product business for more than five years. The average age of the software product business was 9.5 years and the median was 7.5 years. According to industry experts, this distribution does not accurately represent the whole industry – according to the experts, the proportion of young companies should be larger.

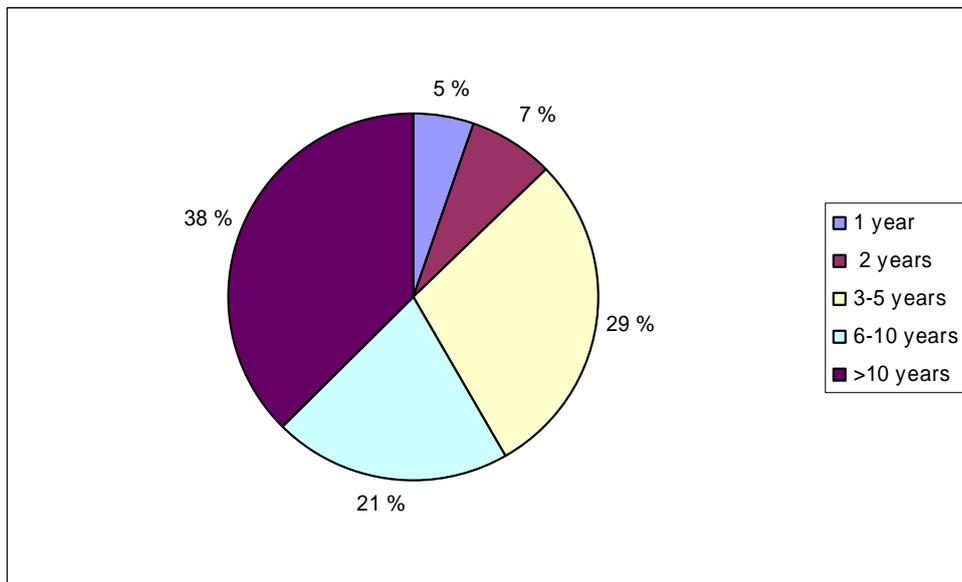


Figure 5. Age of the Software Product Business (n=189)

As Figure 5 shows, despite the fact that the Finnish software product industry is rather immature, there is a large number of companies that have been in business for more than a decade. Looking at the largest companies, which are mainly publicly listed companies, these companies were mostly founded in the early 1990s –some of them dating back to even earlier.

## 2.5 Revenue

Companies were asked about their revenue in the year 2003, their budgeted revenue for the year 2004. In addition, we asked how the software product business revenue is divided between domestic and international markets.

The software product companies had an average total revenue of 15.7 million Euros (16.9 million Euros in 2002) and a median revenue of 0.7 million Euros in 2003 (0.7 million Euros in 2002). The average software product business revenue was 3.7 million Euros (4.6 million Euros in 2002) and median revenue 0.5 million (0.4 million Euros in 2002). The significant difference between averages and medians is explained with large companies that bring the average up. As can be seen by studying the medians, most companies are relatively small. Distribution of the responding companies' total revenue in 2003 is presented in Figure 6.

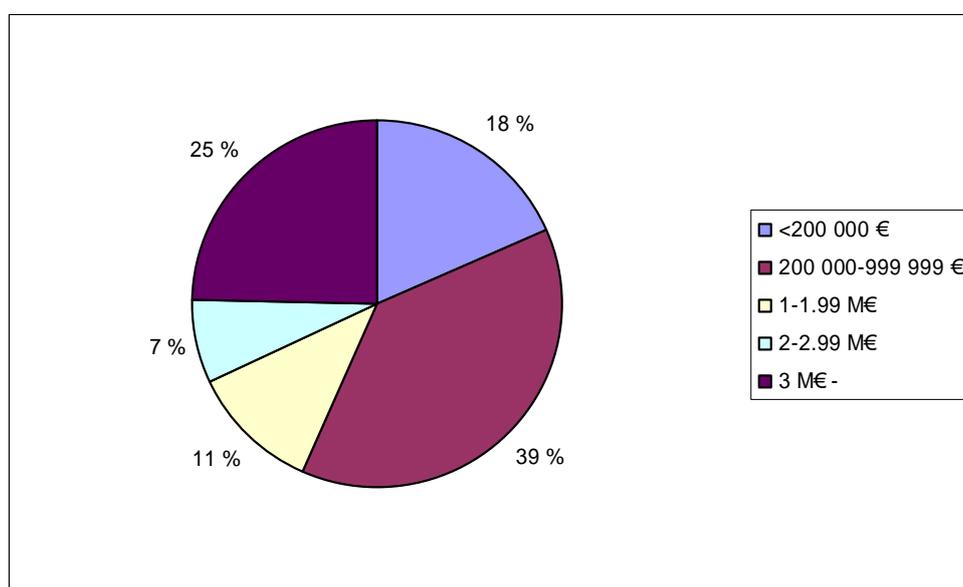


Figure 6. Responding Companies' Distribution of Total Revenue in 2003 (n=169)

The total revenue tends to grow when companies mature, evidenced by a positive correlation between the total revenue and the age of the company (Pearson correlation 0.304). The total revenue's (M Euros) regression against the age of the company reveals that the coefficient of the age of the company is 4.26. Pearson correlation between the software product business revenue and the age of software product business is 0.365 and the respective regression coefficient of the age of the software product business is 0.503. Both correlations are significant at the 0.01 level. These dependencies between turnover and age were similar as in previous year.

In order to gain knowledge regarding the business focus of the respondent companies, Figure 7 shows the percentage of the own software product business revenue from the overall company revenue. On average, the respondents had 55 % (60 % in 2002) of their total revenue acquired from their own software product business and the median was 60 % (70 % in 2002). Small decrease in the share of software product business revenue can indicate that some companies have increased their project business in order to generate revenue as product business has suffered from the economic situation. As Figure 7 shows, companies reached in the survey had quite often software product business as their core business. This is quite logical, since these companies are probably most eager to improve the conditions in the Finnish business environment and

participate in the survey. However, a relatively large amount (32 % in 2003 and 38 % in 2002) of companies with the total revenue ranging from 0.2 to 0.99 M Euros acquired less than 26 % of their total revenue acquired from software product business. This could indicate that the companies of this size may not have set a clear strategy whether to focus merely on product or project / consulting business or they are in current economic situation not able to focus on product business even if it was their desire.

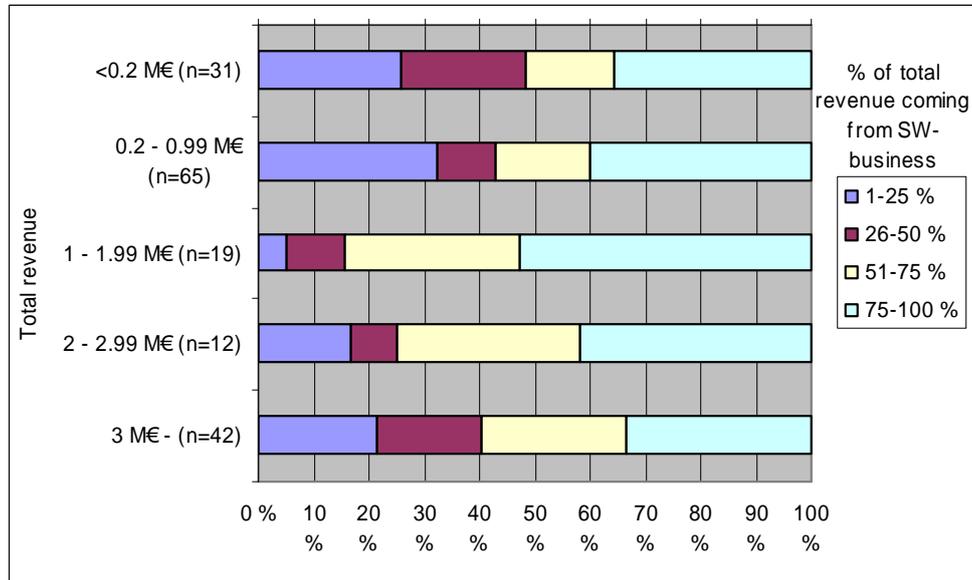


Figure 7. Percentage of Companies' Total Revenue Acquired from Company's Own Software Product Business in 2003 (n=169)

Figure 8 shows the distribution of companies based on their revenue from companies' own software product business. We can see that majority of the responding companies are rather small as 65 % of the responding companies had software product business revenue not exceeding 1 M Euros in 2003.

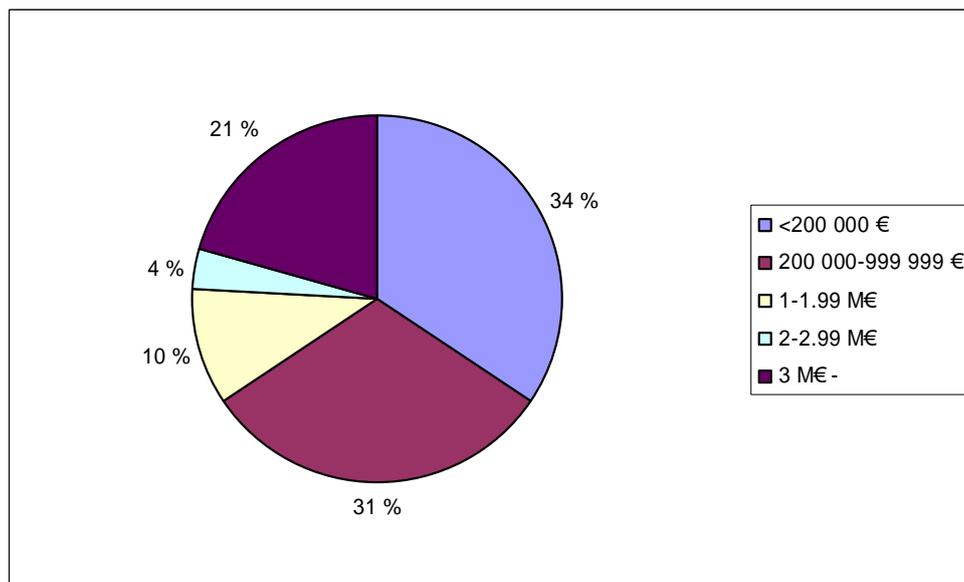


Figure 8. Respondents' Distribution of Companies' Software Product Business Revenue in 2003 (n=165)

We used the following approach to extrapolate the overall value of the industry: First, we systematically checked with industry experts that we have reached all the companies whose software product business revenue exceeded 3 million Euros in 2003 – there were 34 such companies. After that, we calculated a “rough” coefficient by dividing 1066 (1 100 is the total number of companies in the industry – the 34 largest companies = 1066) by 132 (the number of companies participating the survey whose software product business revenue in 2003 was known and not exceeding 3 million Euros), which equaled 8.08. Taking into consideration that our sample had an overrepresentation of large companies, we rounded the coefficient down to 6.75. By using this method the overall calculated value of the industry is 985 million Euros and the value of exports is 379 million Euros. It is worth mentioning, that the value of the 34 largest companies alone was 539 million Euros, of which 291 million Euros came from exports. Thus, over 75 % of the export came from the 34 largest companies.

The value of the industry had decreased 2.6 % from the year 2002 (1011 million Euros). The value of exports decreased 5 %, from 400 million Euros in 2002 to 379 million Euros. The development of the industry revenue is presented in Figure 9. Since figures before 2000 were calculated by using a different estimation approach, they are not directly comparable to those from the year 2000 – 2003. The budgeted figures are the estimated values of the industry given in the software industry survey in the previous year. We can clearly see from Figure 9 that the changes in the economic situation have also made companies more cautious in estimating their growth prospects in the recent years. It’s worth to mention that growth prospects are first time more optimistic than one year ago in this annually implemented survey as can be seen from Figure 9.

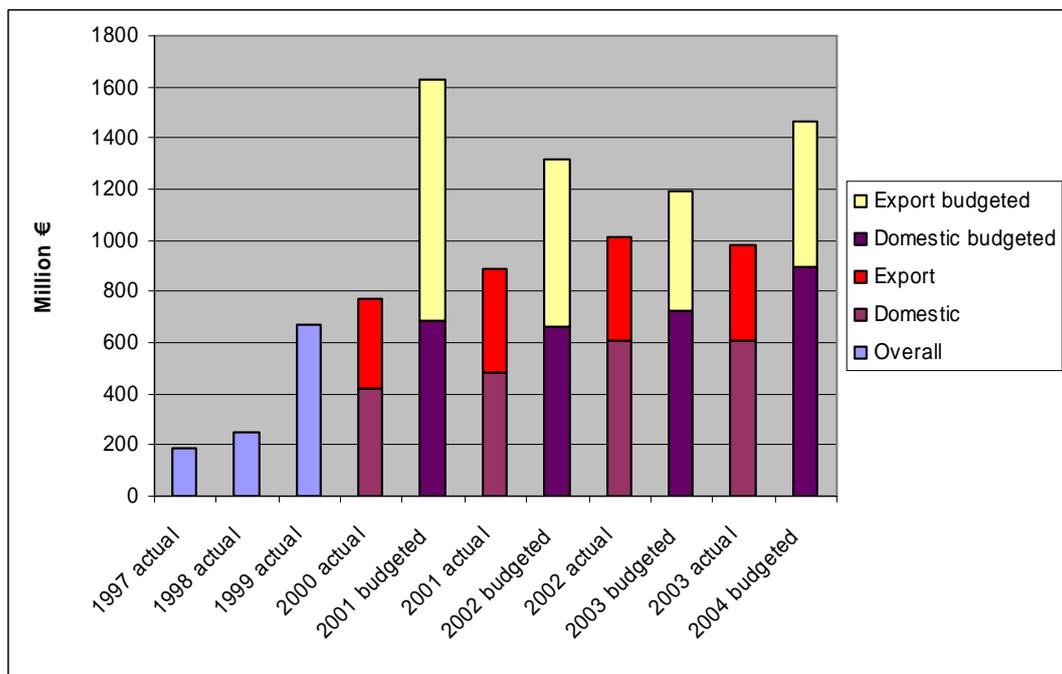


Figure 9. Development of the Revenue at the Industry Level in 1997-2003

The total revenue and the amount of employees working for the companies responding in the survey was summed up, which made the revenue per employee 113 000 Euros (107 000 Euros in 2002). However, the number of large companies strongly influences this ratio. When calculating the revenue per employee ratio as an average of single companies mean ratios, the ratio is 77 000 Euros per employee (87 000 Euros in 2002). When we studied the development of the ratio based on the time the companies had been in the business we found out that the ratio was essentially higher for those companies who had been in the business for more than five years. This indicates that it can take up to five years before the first product is successfully launched into the markets.

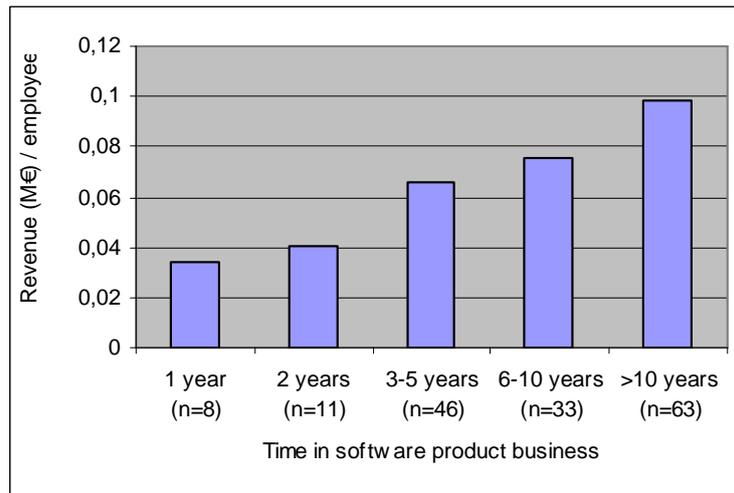


Figure 10. Development of Revenue per Employee in 2003 by the Age of the Software Product business

When studying how the software product business revenue affects the revenue per employee ratio, we can see that companies with software product business revenue exceeding 2 M Euros reach the ratio of over 100 000 Euros / employee. Companies smaller than this are most likely still in a product development phase, which can be seen in moderate rates (under 100 000 Euros /employee) as can be seen in Figure 11.

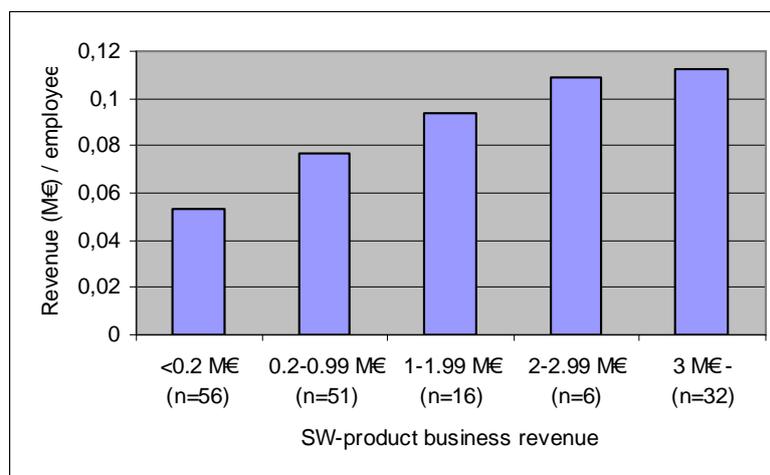


Figure 11. Development of Revenue per Employee by the Revenue of the Software Product Business

Smaller companies expect the fastest growth in the software product business revenue for the year 2004. Some of these companies are just launching their products to the markets and this can cause a substantial increase in sales. In addition, it is often more difficult for small companies to estimate their future sales. It is worth noticing that a relatively small amount of companies responded to the questions about their future expectations. It could be argued that the companies with positive views were more eager to answer these questions compared to those who did not regard the near future so positive. Therefore, the figures in Table 6 should be interpreted cautiously.

Table 6. Expected Annual Growth of Software Product Business for the Year 2004 (n=93)

Annual growth expectation	Revenue from companies' own software product business in 2003 (million Euros)				
	<0.2	0.2-0.99	1-1.99	2-2.99	3-
<0 %	1				1
0-10 %	5	3	1	2	
10.1 –20 %	1	5	2	1	2
20.1 –40 %		10			1
40.1 - 100 %	5	11	8		3
>100 %	20	8	3		
Amount of companies	32	37	14	3	7
Mean	421 %	67 %	62 %	8 %	34 %
Median	206 %	42 %	48 %	8 %	37 %

We studied also how companies have actually grown from the year 2002 compared to their growth estimates for the year 2003. However, the amount of companies for which the comparison could be made is relatively small (n=25) and the economic situation worldwide has naturally affected their businesses. On average, companies had expected an annual growth of 259 % (92 % in 2002 and 439 % in 2001) but the actual growth was 181 % (285 % in 2002 and 226 % in 2001). The expected median growth was 33 % (25 % in 2002 and 106 % in 2001) and the actual growth 20 % (0 % in 2002 and 38 % in 2001). The differences in the averages and medians mean that some of the companies have been able to increase their revenue significantly, but, on the other hand, some companies have suffered from the decline in the revenue. As differences to the previous year's expectations show, companies were more optimistic in their growth expectations for the year 2003 than a year before. The expected and achieved medians and averages are presented in Table 7.

Table 7. Expected and Achieved Growth in Software Product Business in 2003 (n=25)

Annual growth in 2003	Revenue from companies' own software product business in 2003 (million Euros)					
	<0.2 (n=8)		0.2-0.99 (n=5)		1- (n=12)	
	Mean	Median	Mean	Median	Mean	Median
Expected (in 2002)	274 %	117 %	733 %	50 %	51 %	17 %
Actual	89 %	-3 %	719 %	67 %	20 %	15 %

## 2.6 Personnel

The companies responding to the survey employed a total of 22 634 people working in 184 companies in 2003 (23 120 people working in 157 companies in 2002). Most of the

employees, approximately 90 %, work in companies with a revenue of at least 3 million Euros from their own software product business. Out of these 22 634 employees, some 6700 worked in software product business. When this is extrapolated to the industry level, the amount of employees working in software product business was about 12 000 in the year 2003. This extrapolation was made in the same way as the extrapolation for the revenue. On average, there were 123 employees per firm (median 9.5 employees) and 34 people working in software product business (median 6 employees).

When looking at the distribution of personnel in the software product firms that responded to the questionnaire, it can be seen that 27 % of the companies have less than six employees (34 % in 2002). On the other hand, only 13 % (15 % in 2002) of the firms employ more than 100 people. As mentioned before, large companies are over-represented in our sample. Figure 12 presents the distribution of companies' personnel.

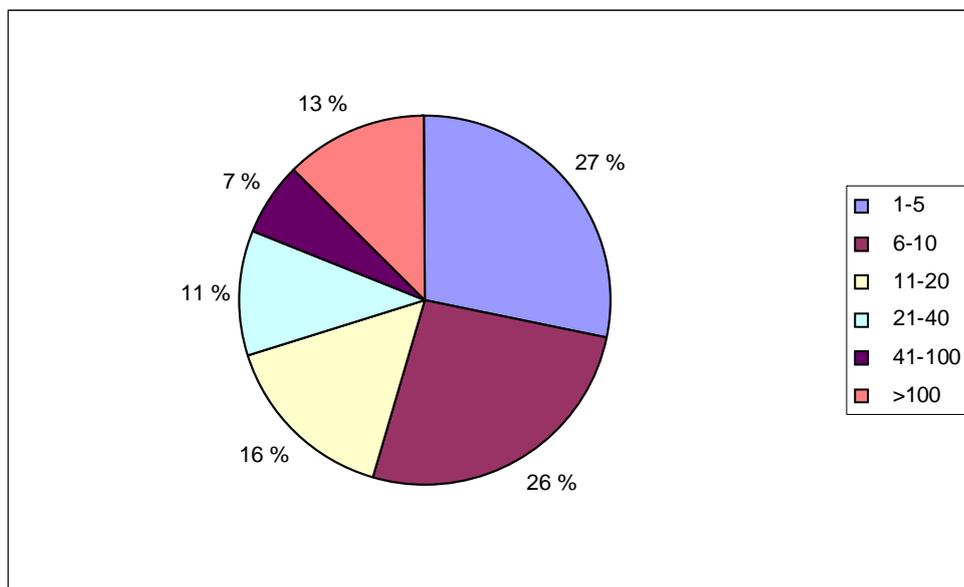


Figure 12. Distribution of Overall Personnel in Software Product Companies in 2003 (n=184)

Figure 13 shows the distribution of companies' software product business personnel. There is a strong correlation between the software product business revenue and software personnel (Pearson correlation 0.978). Regression analysis reveals that the coefficient of software personnel is 0.097. This means that, on average, the software product business revenue grows 97 000 euros by each additional software worker. This can be interpreted as an indication of the immaturity of the industry, since mature software product business should be able to grow its revenue without significantly adding personnel.

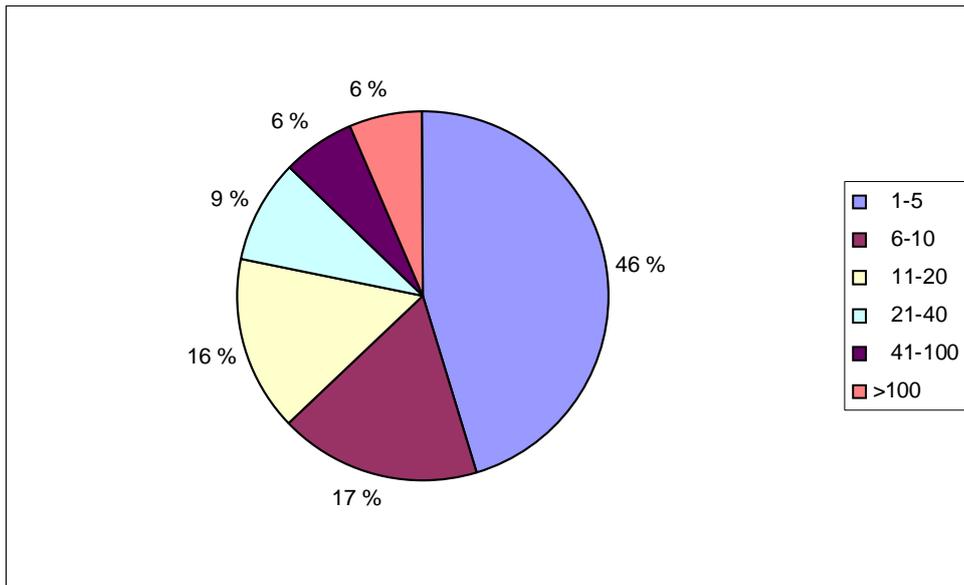


Figure 13. Distribution of Software Personnel in Software Product Companies (n=174)

Figure 14 shows how personnel are allocated to various functions. Over one third (35 %) of employees work in product development (34 % in 2002). The share of personnel providing customer services has slightly decreased from the last year — 15 % of the personnel were allocated to this area (23 % in 2002). The share of personnel in other functions has increased to 5 % from 2 % in 2002. 17 % of the employees work in sales and marketing (17 % in 2002). Management and administration staffs share also decreased to 8 % from 9 % in 2002.

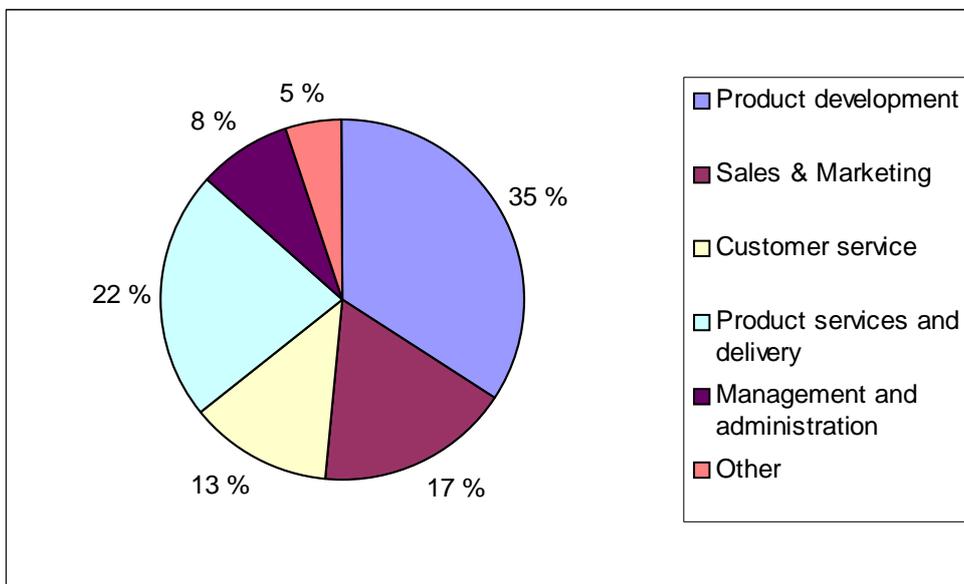


Figure 14. The Allocation of Personnel (n=174)

At the industry level, the total number of software professionals has increased 20 % from the year 2002. The extrapolation was done using the same approach as when calculating the revenue of the industry. Particularly smaller companies' (turnover from their own software product business < 3 million €) personnel increased significantly. Companies remain cautious in plans to recruit in 2004, but smaller companies plan to increase

software product business personnel on average 20 % in 2004. Development of the software product business personnel in 1999-2003 and budgeted estimates for 2002, 2003 and 2004 are presented in Figure 15.

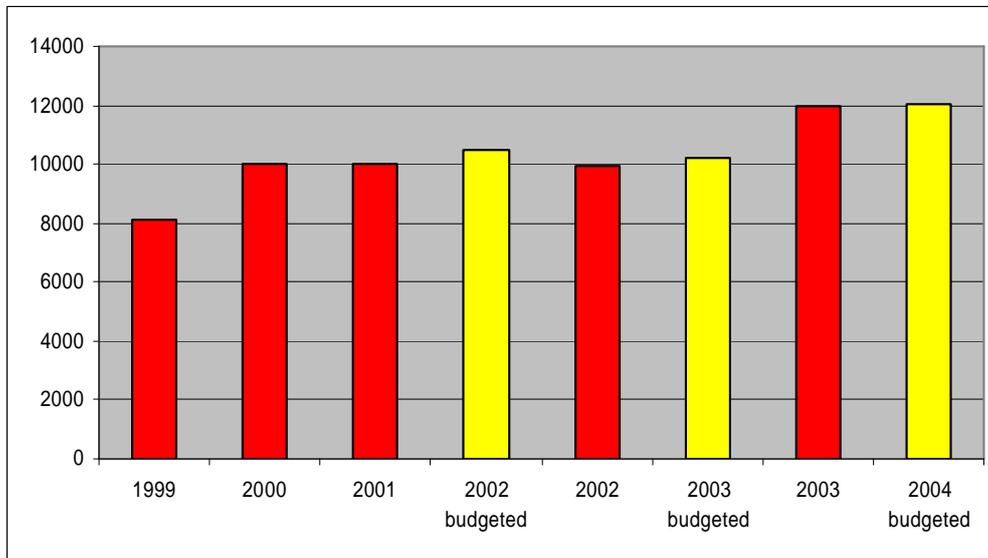


Figure 15. Development of the Software Personnel at the Industry Level in 1999-2003

As Figure 15 shows, companies have recruited personnel much more than they expected in 2003. Only 49 companies reported the number of personnel in the software product business both in 2002 and 2003. These 49 companies employed 4313 software professionals in 2003 (4454 in 2002), with an average of 88 (91 in 2002) and a median of 20 people (15 in 2002). Actually, 54 % had decreased or kept the same amount of software employees, 22 % had increased the software personnel from 1 to 40 % and 24 % had increased the amount by more than 40 %. The same calculations only for smaller companies (revenues from own software product business < 3 M Euros) are much positive, because 55 % of smaller companies (n=31) increased their personnel in software product business. The changes in the number of software product business personnel are presented in Figure 16.

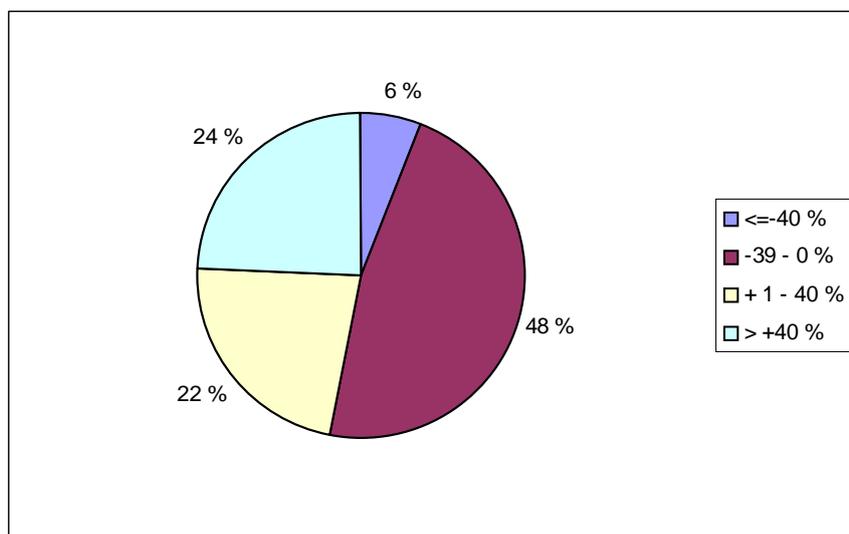


Figure 16. Percentage Change in Software Personnel from 2002 to 2003 (n=49)

When comparing these changes to the percentage changes in software personnel from 2001 to 2002, the most notable finding is that the share of the companies decreasing software employees over 40 percent decreased from 18 % to 6 %. On the other hand the share of the companies decreasing software employees from 0 % to 39 % increased from 33 % to 48 %. The changes in software product personnel indicate that despite the current economic downturn, companies are able to adapt to the changing situation and there are particularly smaller companies that are able to increase their personnel. It is worth mentioning that companies are more eager to report positive development and thus these results are probably more positive than the situation is in the entire industry.

## 2.7 Profitability

Year 2003 was quite challenging for the companies because of the global economic situation. Among the responding companies, it can be seen in Table 8 that year 2003 was generally profitable. On the other hand, half of companies with revenue less than 1.0 million Euros from software product business have made a negative result, but on average small companies have been also profitable.

Table 8. Companies' Average Profits in the Year 2003

Revenue from companies' own software product business in 2002 (million Euros)	Mean	Median	Sum	n
Unknown	0.53	0.53	1.06	2
< 0.2	0.03	0	1.27	50
0.2-0.99	0.04	0	1.98	46
1-1.99	0.27	0.11	3.77	14
2-2.99	0.58	0.40	3.46	6
3 -	4.78	0.65	133.83	28
Total	1.00	0.02	145.38	146

Altogether, companies responding to the survey generated profits of 145.38 million Euros (23,26 million Euros in 2002). Companies with software product business revenue less than 3 million Euros generated profits of 10.48 million Euros (7,4 million Euros in 2002). In addition, it is noticeable that only 146 out of 190 companies reported their profits for the year 2003. There is a tendency that companies doing relatively well are more eager to report their profits. Therefore, the actual situation is likely to be worse than the sample indicates.

Just 5.5% of the companies generated larger losses than 0.5 million Euros in the year 2003. 61.6 % of the companies were in the range of from 0.5 million Euros losses to 0.1 million Euros profits. Some 31.5 % of the companies generated larger profits than 0.1 million Euros as can be seen in Table 9.

Table 9. Companies' Profits in the Year 2003

Profit (million Euros)	Frequency	Valid Percent	Cumulative Percent
<-0.5	8	5.5 %	5.5 %
-0.5 - 0	45	30.8 %	36.3 %
0.01 - 0.1	47	32.2 %	68.5 %
0.11 - 1	32	21.9 %	90.4 %
>1	14	9.6 %	100.0 %
Total	146	100.0 %	

Figure 17 presents the company's profit in proportion to its revenue in the year 2003. There are no significant differences in the profitability based on the company size. It is noticeable that majority of the companies, despite the current economic situation, remained profitable.

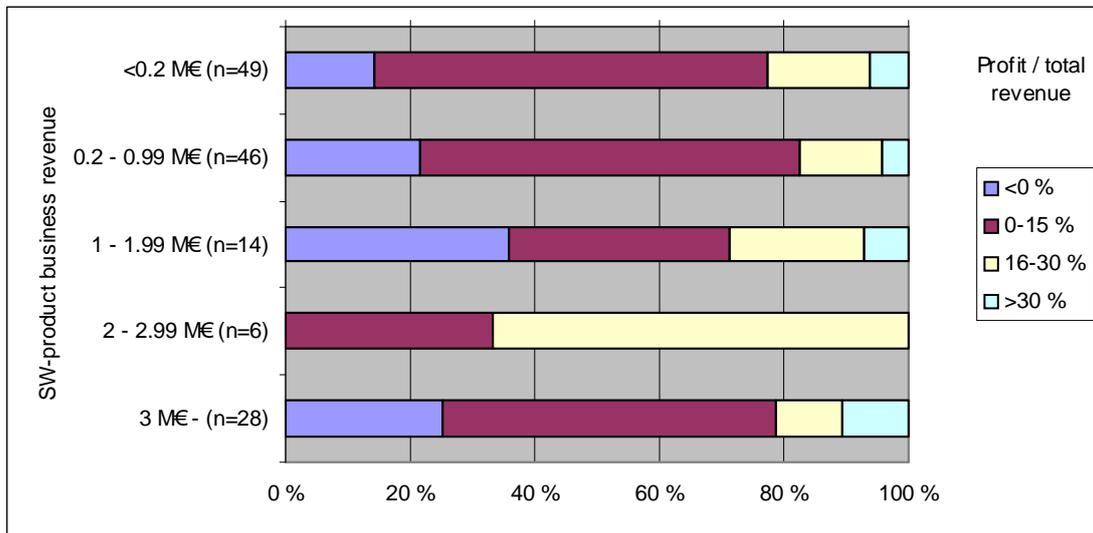


Figure 17. Company Profit / Revenue in the Year 2003 (n=143)

## 2.8 Improvement Areas

We defined eight possible improvement areas in the survey, as presented in Figure 18 that companies are focusing in 2004-2006. The companies were asked to value their two most important improvement areas with numbers 1 and 2, where one was the most important and two the second most important improvement area in the next three years.

The companies were also asked to value their two least important improvement areas with numbers 7 and 8, where 8 was the least important improvement area and 7 was the second least important improvement area. 44 % of the companies rated product development or productization as the most important or the second most important improvement area. It is worth to mention that only 4.5 % of the companies rated product development or productization as the least important or the second least important improvement area. Networking and cooperation and international sales and marketing were also quite often ranked as important improvement areas as can be seen from Figure 18.

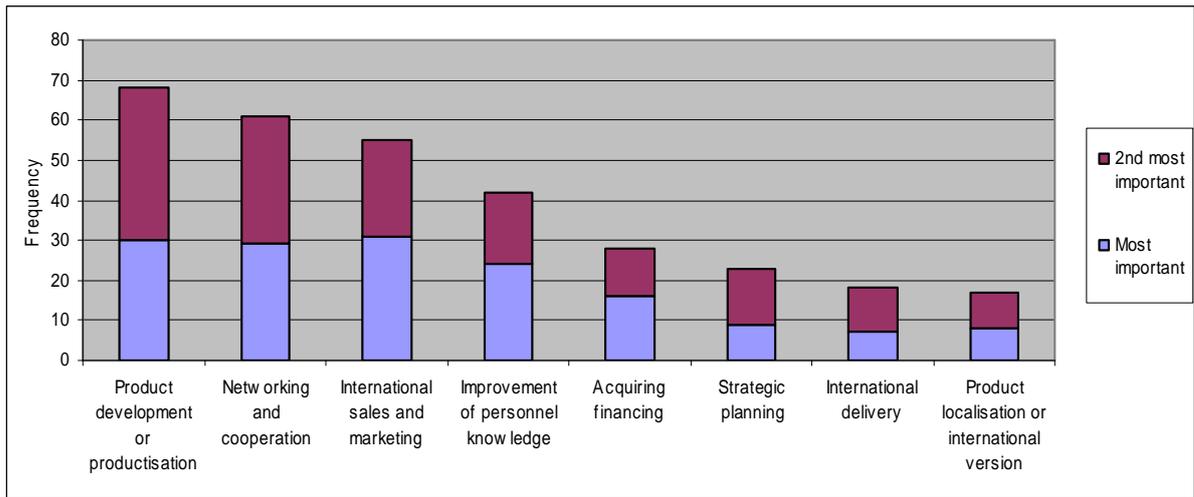


Figure 18. The Most Important Improvement Areas within 2004-2006 (n=154)

We studied how the size of the company, defined by revenue, affects the improvement areas. Small companies (revenue 0-2 M Euros) selected most often networking and cooperation as the most important improvement area and product development or productization was also very important improvement area for smaller companies. Larger companies ranked most often product development or productization as the most important improvement area. International sales and marketing was also very important improvement area for larger companies. Despite the size of the company in general, most important improvement areas seemed to relate to very fundamentals of business, i.e., product development, networking and international sales and marketing. Most and second most important improvement areas by the size of the company are presented in Figure 19.

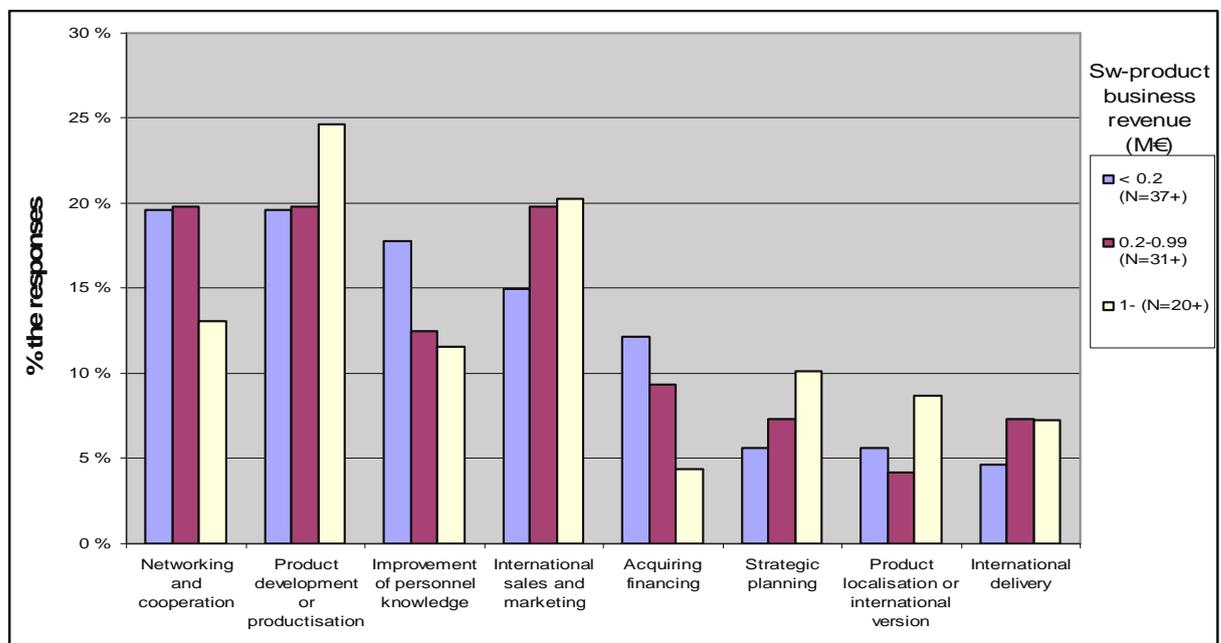


Figure 19. Distribution of the Most Important Improvement Areas within 2004-2006 by the Software Business Revenue

We also studied how a company's age affects to the improvement areas. The youngest companies saw most often product development or productization as the most

important improvement area and young companies saw also quite often networking and cooperation and international sales and marketing as the most important improvement area as can be seen from Figure 20. The companies with age between 6-10 years saw most often product development or productization as the most important improvement area. It seems to be quite difficult to name any especially important improvement area for companies older than 10 years. These oldest companies are very heterogeneous group and therefore the size of the software product business is better determining variable to explain their improvement areas.

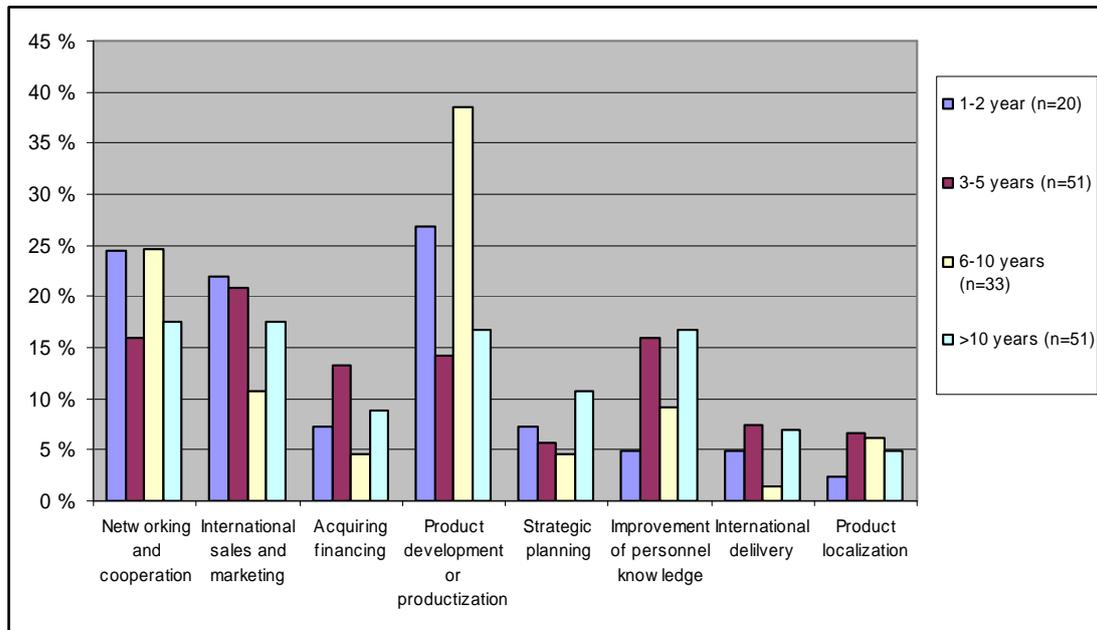


Figure 20. Distribution of the Most Important Improvement Areas within 2004-2006 Based on the Age of the Software Product Business

### 3 CHARACTERISTICS OF THE BUSINESS

#### 3.1 Main Product

In order to get a deeper understanding of the business models used by the Finnish software product companies, we asked them various questions related to the development, sales and delivery of their main product. The following sections discuss our findings regarding the sales composition, the sales channel used, and the method of delivery.

##### 3.1.1 Sale Composition

The companies were asked about the composition of their main product's delivery. We asked about the cash flow during the entire life cycle of the product. The categories were:

- Sales and rentals of the user licenses
- Customer specific projects and tailoring
- Customer installations
- User training
- Maintenance, service and help desk
- Other

Figure 21 shows an average customer sales distribution into categories mentioned above, for all respondents. It can be seen that on average 47 % (51 % in 2002) of the sales revenue came from licenses. Customer projects and tailoring accounted for 26 % (19 % in 2002) and installations 12% of the whole price.

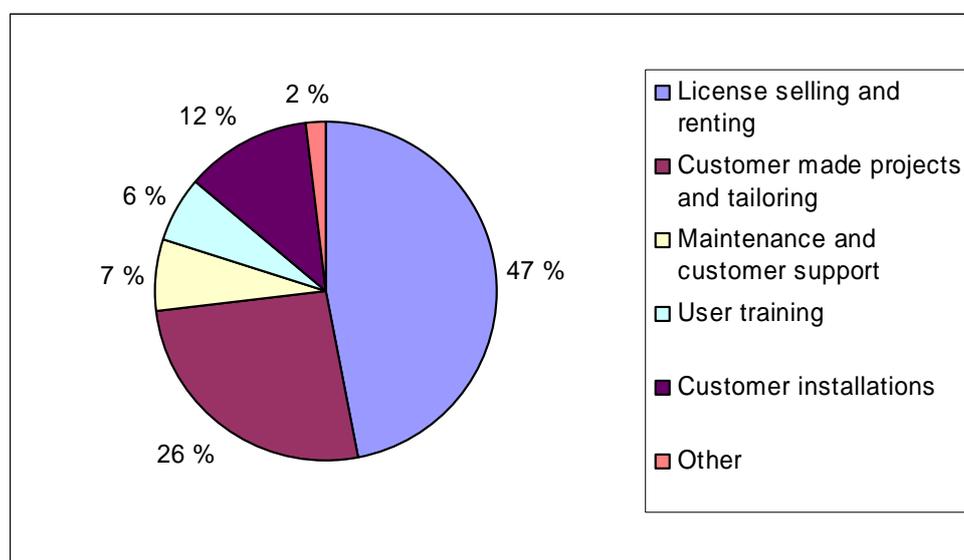


Figure 21. Composition of a Typical Delivery of the Main Product (n=165)

Figure 22 shows the main product's sale composition sorted by revenue from software product business in 2003. It seems that typical delivery of larger companies has slightly bigger share of license selling and renting and the share of customer made projects and tailoring is smaller.

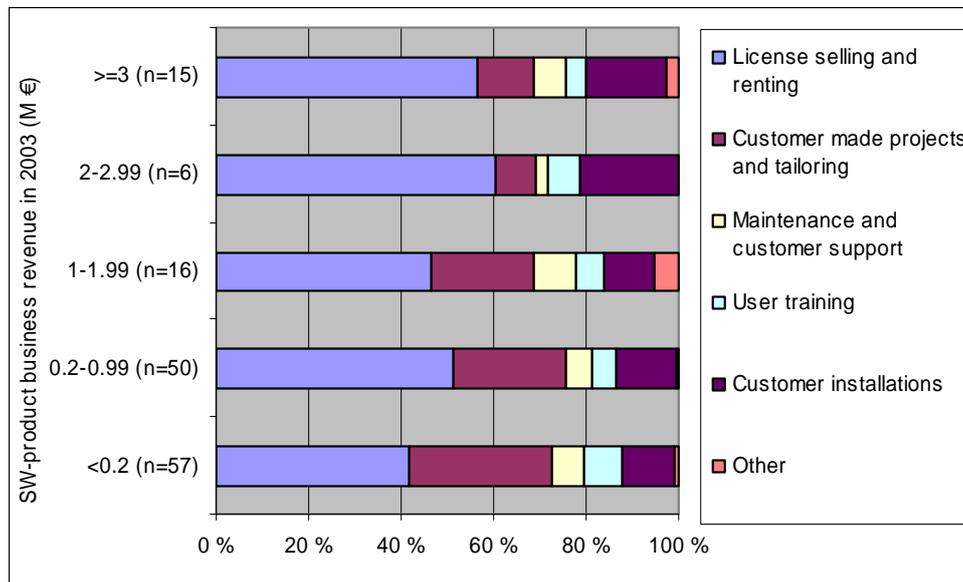


Figure 22. Composition of a Typical Delivery of the Main Product by Software Product Business Revenue

There is one factor causing some error in the distribution. For some of the companies, it is quite difficult to distinguish between license selling and maintenance. For example, a company might receive maintenance revenue, which partly includes the updates or new versions of the product. This part could qualify as license selling as well.

Generally, companies paid only marginal shares of their main product's revenue to third parties, on average just 7.3%. The size of the company did not seem to affect the percentage paid to third parties.

### 3.1.2 Sale Channel and Product Delivery

We asked the companies about the sales channel of the main product and how the product is being delivered. We listed various sales and delivery channels and asked the companies to rate how much they used the various channels on a Likert scale from 1 to 7, where 1 meant "hardly at all" and 7 "very much". The most common way of reaching the customer was through direct selling. Resellers and agents were also used, more often by larger companies. Other approaches were very narrowly used, as shown in Figure 23.

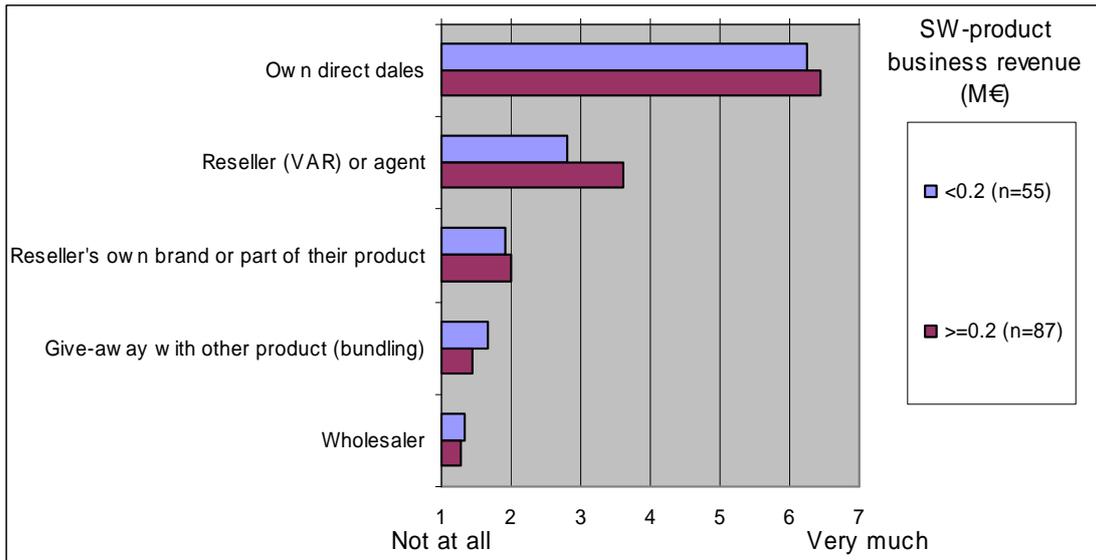


Figure 23. Sale Channels Used with the Main Software Product

Smaller companies (software product business revenue <0.2 M Euros) rely more on electronic delivery (the Internet) than using physical delivery. Larger companies use electronic delivery as much as physical delivery, as illustrated in Figure 24.

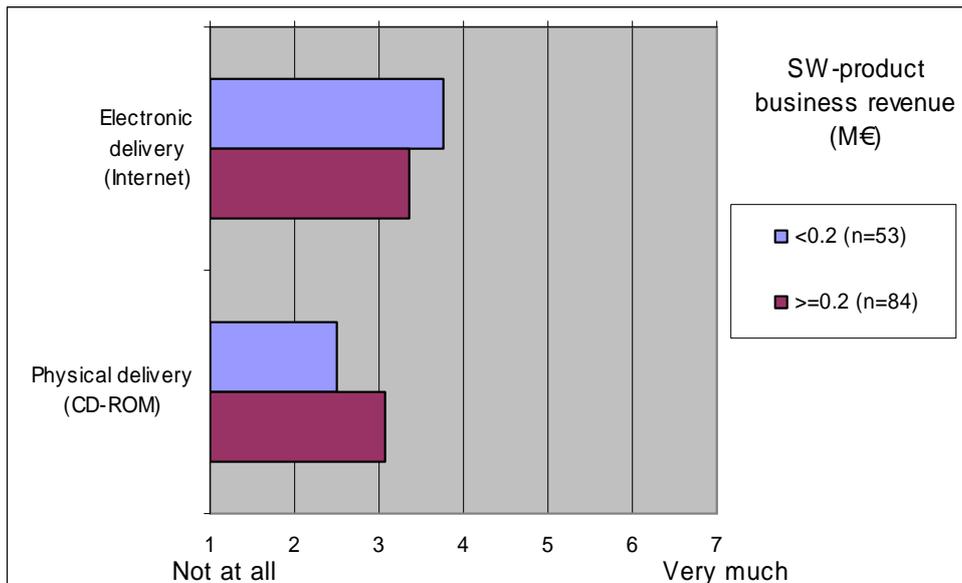


Figure 24. Delivery Channels Used with the Main Software Product

### 3.1.3 End Users and Market Segments

We asked the companies to identify their main product's end user. We categorized end users into 6 groups, which are micro enterprises (1-4 employees), small enterprises (5-50 employees), medium enterprises (51-250 employees), large enterprises (over 250 employees), public administration and private consumers. The majority of Finnish software products are sold to enterprises and public administration, and only rarely to consumers. The share of micro enterprises was also quite low. Because one company can have customer in more than one segment (dichotomy label), the overall percentages can be above 100 % in Table 10.

Table 10. End Users

Dichotomy Label	Revenue from companies' own software product business in 2003 (million Euros)				
End user	< 0.2	0.2-0.99	1-1.99	2-2.99	3 -
Micro Enterprise	20 %	12 %	6 %	33 %	7 %
Small Enterprise	50 %	39 %	41 %	83 %	13 %
Medium Enterprise	57 %	49 %	53 %	100 %	60 %
Large Enterprise	50 %	47 %	53 %	83 %	73 %
Public Administration	29 %	43 %	18 %	17 %	53 %
Private consumer	13 %	6 %	12 %	33 %	13 %
Total	219 %	196 %	183 %	349 %	219 %
Number of cases	56	51	17	6	15

Out of the 166 responding companies, 82 indicated (49.4 %) that their main product is focused on industry-independent markets as the rest 84 (50.6 %) had industry-specific markets, as Figure 25 shows. There were no dramatic changes in the foci based on the size of the software product business, but the number of responding companies in some categories was also relatively small.

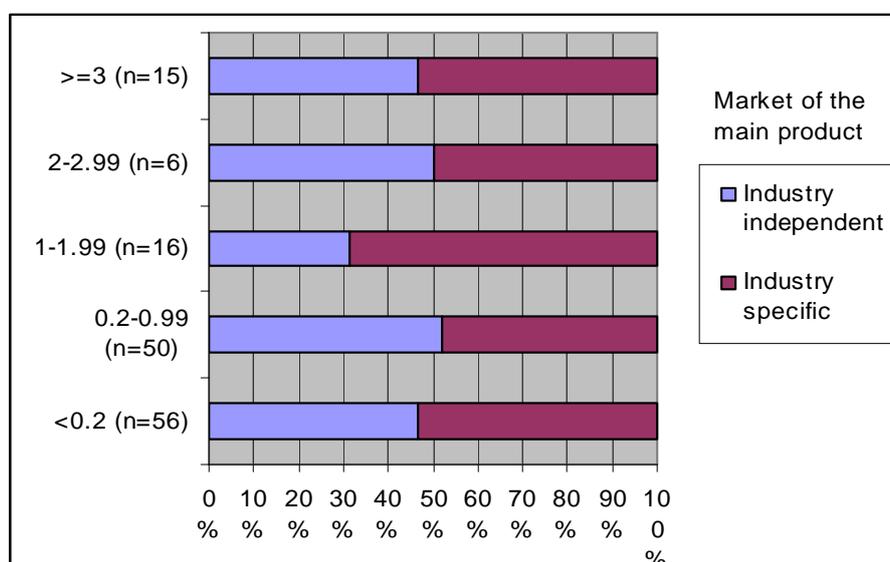


Figure 25. Target Market of the Main Product by the Size of the Software Product Business

We also asked the companies in which markets the main product was offered and if there was an industry-specific market. Most common fields of industries were industry, transport, warehousing and telecommunications, healthcare and social services and construction, as can be seen from Figure 26.

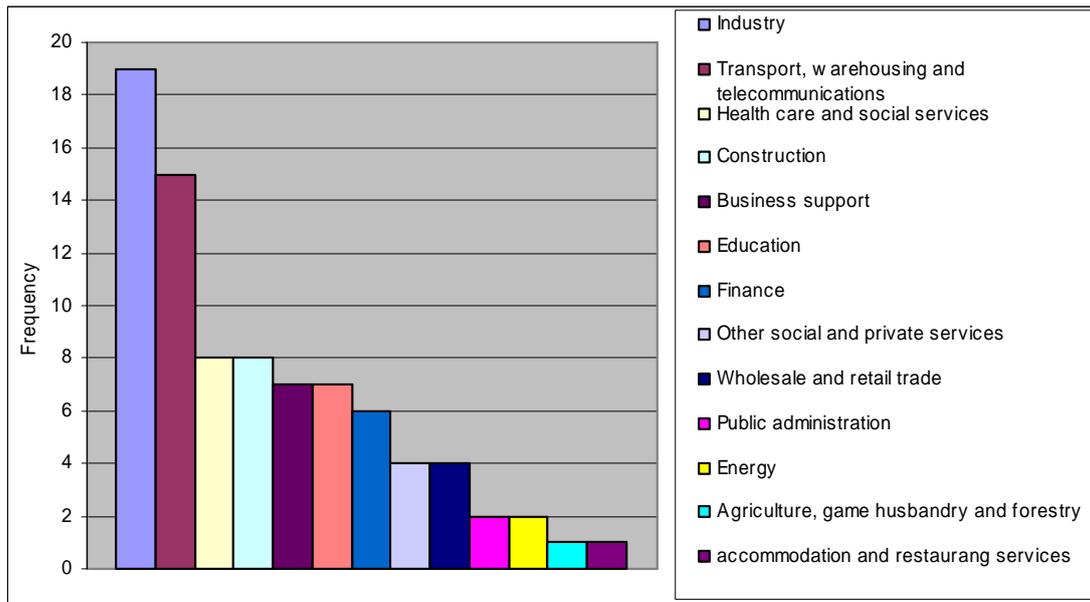


Figure 26. Frequencies of the Industry-Specific Markets of the Main Product

### 3.1.4 Versioning

We also asked the companies on which basis they release a new version of their main product. With smaller companies, with software product business revenue not exceeding 0.2 million Euros, 52 % of them release a new version without a pre-defined cycle (51 % in 2002). In companies having software product business revenue over 0.2 million Euros, 42 % of the companies indicated that their version releasing is not based on a pre-defined cycle (60 % in 2002). An interesting finding was also the increase in basing the releasing on a fixed schedule as 48 % of the larger companies indicated so (30 % in 2002). The version release basis is presented in Table 11.

Table 11. Basis of the Releasing a New Version of the Main Product

Dichotomy Label	Revenue from companies' own software product business in 2003 (million Euros)	
	< 0.2 (n=56)	0.2 – (n=85)
Release basis	% of responses	% of responses
In every customer delivery	14.3 %	7.1 %
Without pre-defined cycle	51.8 %	42.4 %
Based on the customer need	60.7 %	43.5 %
On a fixed schedule	19.6 %	48.2 %

There were no actual changes in how many versions a year companies released a new version of their main product compared to 2002. Both small companies (software product business not exceeding 0.2 M Euros) and companies having software product business revenue over 0.2 M Euros released on average two new versions of their main product a year. Surprisingly, the differences in release frequency between companies with revenue below and over 0.2 million Euros were not significant as Table 12 indicates.

Table 12. Version Release Interval of the Main Product

Version release interval	Revenue from companies' own software product business in 2003 (million Euros)	
	< 0.2 (n=57)	0.2 – (n=86)
Weekly	0 %	1.2 %
Monthly	5.3 %	5.8 %
Every second month	5.3 %	4.7 %
3-4 times a year	28.1 %	25.6 %
2 times a year	24.6 %	32.6 %
Annually	22.8 %	25.6 %
Less frequently	14.0 %	4.7 %
Total	100.0 %	100.0 %

We also studied how the maturity of the software development processes affects version release intervals. We found only very low correlation between version release intervals and maturity of the software development processes (Pearson correlation 0.182). Naturally, the type of software produced affects among many other factors to the need for releasing new versions. For instance, in security business (i.e., virus protection) version release is critical when a new virus appears but in game industry there are rarely many versions released of the same game (minor patches and updates excluded).

### 3.2 Research and Development

On average, software product companies invested 31.2 % (31.4 % in 2002) of their revenue on R&D. There was a significant increase in smaller companies' R&D investments. Particularly companies that generated revenue from own software product business 0.2 – 0.99 million Euros, increased R&D investments on average from 20.7 % of revenues in 2002 to 27 % of revenues in 2003. In addition, the median investment of all the companies (n=140) increased from 20 % in 2002 to 21 % in 2003. Table 13 presents the average and median product development investment (% of the revenue) for the year 2003 for those companies, whose software product business revenue is known.

Table 13. Product Development Investments in 2003 in Relation to (% of Total Revenue)

Revenue from companies' own software product business in 2003 (million Euros)	Mean	Median	n
< 0.2	35.5 %	20.0 %	51
0.2–0.99	27.0 %	22.5 %	44
1 -	30.8 %	27.6 %	45
Total	31.2 %	21.0 %	140

Table 14 presents the product development investments based on the time the company has been in the software product business. In 2002, on average one-year-old companies invested 31 % and 2 year-old-companies invested 22 % of their revenue on R&D. The investments in 2003 were 24 % and 55 % respectively. Particularly one-year-old companies R&D shares have been relatively low in 2002 and 2003 (one-year-old companies invested 169 % of their revenue on R&D in 2001). Despite the fact that the number of young companies in the sample is small, this can indicate that in the current economic situation young companies finance their R&D merely by operations compared to the situation, where more young companies could finance their R&D by venture capital. This is an important finding and means that companies face increased challenge in their productization aims as R&D is influenced by customer projects and tailoring.

Table 14. Product Development Investments in 2003 in Relation to the Age of Software Product Business

Time company has been in software product business (years)	Mean	Median	n
1	24.2 %	10.0 %	5
2	55.0 %	30.0 %	11
3-5	40.2 %	30.0 %	41
6-10	27.6 %	30.0 %	31
> 10	22.2 %	20.0 %	53
Overall	31.25 %	21.0 %	141

Figure 27 depicts the R&D median investments according to the maturity of the software product business. Majority of younger companies (age of software product business < 10 years) increased their R&D investments in 2003, but the median R&D investments are far from the level of year 2001. This clearly points out the fact that in the current economic situation despite the phase of the company's life cycle majority of the companies are investing some 20-30 % of their revenue on R&D where as in 2001 youngest companies invested essentially larger amount in their R&D.

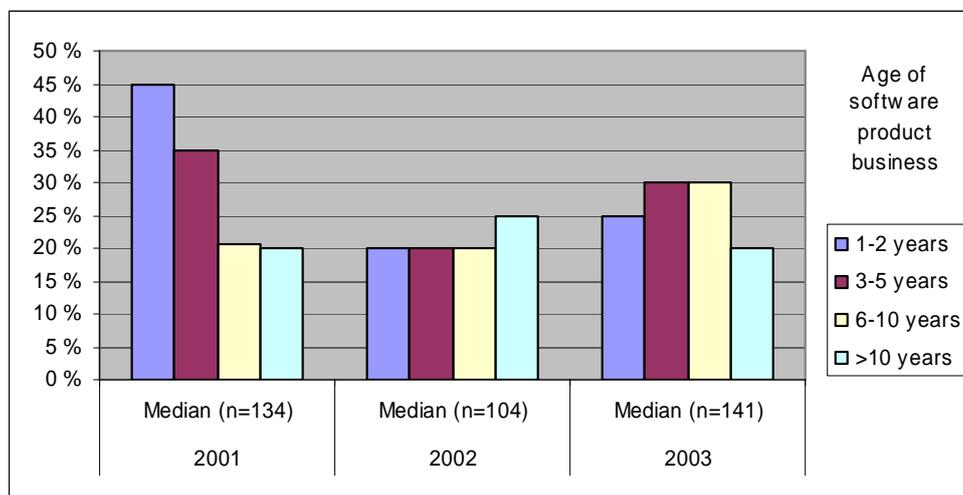


Figure 27. R&D Investment (% of Total Revenue) According to the Maturity of the Software Product Business in 2001 - 2003

We also studied how the focus of the product development has changed in the company sample from 2001 to 2003. During these years most product development emphasis had been put on increasing the degree of productization and on creating value-adding services. Particularly the emphasis in improving R&D and delivery processes and in value-adding services increased in 2003. For smaller companies there were not many changes, but larger companies increased their emphasis in improving R&D and delivery processes. Despite the size of the company, the emphasis of R&D put in creating new products had significantly decreased from year 2001 as Figure 28 indicates. This could indicate that in current economic situation companies try to avoid risky R&D projects and focus merely on less risky, i.e. in improving the current products and creating services around it.

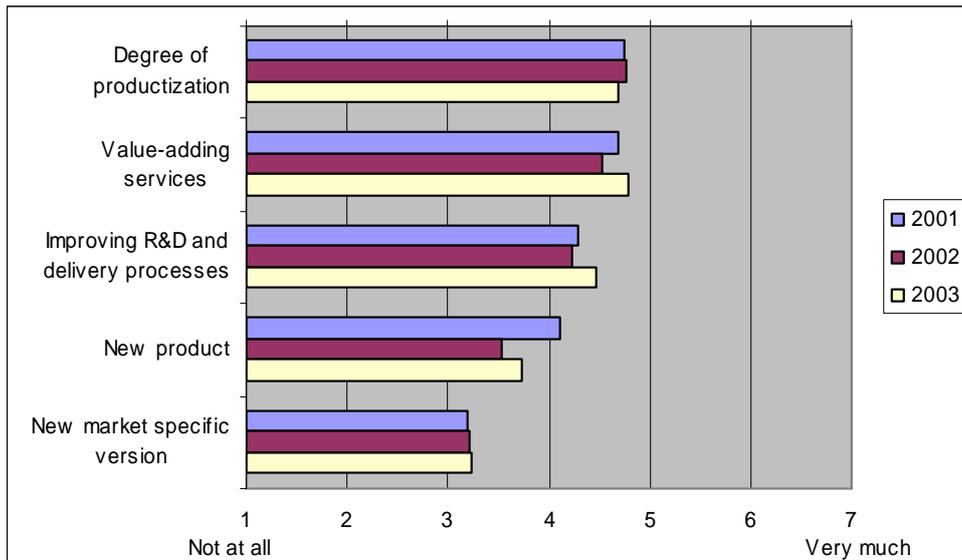


Figure 28. Product Development Emphasis in 2001, 2002 and 2003

Similarly to 2002, in 2003, companies that have been in the software product business for less than six years emphasize most leveraging the degree of productization. Companies that have been in business for at least six years emphasized most creating value-adding services around their main product and improving R&D and delivery processes. Product development emphasis by the age of software product business can be seen in Figure 29.

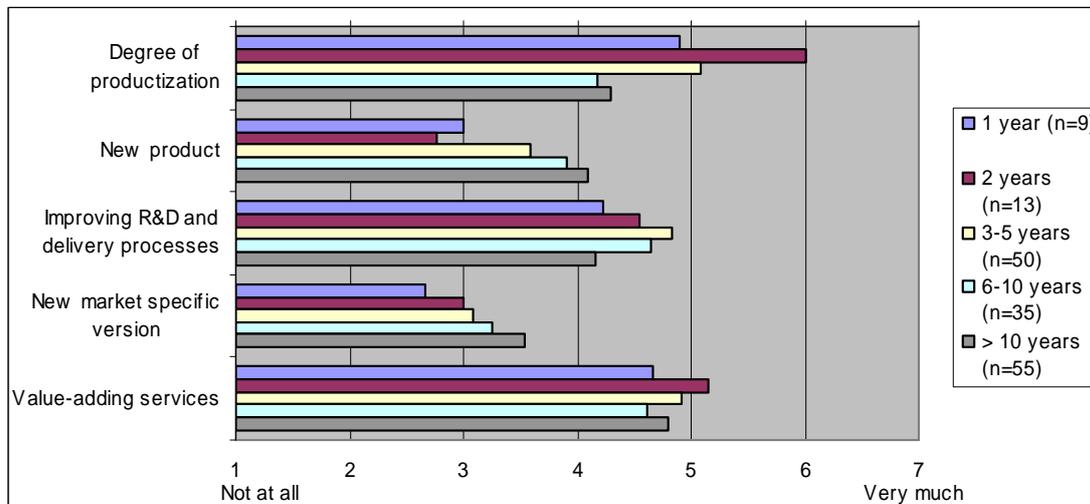


Figure 29. Product Development Emphasis Based on the Age of Software Product Business

### 3.3 Product Development Processes

We asked companies about their product development processes. 39 % of the companies did not systematically set several milestones for their product development projects (given no more than a value of 4 on a 7-scale Likert). The averages of the used approaches in product development are depicted in Figure 30.

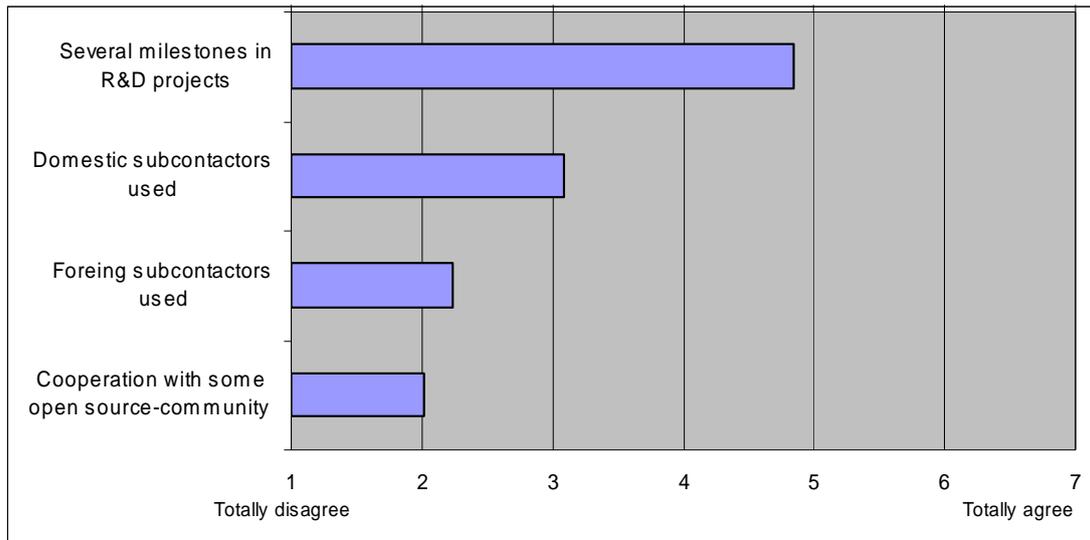


Figure 30. Describing Factors of the Product Development Process

Interestingly, the previous methods used in product development process did not dramatically seem to affect the degree of productization. However, small correlation was found between the using milestones in product development and degree of productization (Spearman correlation 0.260, significant at the 0.01-level). Interesting correlations were also found between subcontracting and cooperation with some open source-community. Cooperating with some open source-community correlated positively with using of foreign subcontractors (Spearman correlation 0.220, significant at the 0.01-level) and also with using of domestic subcontractors (Spearman correlation 0.203, significant at the 0.01-level).

We also asked companies to estimate their product development process by some statements, where the far-ends were not necessarily opposites, but describe i.e. how information for products is primarily gathered. Majority of the companies indicated that new product development projects are at least partly based on understanding the market needs, instead of basing decisions merely on their own technological competences (given at least a value of 5 on a 7-scale Likert). Releasing a new product was by 33.9 % of the companies quite clearly based on a fixed time schedule (given no more than a value of 3 on a 7-scale Likert) where as 47.5 % of the companies were including almost all the wished features despite delays in releasing (given at least a value of 5 on a 7-scale Likert). Majority of the companies gathered requirement and feature needs from their customers where as using market research was quite seldom used, as only 31.5 % of the companies indicated so (given at least a value of 5 on a 7-scale Likert).

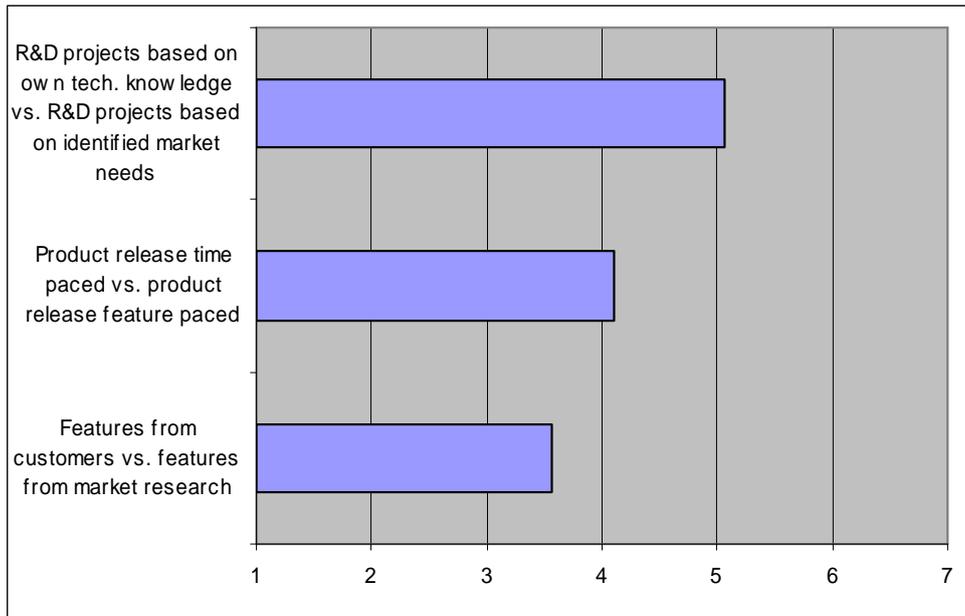


Figure 31. Characterizing Factors of the Product Development Process

Interestingly, positive correlation was found between the degree of productization and product features based on market research (Spearman correlation 0.319, significant at the 0.01-level). This can be explained by the fact that software products with high degree of productization are usually sold to hundreds or thousands customers. Therefore, market research is usually the most effective way to gather and manage customer needs if there are a lot of potential customers.

## 4 INTERNATIONAL OPERATIONS

Software product business is typically dependent on high volumes, reusability, and wide market acceptance. Therefore, international expansion will at some point become a necessary step for growing companies beyond the growth limits imposed by the size of the Finnish market, which counts for less than 1 % of the world software market. But internationalization is also highly risky. The pressure on early internationalization, required resource intensity, the dynamism of external environment, fierce competition, and the general immaturity of the industry are only some of the factors that contribute to the high risk level of internationalization. These risks impact not only the growth and profitability prospects of the internationalizing firm, but often also the very viability of the business. These arguments justify the special attention put to international operations in this report.

This chapter provides an overview of Finnish software product industry firms' international operations. More specifically, the focus of this chapter is on identifying the typical profile of an internationally operating software product firm and its differences from its domestically operating siblings. We also analyze data on the process of internationalization, on primary foreign markets, on modes of international entry, and on the resource propensity of the analyzed firms for international operations.

### 4.1 Scale of International Operations

Overall, 84 (49.7 %) out of the 169 responding firms had some revenue streams from foreign markets in 2003, and thus can be considered as internationally operating. This represents a slight increase from the 46 % reported year ago. The distribution of internationally operating firms, as well as the distribution of their foreign revenue share, are presented in Figure 32. We can observe that over half of the companies with international sales received only one quarter or less of their revenue from outside of Finland. On the other hand, less than 20 % of the firms generated more than 75 % of their revenue abroad. All in all, this represents a slight shift to smaller shares of revenue from abroad compared to last year when the corresponding figures were 50 % and 22 %. This U-shaped distribution suggests a gap between initial sales abroad and full-scale internationalization.

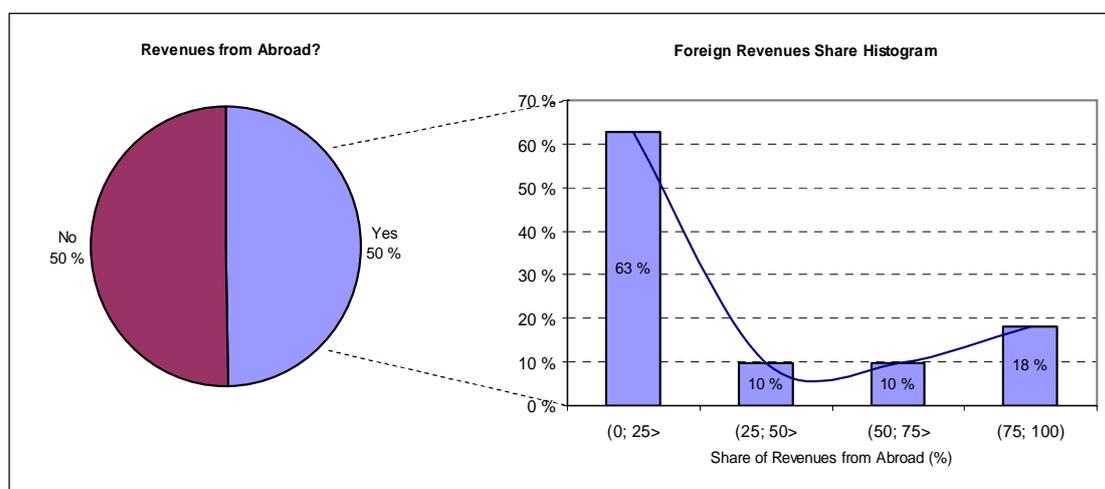


Figure 32. Firms that Generated Revenue from International Operations ( $n_1=169$  and  $n_2=83$ )

## 4.2 Profile of Internationally Operating Firms

The basic indicators of international operations and their averages from 2003 and 2000 for internationalized firms are presented in Table 15. The average number of foreign markets targeted in 2003 was 6.3. This represents slight growth in geographic coverage, as the corresponding figure was 4.6 in 2000. Though last year, the corresponding figure was 8.1, so in recent times there has been a diminishing trend in geographical coverage. Also the median number of export countries had grown significantly from 1.5 export countries in 2000 to 3.0 in 2003. Also in this case, the corresponding figures from the year 2002 showed wider internationalization but it has to be stated that this year's sample was larger and did not include some very large firms that were included last year.

Probably the most important internationalization indicator, the share of foreign revenue, shows that almost 31 % of revenue (only 19 % in 2000) was generated abroad in internationalized software product companies. The corresponding median is again much lower, at only 10 % (5 % in 2000). The numbers indicate a significant increase in the share of foreign revenue since 2000.

Still, the numbers show a significant difference compared with those in last year's survey representing the corresponding figures from 1999 and 2002. In 1999 as well as in 2002 the corresponding figures were somewhat higher from what was found in this year's survey. This indicates a wide dispersion in the level of internationalization among software companies, since this year's sample was wider and excluded some large firms that were present last year.

On average, the internationalized firms had employees in 2.7 countries and more than 50 % of the firms did not have any employees abroad. Almost one quarter of their total employees (including those based in Finland) focused on export business on a full-time basis. The corresponding median value is only 10 % (3 % in 2000). The strong increase since 2000 suggests that many companies today assign significantly more employees to foreign operations.

Table 15. Indicators of International Operations

<i>Indicator</i>	<i>2003</i>			<i>2000</i>		
	<i>Mean</i>	<i>Median</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>N</i>
Number of countries generating revenue, excl. Finland	6,3	3,0	79	4,6	1,5	74
Share of revenues from outside of Finland 2002 (%)	31 %	10 %	79	19 %	5 %	73
Number of countries where company had employees, excl. Finland in 2002	2,7	0,0	73	1,6	0,0	73
Share of employees focusing full-time on foreign operations in 2002 (%)	24 %	10 %	75	14 %	3 %	71

A comparison of some key descriptive statistics between internationally and domestically operating companies is presented in Table 16. The average total revenue of internationalized firms was 4.1 million Euros in 2003. There was a significant difference in total revenue between internationalized and domestic firms, and the average internationally operating company was more than 6 times bigger than the average domestic software company. However, the findings differ markedly from last year's results. Compared with last year's 31.1 million and the 27.4 million from 2001, this year's average total revenue represents a drastic decrease in average revenues. However, previous years' samples included some very large companies that were absent from this

year's survey, so the distribution median gives a more correct profile of a typical internationally operating software firm. But even the median indicates changes in firm's profiles compared to last year even if they are less significant. This year also a few large companies influence some of the results greatly. For instance the average profit of internationalized companies in 2003 is largely influence by one company's 14 million Euros' loss. Hence, in this year's results also, the median better describes the actual situation. Still, the median indicates significant difference in size between domestic and international software product firms. In general a stronger relative share of small software companies compared with previous years is obvious and can also be noted from the drop of number of employees on average from 286 last year to 35.4 this year. Again, the distribution median gives a more accurate idea of the companies' profiles.

Table 16. Profile of International vs. Domestic Firms in 2003

<i>Indicator</i>	<i>International</i>			<i>Domestic</i>		
	<i>Mean</i>	<i>Median</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>N</i>
Revenues in 2003 (M€)	4,1	1,2	75	0,6	0,25	71
Predicted growth rate 2003-2004	37 %	20 %	64	141 %	33 %	67
Proportion of revenues in 2003 from own SW products (%)	83 %	100 %	62	74 %	100 %	63
Age of company	12,7	12	78	8,6	5,5	82
Age of own software product business	10,7	9	80	7,4	5	82
Number of employees in 2003	35,4	13,5	78	8,6	6	81
Profit in 2003 (M€)	0,0	0,04	63	0,0	0,001	63
Return on sales	5 %	8 %	63	-7 %	2 %	63
R&D per sales in 2003 (%)	21 %	20 %	53	24 %	20 %	59

In order to analyze differences in the distribution of revenue between international and domestic firms, we have used a modified histogram<sup>1</sup>, which is presented in Figure 33. It shows that domestic firms tend to have lower sales volumes than international firms. In the categories of middle income firms the shares are quite similar, but in the category of smallest revenue the share of domestic firms is over ten times bigger than that of internationalized firms. On the other hand, there are very few domestic firms with revenues from 2 to 10 million Euros, and none with a total revenue over 10 million Euros. There seems to be a strong correlation between internationalization and larger revenues.

Internationally operating firms, by virtue of not being limited by the size of Finnish market, have flatter revenue distribution in middle income categories, suggesting weaker growth limits compared to domestically operating firms. However, none of the correlations observed between total revenues of firm versus operating only domestically or internationally are as strong as last year. This may result from larger sample data that gives a more profound picture of the profile of Finnish software companies and from the absence of some very large companies that were present last year.

<sup>1</sup> Modified histogram: The bar chart showing frequency of occurrence within a series of variable (non-constant) ranges. While this chart can emphasize differences between variables, it should not be used to conclude on shape of distribution due to the irregular categories and consequent deformation of distribution shape.

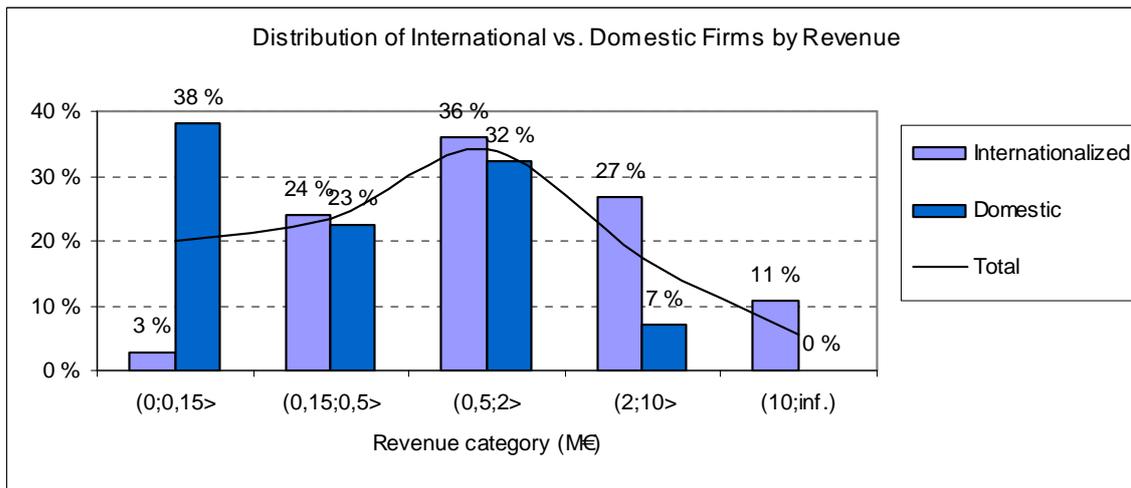


Figure 33. Distribution of International vs. Domestic Firms by Revenue (n=146)

The average profits of both domestic and international firms are close to zero. Both figures are shifted downward by a few firms with great financial losses in 2003. Median of internationalized firms was only about 40 000 Euros and of domestic firms close to zero. The distribution of domestic firms by profit is much more centralized and is highly concentrated around zero. Almost 75 % of domestic firms have profit between 0 and 100 000 Euros. On the other hand, the profit distribution of internationally operating firms is much wider, with one fifth of these reporting losses, and over a quarter reporting profits in excess of 300 000 Euros. This clearly indicates that international operations are significantly riskier in general than domestic ones. These risks are associated with greater growth opportunities, if the firm is successful.

Another, perhaps more objective and comparable measure is profitability. The following analysis focuses on return on sales (profit divided by annual sales). The distribution of international and domestic firms is presented in Figure 34. Even here, it appears that internationalized firms have a somewhat wider profitability distribution than domestically operating firms.

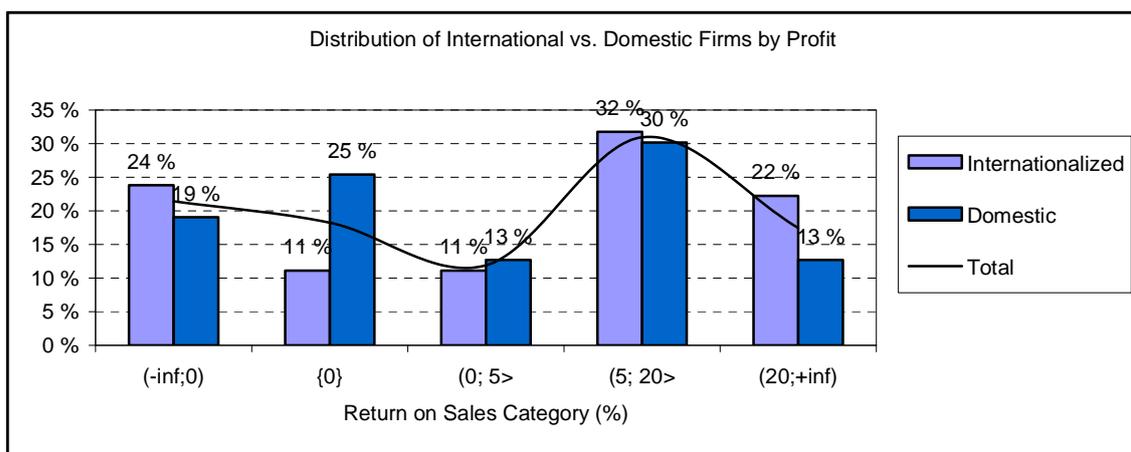


Figure 34. Distribution of International vs. Domestic Firms by Profitability (n=126)

Distribution by age seems to follow a distinct pattern for both internationalized and domestic firms. The share of domestic firms is largest in the category of middle aged companies and gets smaller in categories both younger and older than it. The share of internationalized firms, on the other hand, grows steadily hand in hand with the aging of the companies. This would suggest that decision to internationalize is in software product industry somewhat dependent on maturity of a firm in terms of age and comes about most probably in the age category of 9 to 15 years where the share of domestic firms drops and that of internationalized firms climbs up. This dependence on age is quite contrary to what was found last year.

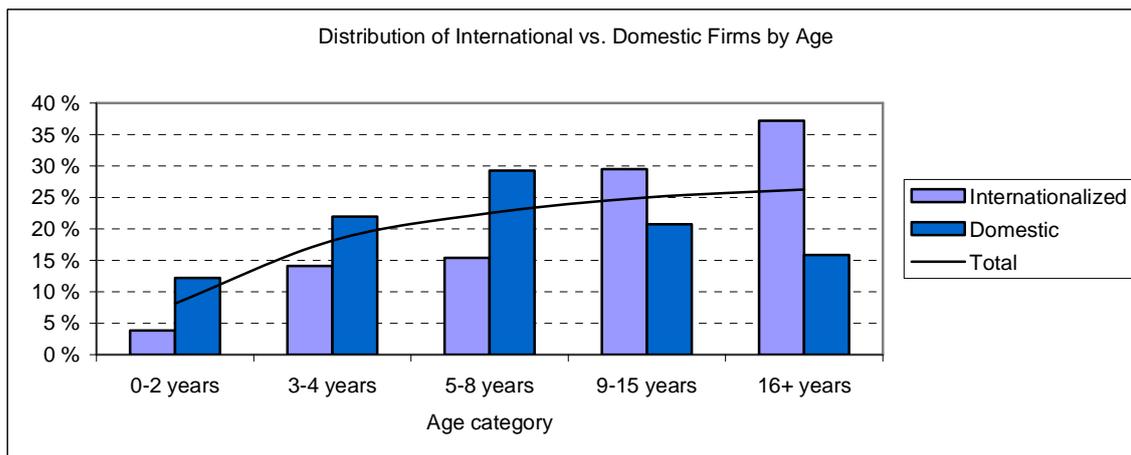


Figure 35. Distribution of International vs. Domestic Firms by Age (n=160)

The number of employees is for both domestic and international firms in proportion with revenue. This indicates that there is no significant difference in productivity between international and domestic firms.

### 4.3 Improvement emphasis

The next issues of our interest are the differences in emphasis on key improvement areas. The importance of eight areas as perceived for horizon of three years by international vs. domestic firms is presented in Figure 36. The average internationalized firm in our sample finds as key areas for improvement international sales and marketing, R&D and productization, and networking and co-operation.

The findings differ slightly from what was found last year. Last year the most important improvement area was considered to be R&D and productization, followed then by international sales and marketing. This year's third most important improvement area was networking and co-operation, followed by knowledge and skills of personnel. So there were no drastic changes, but the first and second most important improvement areas, as well as third and fourth, changed places.

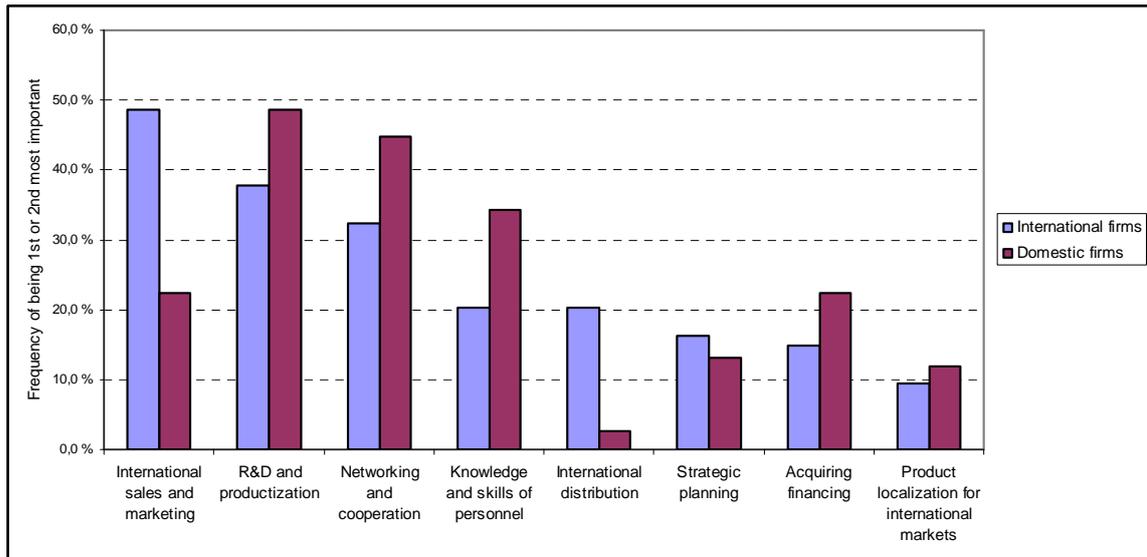


Figure 36. Improvement Emphases by International vs. Domestic Firms for 2004-2006 (n=150)

The most significant difference in importance perception between internationally and domestically operating firms is in international sales and marketing, and also in international distribution, which are found much more important by international companies. The results indicate that for many currently domestically operating firms, internationalization is not currently issue of high priority. However, distribution of the answers is highly heterogeneous and there are over one fifth of domestic firms finding international sales and marketing as one of the two most important improvement areas. These findings are in line with last year's results.

Product localization for international markets was felt to be more important by domestic firms than international ones. This can be explained by the fact that most of the internationally present firms have already gone through product localization phase and established corresponding processes, while for some domestic firms thinking of internationalization this is the current issue to deal with.

#### 4.4 Primary Foreign Markets

The next issue, being of major concern when analyzing international operations, is to find out what geographic markets are perceived as the most important ones, how foreign sales are distributed between them, and, in addition, if and what functions are located in these major export markets.

The Swedish market is reported to be on top in terms of importance as presented in Table 17. Sweden, USA and Germany have been reported as one of the three most important markets most often. As other most important markets were mentioned the UK, Norway, Estonia, Russia and France. The structure of geographic markets in 2003 was quite similar to the year before. However some changes, such as the growing importance of Sweden and the USA and the diminishing importance of Germany, took place.

Table 17. Three Most Important Markets

Rank	1st export country (n=76)	2nd export country (n=55)	3rd export country (n=45)	1st-3rd export country* (n=176)
1	Sweden 26 %	Germany 18 %	Sweden 20 %	Sweden 61 %
2	USA 21 %	Sweden 15 %	Norway 11 %	USA 41 %
3	Estonia 11 %	UK 9 %	USA 11 %	Germany 36 %
4	Germany 9 %	USA 9 %	UK 9 %	UK 27 %
5	UK 9 %	Spain 7 %	Germany 9 %	Norway 18 %
6	Switzerland 4 %	Russia 5 %	Australia 7 %	Estonia 12 %
7	France 3 %	Norway 5 %	Russia 4 %	Russia 11 %
8	Holland 3 %	Holland 5 %	Latvia 4 %	France 11 %
...	...	...	...	...
	100 %	100 %	100 %	300 %

\* Probability of being one of the three most important export markets

We found that exporting firms were generally focused only on one foreign market. In the sample of 56 firms, well over half of the export volumes came from single foreign market. The three most important countries stood for over 80 % of all exports. The concentration in a single foreign market has slightly increased since last year, even if the change is a small one. The concentration of exports for 2003 is shown in Figure 37.

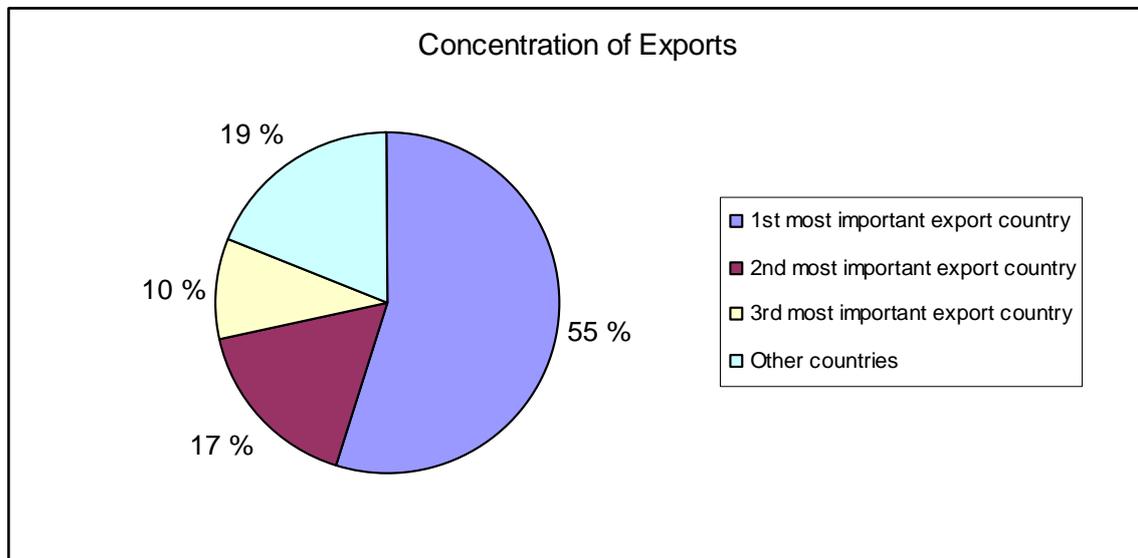


Figure 37. Concentration of Exports (n=56)

Figure 38 shows functional presence of firms in the three most important markets. Although most of the activities are generally organized and taking place domestically due to the generally small size of analyzed firms, many companies report on wide portfolio of functional presence also in their primary foreign markets.

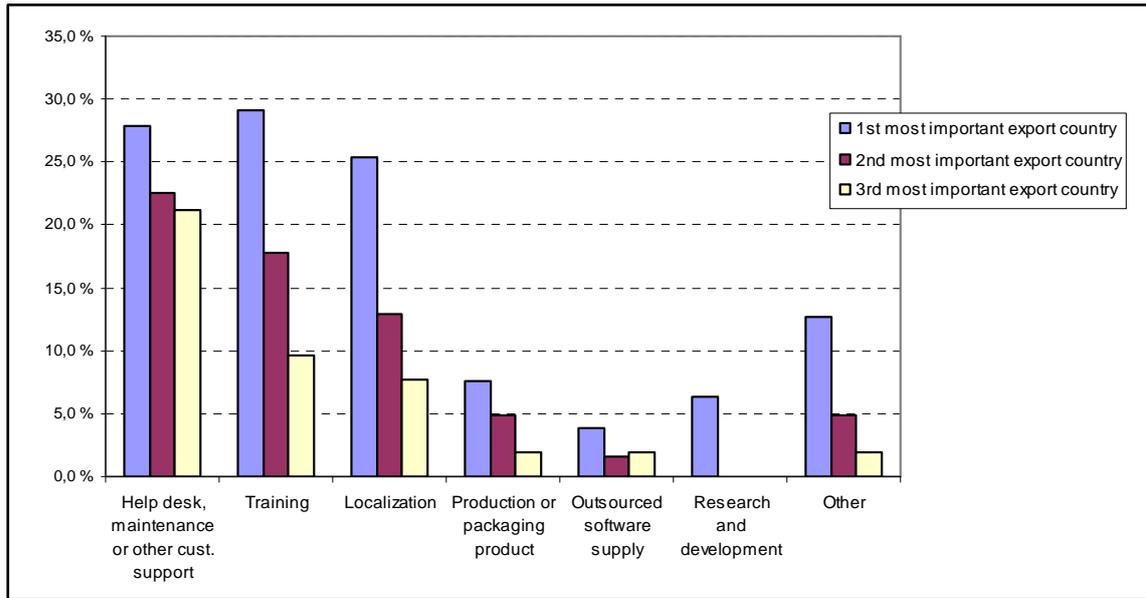


Figure 38. Functional Presence of Firms in Export Markets ( $n_1=79$ ;  $n_2=62$ ;  $n_3=52$ )

Help desk, maintenance and other customer support services took place directly in occupied markets in almost 28 % of the 1<sup>st</sup> most important export countries in sample firms, as was the case last year also. It was also the most common activity abroad in 2<sup>nd</sup> and 3<sup>rd</sup> most important export countries. Almost 30 % of the firms reported training activities and one quarter localization activities at their target markets. All these findings are in line with the fact that it is quite common in software industry that additional services including customer training, maintenance and multiple forms of customer support can unlock substantial value and bring corresponding revenue to supplier, and thus they are most often engaged in such activities.

On the other hand, other areas of foreign activity declined markedly from last year. This year only in 6 % of the cases research and development took place in the most important export country, which was the case for almost 27 % last year. Production and packaging was located in less than 8 % of cases directly in target market, while software was outsourced abroad by less than 4 % of analyzed firms. Over 40 % of analyzed firms have none of the above activities abroad. This may again reflect the increased share of small firms in the sample.

In functions such as training, localization, production and packaging and especially R&D it is noticeable that their share is much higher in the most important market while decreasing with every additional market, in the case of R&D to zero. This can be assigned to centralization of these on local basis and provided coverage to more than one country.

#### 4.5 International Operation Modes

In order to understand the means different groups of firms were using to direct their products and services to foreign markets, we have analyzed their international operation modes in terms of popularity and consequently built profiles of typical users for most common operation modes.

By far the most popular operation modes used for foreign sales, same as the year before, were direct export followed by foreign value-adding retailer or agent. Direct sales were reported by 76 % (60 % last year) of internationalized firms, while about 62 % (48 % last year) of them made use of retailer or agent. About one fourth of firms had their own foreign subsidiary, and 22 % of them were selling to OEM or under private label. Joint ventures, foreign wholesalers and bundle sales with foreign products were in Finnish software product industry used only rarely. The level of use of individual international operation modes is shown in Figure 39.

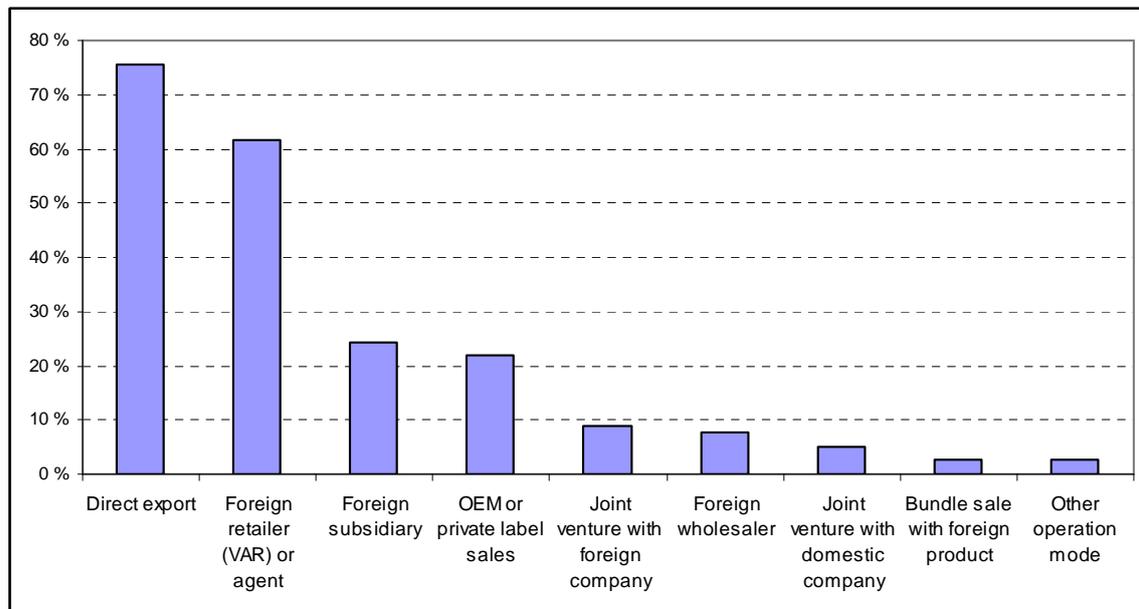


Figure 39. Frequency of Use of Alternative Operation Modes (n=78)

Direct sales was the most popular sales mode targeting on average 7 countries, as shown in Table 18. Typical firm using this operation mode was rather small in terms of revenue, had rather high expected growth, small losses, and only limited international operations both in terms of number of markets and share of revenue from them. In general, direct export seems to be a common mean for smaller firms with not fully developed internationalization.

Table 18. Firms' Characteristics by Operation Mode

International operation mode		Operation mode char.		General firm characteristics				Intl. operations firm characteristics	
		Share of firms used by	No. of countries operation mode used in	Revenues (2003) [M€]	Predicted growth (2003-2004)	Profit (2003) [M€]	Age [years]	No. of revenue gener. foreign countries (2003)	Foreign revenue share (2003)
Own direct export	Mean	76 %	7,0	4,8	43 %	-0,12	12,4	7,6	35 %
	(n)	(59)	(59)	(55)	(44)	(45)	(58)	(58)	(58)
Foreign retailer (VAR) or agent	Mean	62 %	6,9	5,0	32 %	-0,19	12,5	8,6	38 %
	(n)	(48)	(48)	(46)	(37)	(39)	(48)	(47)	(47)
Own foreign subsidiary	Mean	24 %	4,8	11,2	25 %	-0,78	15,1	11,7	49 %
	(n)	(19)	(19)	(18)	(13)	(16)	(19)	(18)	(19)
OEM or private label sales	Mean	22 %	2,4	4,8	33 %	0,73	10,9	9,6	46 %
	(n)	(17)	(17)	(16)	(12)	(12)	(16)	(16)	(16)

Foreign retailer or agent was also deployed on average in 7 revenue generating foreign markets. Typical firm had usually medium revenue, medium expected growth, and small losses.

A foreign subsidiary, an operation mode typically used by larger companies, was usually established in a little less than 5 countries. Such firms had rather small growth expectations, big losses and very high share of international revenue.

The fourth commonly used operation mode, OEM or private label sales, was usually used to cover large number of markets. Firms using this mode were rather young but having quite a high revenue, optimistic growth outlook, and rather high share of foreign revenue.

## 4.6 Resource Fit for Internationalization

The intention of this short subchapter is to analyze resources of sample firms from the perspective of their fit to international operations and to make some findings on general predisposition of Finnish software product industry firms to operate on foreign markets. The firms were asked to grade the fit of selected resources on 7-point Likert scale. The value seven represented a complete fit for international business, while the value of one for domestic one.

### 4.6.1 Internationalized firms

The chart showing distribution of grading by already internationalized firms is in Figure 40. Highest rating by far, on average 4.3 points, was given to the fit of current products and services for foreign markets, as was the case last year also, even if the grade was now much higher than last year's 3.9 points. The question whether most attractive risk-return ratio for existing resources could be achieved domestically or abroad as well as whether the knowledge, skills and motivation of employees focuses primarily on business on foreign or domestic markets were both graded 3.8 points. Last year they were both graded 3.2 points. Current customer and supplier relationships were as well slightly in favor of international operations receiving 3.7 points.

Growing of a business was considered to be slightly cheaper domestically as suggested by the 3.4 points it received. Reputation and brands were also graded in favor of domestic operations receiving 3.2 points. Last year also they were considered better suitable for domestic operations.

On average all grades rose by 0.6 points from last year, which represents a slight enhancement in fitness for international operations. The findings are well comparable since last year also the sample consisted of already internationalized firms. The distribution of grading in 2002 and 2003 by means is presented in Table 19.

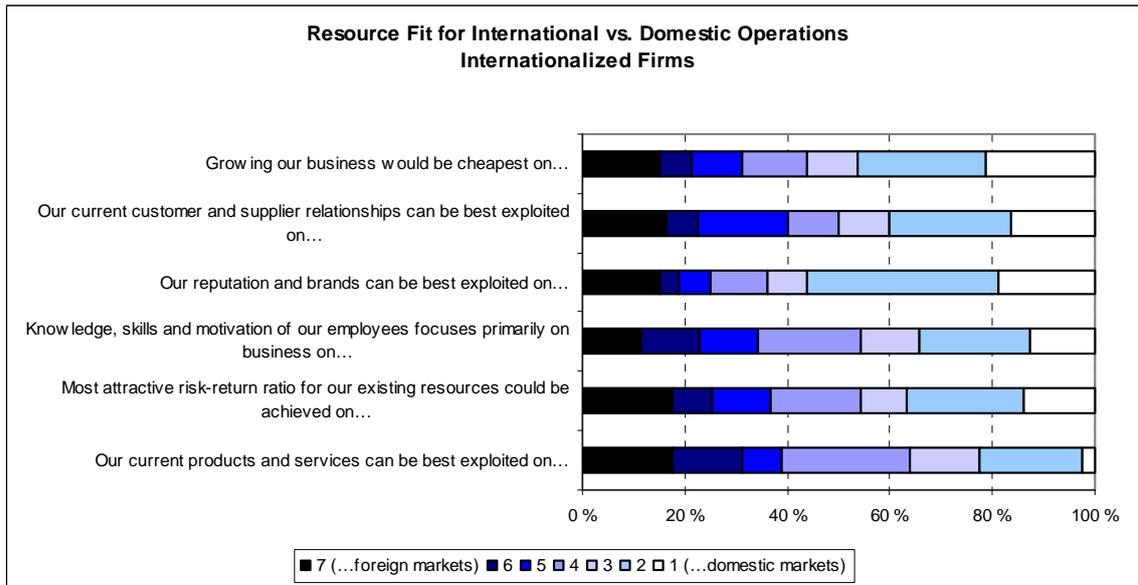


Figure 40. Fit for International Operations by already Internationalized Firms (n=79)

#### 4.6.2 Domestic firms

The distribution of grading by domestic firms differs a great deal from that by internationalized firms, as shown in Figure 41. The highest rating, only 3.0 points, was given to the fit of current products and services for foreign markets, as was the case among internationalized firms as well. The question whether the knowledge, skills and motivation of employees focuses primarily on business on foreign or domestic markets was graded second highest, receiving 2.6 points

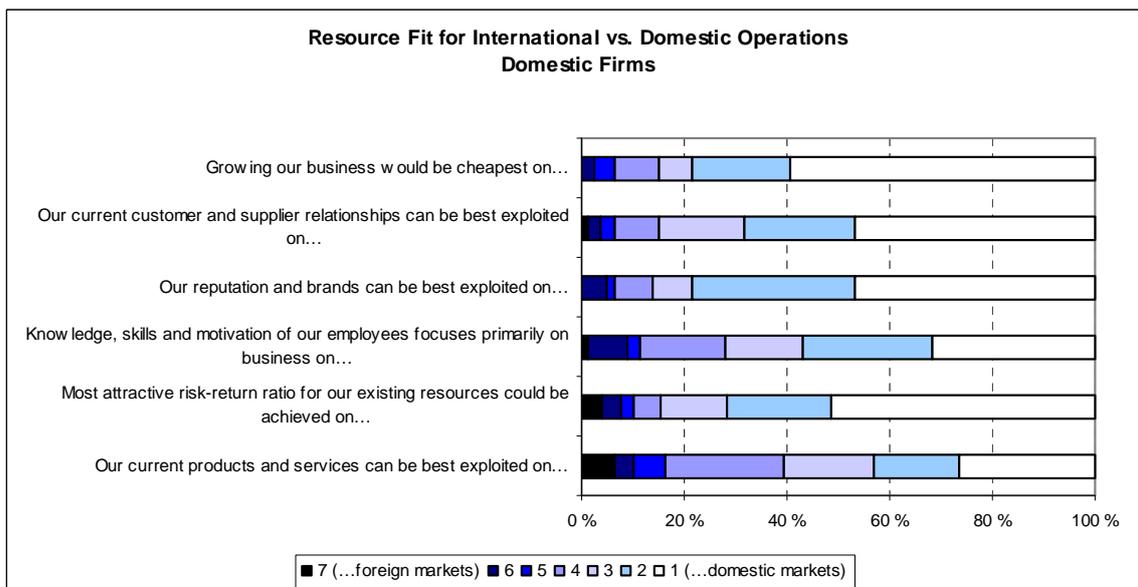


Figure 41. Fit for International Operations by Domestic Firms (n=79)

As suggested by the distribution of grading, the first two resources represent the best potential for internationalization, as the other resources were all graded 2.1 points or less.

Both domestic and international companies find growing of a business cheapest by far domestically. All in all, the estimated order of resources by fitness for internationalization is roughly the same for both internationalized and domestic firms, the difference being that the average ratings by domestic firms just are more strongly in favor of domestic operations.

Table 19. Distribution of Grading in 2002 and 2003 by Means ( $n_1=71$ ;  $n_2=79$ )

<i>Resource</i>	2002	2003	
	<i>Internationalized</i>	<i>Internationalized</i>	<i>Domestic</i>
Our current products and services can be best exploited on...	3,9	4,3	3,0
Most attractive risk-return ratio for our existing resources could be achieved on...	3,2	3,8	2,1
Knowledge, skills and motivation of our employees focuses primarily on business on...	3,2	3,8	2,6
Our reputation and brands can be best exploited on...	3,0	3,2	2,0
Our current customer and supplier relationships can be best exploited on...	2,9	3,7	2,1
Growing our business would be cheapest on...	2,6	3,4	1,9

## 5 FINANCING AND OWNERSHIP

The financing needs of Finnish software product companies are different compared to Finnish companies in general. The whole industry is young, dynamic and global by nature which makes it imperative for companies to internationalize rapidly, influencing the financing needs. These factors contribute to making the software product industry quite specific in terms of the investment opportunities the industry can provide and the resulting financial structures in the industry.

This chapter examines the typical financing sources for software product firms and what is the resulting ownership structure in the industry. We also examine the plans for the future of the firms to acquire external financing.

### 5.1 Ownership

The largely equity based financing reflected in the financial structure of Finnish software companies differs significantly compared to more established industries. In addition, the presence of different types of shareholders aside from founders can significantly influence strategic choices a firm has. Therefore, this subchapter will examine the typical ownership structure of the firms.

The average structure of ownership, classified according to the type of ownership, is presented in Table 20. The sample used for ownership structure analysis consists of 154 responding companies. The majority of the ownership was held by the founders and their family members, representing on average 69 % of the ownership. The second biggest share, about 11 %, was owned by management and employees followed by corporations with 8 %. Last year the second biggest share was held by corporations with an average share of 10 %, followed by management and employees representing an average share of 9 %.

On average in our sample, about 7 % was held by venture capital investors. Out of this, about 5.6 % belonged to private venture capitalists and less than 1.4 % to government VC investors. A share of 2 % was held by business angels, and remaining share was owned by financial institutions and other investors.

Table 20. Average Ownership Structure as of 31.12.2003 (n=154)

Type of ownership	Total
Founders and their family members	69 %
Management and employees	11 %
External individuals/ business angels	2 %
Private VC investors	6 %
Government VC investors	1 %
Banks, insurance companies and other FIs	0 %
Corporations	8 %
Other investors and shareholders	3 %
Total	100 %

From the perspective of the dynamics of the ownership, the strongly increasing share held by VCs compared to previous year should be noted. VC investors' ownership increased from the 3 % as reported in 2002 to 7 % in 2003, which represents a statistically very significant increase ( $p < 0.01$ ). The trend is quite opposite to what can be

identified from the previous year's survey. This could possibly indicate an increasing number of investments made into the sector during 2003 compared to 2002.

Another useful perspective to study the ownership structure is to group the ownership structures along their age. For this purpose, overall usable sample of 154 firms was divided into five groups according to their age. Each group contains between 17 % and 26 % of total available sample, except for the first group representing 14 youngest firms corresponding only to 9.1 %. Figure 42 presents the resulting average ownership structure as distributed along the firms' age.

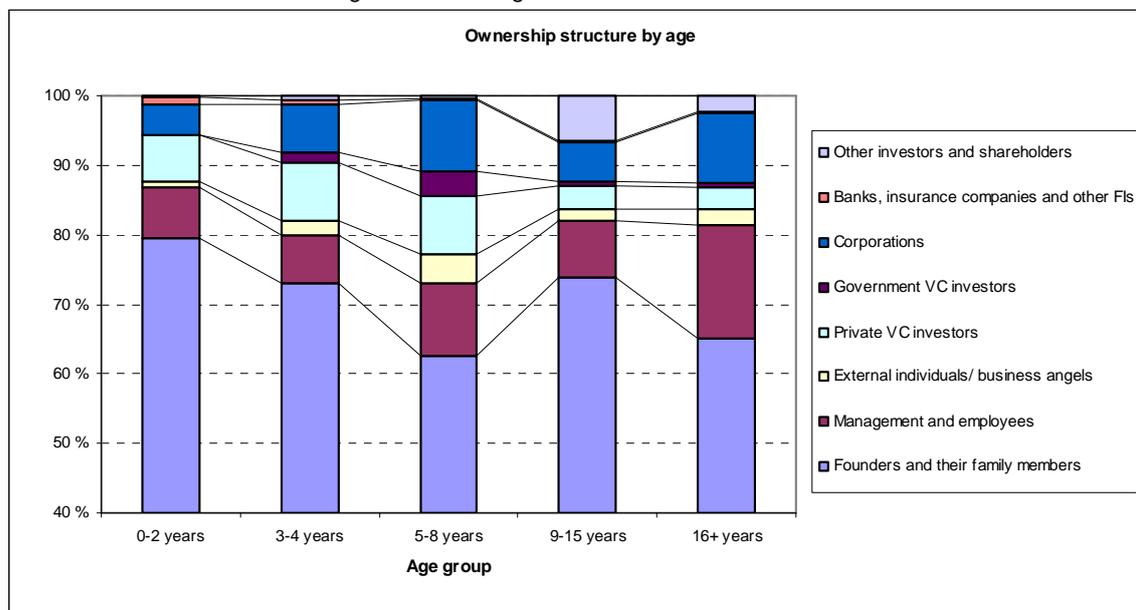


Figure 42. Ownership Structure by Firms' Age as of 31.12.2003 (n=154)

The ownership share held by founders and their family members in Finnish software product firms was strong and highly stable over the whole life cycle ranging from 62.5 % to almost 80 %. The ownership share of management and employees was also relatively stable over age groups, ranging from about 7 % to 16 %, and share held by external individuals, ranging from a little less than 1 % to 4 %.

A strong trend of decreasing share of VC ownership when firms mature noted last year, following the logic of risk capital, is less apparent in this year's survey. For the companies 2 years old or younger, private VC held on average only about 7 %, which was followed by 8.5 % held in firms of 3 to 8 years of age, and continued towards 3 % held in the group of oldest companies. Government VC investors had strongest ownership stake in 5 to 8 years of age firms, being 3.5 %. The previous year the share of government VC investors was strongest in 3 to 4 years of age firms. In the previous years' survey the ownership of banks and other financial institutions was present only in the group of oldest, most mature, and the least risk bearing companies and counted for almost 4 %. This year it is present in all age categories, and is strongest in the group of the youngest firms, being 1.1 %, and the second strongest in 3 to 4 years of age firms, being 0.8 %. In the three more mature categories ownership of banks and other financial institutions counts for only 0.1 % each.

Corporate ownership share was quite unstable in relation with the age of the analyzed firms. Starting from about 4 % for the group of the youngest firms, it went up to 10 % in 5 to 8 years old firms, and fell back down to less than 7 % for the second oldest companies in the sample. Unlike last year, the share of corporate ownership went back

up again in the most mature firms, being as high as 10 %, as opposed to last years' less than 7 %. Other investors and shareholders' share peaked in 9 to 15 years of firms' age reaching 6.5 %, then decreasing to 2.3 % for the group of firms of 16 years of age or more.

## 5.2 Access to Finance

The access to external financing is especially critical for dynamic young innovation-based industries. Most of the firms in the software product industry are young with extensive investments made into research and development while having yet limited or not any sources of internal financing. At the same time, high pressure on rapid expansion and internationalization even intensifies the urgency of need for external financial backing. Therefore, in this subchapter we will present how accessible firms find external financing, and what are the possible impacts of finance availability problems.

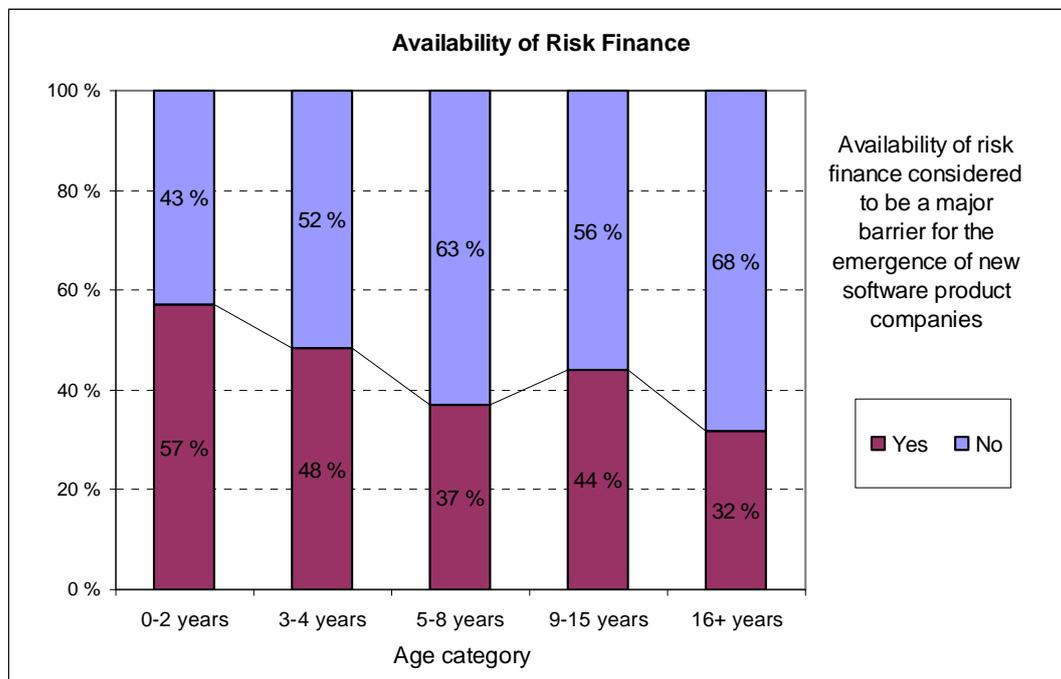


Figure 43. Opinion on the Availability of Risk Capital by Age (n=160)

On average, 41 % of the 160 firms considered the availability of risk finance to be a major barrier for the emergence of new software companies. As shown in Figure 43, there were clear differences in this perception based on the firms' age. Almost 60 % of companies 2 years old or younger perceived availability of risk finance as a major barrier. However, we did not find a strong relation between this perception and the location of the respondent firms.

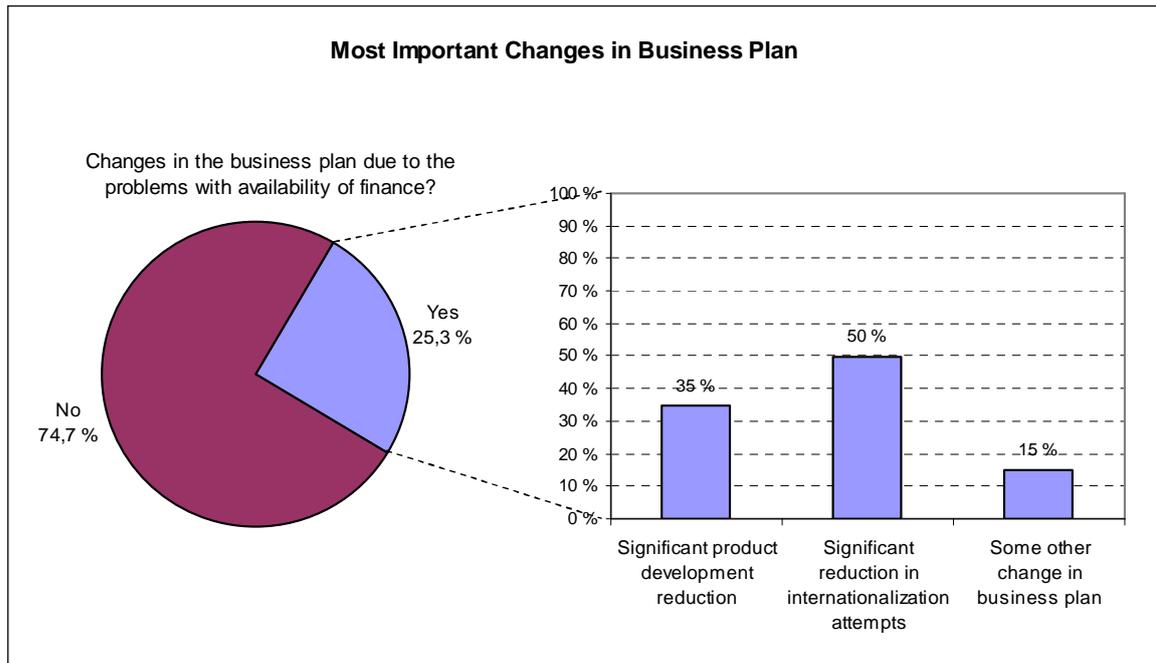


Figure 44. Availability of Finance and Impacts on Business Plan ( $n_1=261$ ;  $n_2=66$ )

On average 25 % of the 261 respondent companies (24 % in 2003) reported having been forced to significantly change their business plans due to problems in the availability of finance as depicted in Figure 44. For the majority of companies, access to risk capital is not a problem because of low growth orientation and thereby little need for external finance. However, for highly growth-oriented minority of companies that create the majority of growth and employment, access to risk capital is a crucial enabler of productization and internationalization. Of those companies that had to change their business plans because of problems in the access to finance, 35 % found the reducing of product development and 50 % the reducing of internationalization attempts as the most important change. The impact on internationalization attempts is strongest on firms of 16 of age or older, of which over 58 % reported having had to reduce internationalization attempts.

Although evidence from other sources would suggest the problems with access to finance being highest for young companies, we could not find a clear pattern in our data. A potential and worrying explanation is that capable entrepreneurs never started the venture they would have started if the financing were not a barrier. In other words, rather than finding companies of less than two years old complaining the financing problems changing their plans, we may just not observe the companies if they do not exist, i.e., the potential entrepreneurs changed their plans before starting the venture in the first place. The fact that 57 % of the youngest companies considered the availability of finance as a significant barrier for the emergence of new software product companies supports this explanation, even though the figure is significantly less than last year's 71 %.

### 5.3 Financing Plans

The focus of this subchapter is on firms' intentions to seek external financing, structure of financing intended to be sought, how are the financing plans influenced by firms' age,

revenue, profitability and growth expectations, and what are the reasons behind recent changes in plans for external financing.

41 % of the 163 responding firms planned to seek external finance within the next two years (2004-2005) as shown in Figure 45. This represents a very significant increase when compared with 31 % year ago and is close to 43 % two years back.

More than 88 % of firms declaring to seek for financing in next two years intended to raise additional equity based financing which is over twice as many as last year's 36 %. Over 42 % of these companies aimed to raise capital loans and also 42 % were planning to raise debt finance. Compared to recent financing plans, the reported plans for 2004-2005 were significantly more oriented on equity-based investments than on previously more common debt financing. Financing plans are also more fragmented than in previous years since over 17 % of firms declaring to seek for financing had planned to raise funding from all three categories. The external financing plans are being exhibited in more detail in Table 21.

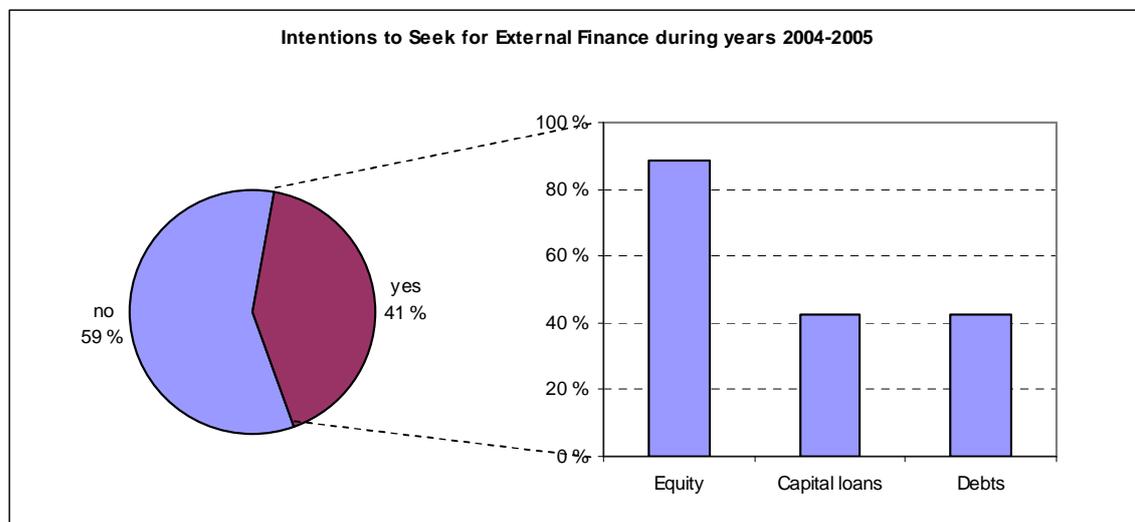


Figure 45. External Financing Plans (n=163)

Average value of equity financing aimed to be raised in years 2004 and 2005 for the companies intending to do so was 900 000 Euros. In the case of capital loans the average value was 440 000 Euros and for debt financing about 390 000 Euros.

Table 21. Detailed External Finance Seeking Structure

Source of Finance	Percentage
Equity only	37 %
Capital loans only	4 %
Debts only	4 %
Equity and capital loans	17 %
Equity and debts	17 %
Capital loans and debts	4 %
All finance sources	17 %
Total	100 %

In order to understand the typical profile and grouping of firms planning to seek external finance, we have structured firms' by age, revenue, profitability and growth expectations and compared proportions of them intending to seek external finance during 2004 and 2005 as presented in Figure 46.

The highest proportion of firms intending to raise external finance in the horizon of two years, almost 85 %, was in the group of firms being two years old or younger. This represents a significant increase compared to last years' 60 %. Plans to raise new external finance decreased rapidly when firms grew older being less than 28 % for firms 9 to 15 years old, even though climbing back to 33 % for the oldest category of firms.

When categorizing the companies by revenue, the most frequent plans for external financing were in firms having zero to 500 000 Euros of revenue, shared by the firms with a total revenue between zero and 150 000 Euros representing a proportion of almost 55 %, and firms having 150 000 to 500 000 Euros of revenue representing a proportion of over 51 %. This indicates an increase in willingness to raise external finance already in the earliest stage of development whereas last year the most willing companies were in the second category of total revenues. This may indicate an increase in firms' confidence to try to raise external finance without any reference sales. A very significant change was found in the category of firms having over 10M Euros in revenue where the proportion of firms intending to apply for external finance in the horizon of two years dropped to zero. Nevertheless, in this case it has to be noted that there were only nine responding firms in this category.

Profitability, measured by return on sales, had a slight negative relation with plans to seek for external finance even though the correlation was not as strong as last year. This year also, more than half of the firms with negative or zero cash flow intended to raise external finance, while this was the case of only 20 % of those having ROS (Return of Sales) between 5 % and 20 %. However, intentions to raise external finance climbed back to a little over 39% for firms having ROS higher than 20 % while last year this was the case of none in that category. This situation challenges the effect of internally generated financing displacing the demand for external finance that was clearly apparent last year. As expected, the plans to seek for external finance were strongly correlated with growth expectations for 2-year horizon measured by compound annual growth rate. External finance acquisition was planned only by 26 % of firms having expected CAGR (Compound Annual Growth Rate) between zero and 15 %, while for firms with expected growth of 80 % and more p.a. it was over 67 %.

Based on these analyses we can conclude that group of firms having highest interest in external financing consists of young firms with small but existing revenue, low profitability and very high growth expectations.

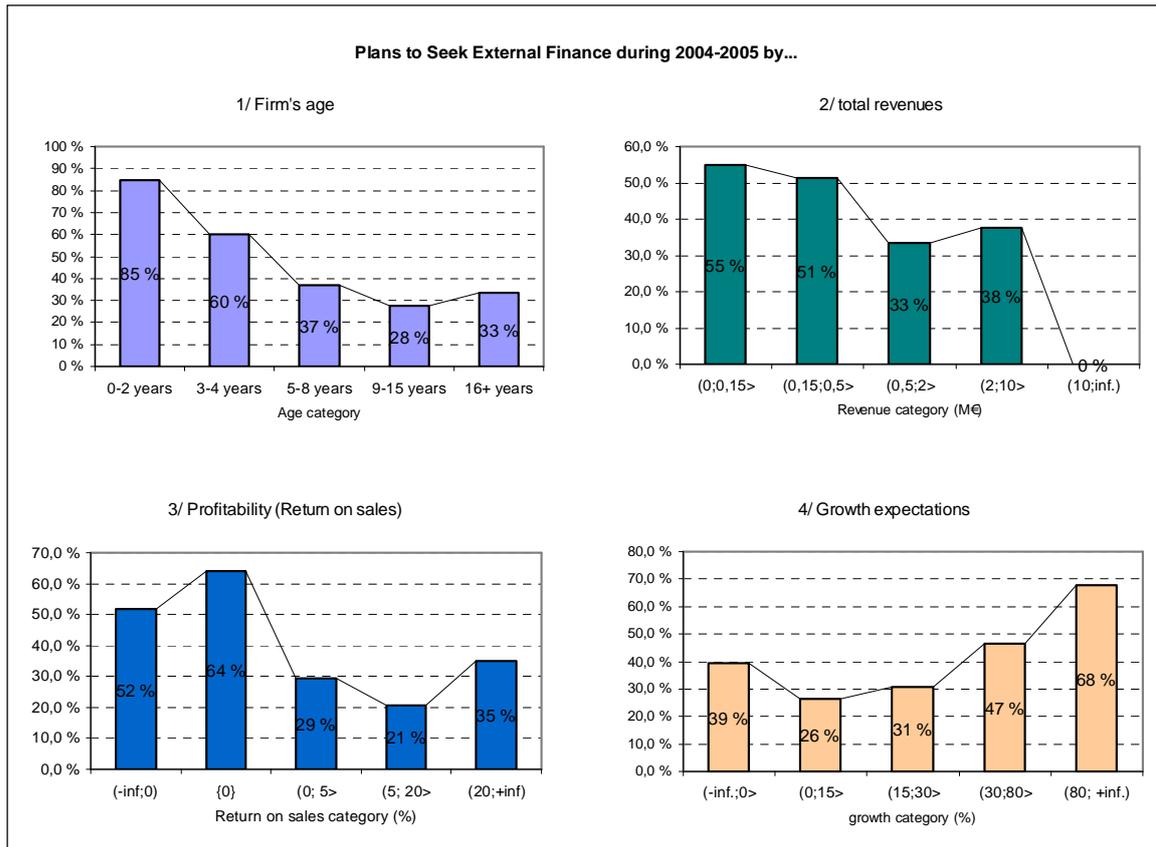


Figure 46. Plans to Seek External Finance by Age, Revenue, Profitability and Expected Growth ( $n_1=163$ ;  $n_2=150$ ;  $n_3=128$ ;  $n_4=134$ )

When looking at the structure of external finance planned to be sought, we can recognize also some interrelations especially with the revenue, age, and growth expectations of firms. Generally, small and young firms had much higher proportion of planned capital loan financing plans. With increasing maturity and revenue, capital loan plans were continuously replaced by debt financing plans. The equity financing plans were stable along the revenue and age. Growth expectations appeared to be an important determinant of the appropriate source of finance. Presence of different types of finance in plans for raising external finance based on growth expectations is shown in Figure 47. The data indicate that more stabilized firms with lower growth expectations tend to prefer debt financing. On the other hand, firms with high expectations for growth had much stronger presence of equity and capital loan financing in their plans.

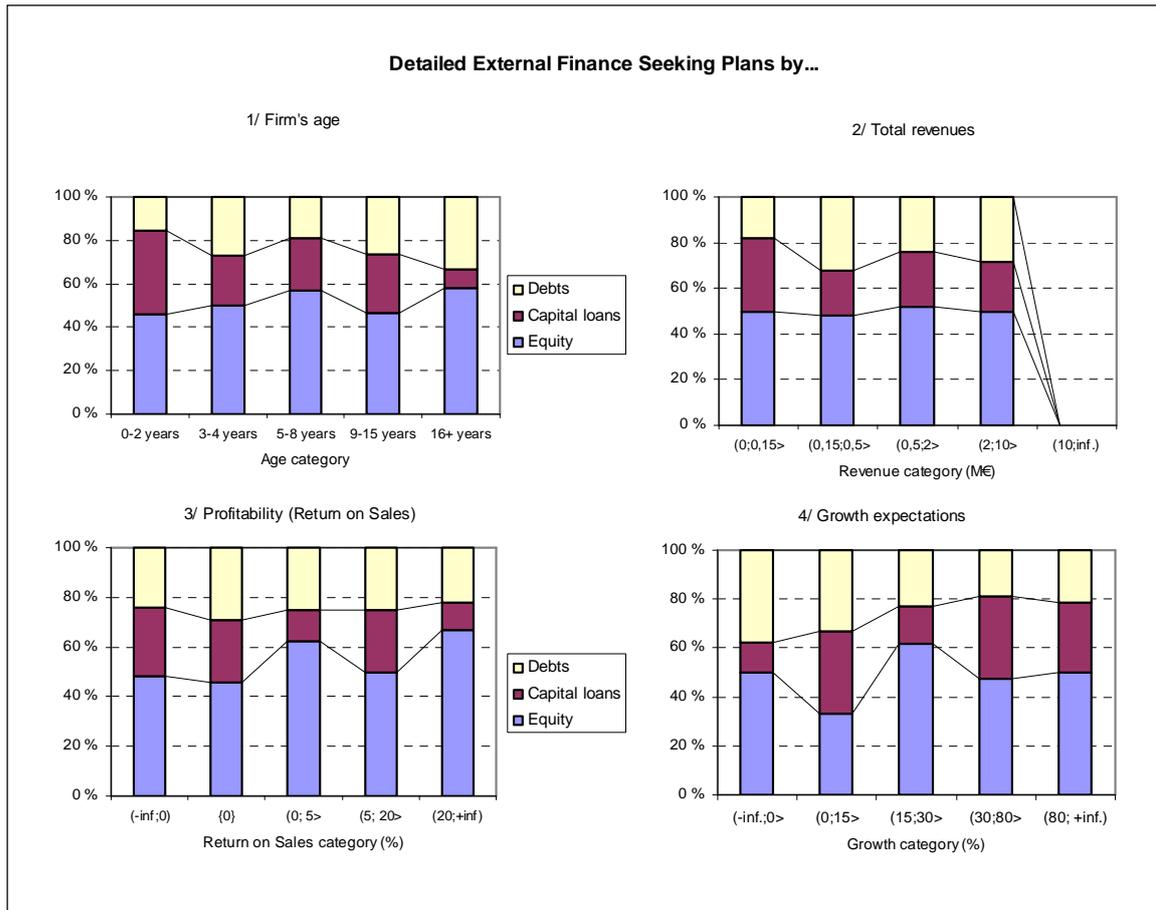


Figure 47. Detailed Plans to Seek External Finance by Age, Revenue, Profitability and Expected Growth (n=52)

These findings on structure dependence are coherent with financial theories suggesting that more mature and stable firms with lower risk are aiming to utilize financial leverage by employing debt instruments, which are reachable to them. On the contrary to that, highly risky young firms with hopes for rapid growth are limited in their choices and usually seek for financing on equity and capital loan markets.

As mentioned earlier, firms reported significantly more frequently their intentions to seek for external finance in two-year horizon when compared with the previous year. The 41 % share of firms intending to raise external finance is close to what it was in 2000, 47 %, and in 2002, 43 %. There are two major interpretations for this. Either firms have higher growth expectations and thus need more external financing to support their expansion, or external financing has become better available since last year. The comparison of external financing plans structured by growth expectations as in years 2002 and 2003 is presented in Figure 48.

The comparison chart suggests that both of these interpretations have empirical backing. While firms having prospects of negative or little growth changed their consideration for external financing upward, the firms with moderate growth expectations of 15 to 80 % limited their plans to raise external finance or kept them at the same level. The situation when firms reduced external financing plans, while having same growth expectations, indicates a decrease in the confidence on the feasibility of raising external finance. In addition to that, as indicated by population distribution curve on the chart, there has been a slight upward adjustment of shares of categories relative to growth prospects. The

proportion of firms grows with respect to growing expectations for future growth, the category with negative or zero growth making the only exception. Especially the proportion of firms with highest growth expectations has grown remarkably. The general adjustment has lead to increase of expansion financing demand and consequently to more external finance including plans.

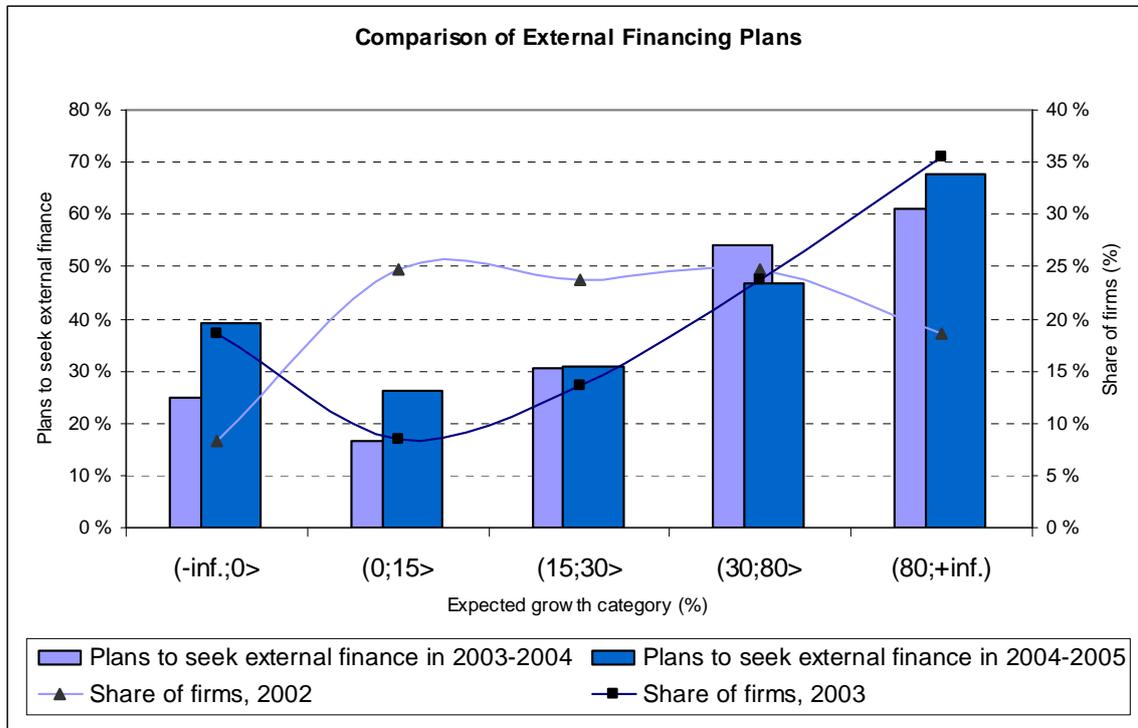


Figure 48. Comparison of Financing Plans between 2001 and 2002  
( $n_{2002}=97$ ;  $n_{2003}=59$ )

## 6 BUSINESS MODELS OF THE COMPANIES

A central issue for software product companies is the choice of business models with respect to the level of productization and the timely issue of how services are used to support the sale of products. This section describes the findings of the survey regarding the types of business models companies use.

### 6.1 Categorization of the Companies

In order to understand the various business models in use, we categorized companies into groups based on the degree of productization and the source of revenue (i.e. Hoch et. al. 1999, Rajala et al. 2001, and Cusumano 2003).

#### 6.1.1 Categorization Variables

We did the categorization of the companies according to two variables. The first was the degree of productization of the software offering; and second the share of pure product business, i.e., the percentage of revenue acquired from product licenses.

We asked the companies about the degree of their main offering's productization by asking how well the main product could be duplicated without customer-specific work. The degree of pure product business was measured by asking about customer billing; how many percents of total billing of an average customer delivery were based on product offering.

Based on answers to these two questions, we were able to categorize companies to four classes depending on the type of the business they practiced. We named categories to *product licensors*, *product integrators*, *solution consultants* and *product tailors* as shown in Figure 49.

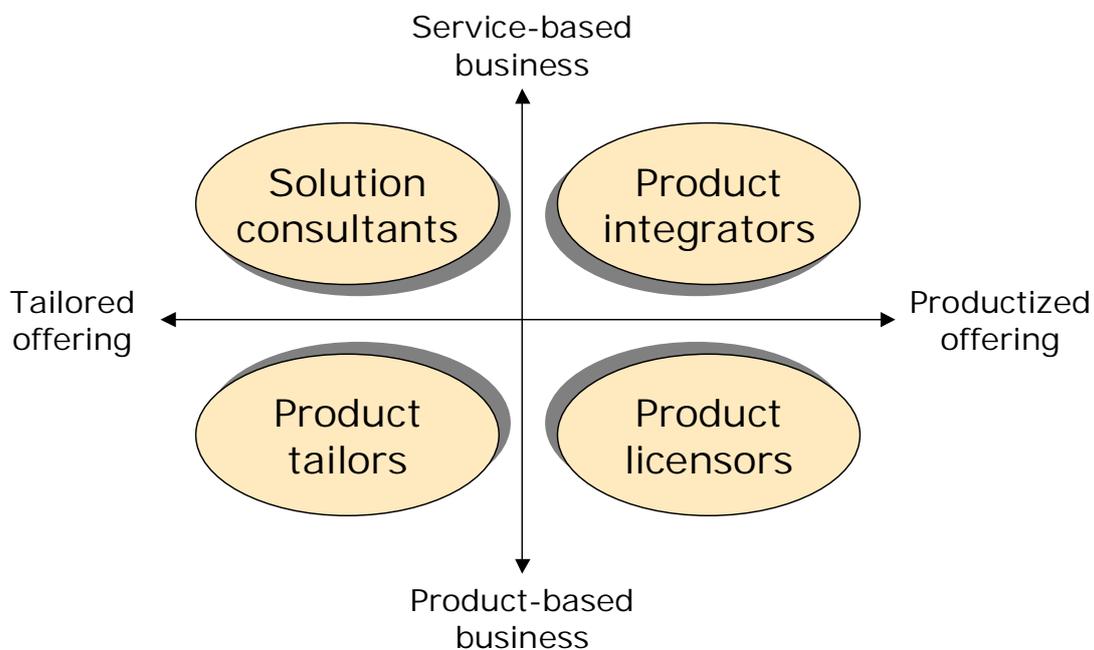


Figure 49. Categorization of Companies

We categorized all companies to one of these four groups. Finally, we had 44 product licensors, 46 product integrators, 47 solution consultants, and 26 product tailor companies.

### 6.1.2 Categorization Criteria

We selected product licensor companies to consist of those that had more than 60% of their product business revenue acquired from product licenses and whose product could be duplicated without hourly-based-billing to customers “quite often”, “often”, or “always”. Product licensor companies base their product business on product that is highly productized and most of the revenue is obtained through licenses, thus the name “product licensor”

A company was considered a product integrator if it had 60% or less of their product business revenue acquired from product licenses; and products that could be “quite often”, “often”, or “always” duplicated to different customers without hourly-based-billing. Product integrator companies’ customers are mainly enterprises and they emphasize services in their offering and often integrate their offering to customer’s environment. This is why they are named as “product integrator” companies.

We considered a company a solution consultant if it had less than 40% of its product business revenue acquired from product licenses; and product that “could not be at all”, “could not be almost at all”, “could be only very limitedly” or “could be only in some extent” duplicated to different customers. Solution consultants had more revenue acquired from services than product, thus the name “solution consultants”.

On the contrary to solution consultants, product tailors were defined to earn 40 % or more from product licenses; and to have equally low level of productization of their offering as solution tailors. Thus both solution consultants and product tailors had to do customer specific tailoring work to duplicate the product to different customers. Because main revenue of product tailors was product, but still they had to do tailoring work, we named them “product tailors”.

### 6.1.3 Description of Categories

Based on variables according to which the categorization was made, we can describe the groups on a high level:

- Product licensor companies are companies that have a highly productized software offering and that focus their business to develop and sell the product. These companies are in the “purest” end of software product business and often expected to have high growth potential.
- Product integrator companies also have highly productized software, but the software is only the core of the offering, services being the main part of it. Services consist of user training and maintenance to name but a few.
- Solution consultants have product with low degree of productization and, thus, they have to do much tailoring work for each customer. Thus their business is in the “impurest” end of software product business. Solution consultants are counted as product business because the core of their solution is based on product.
- Product tailors are companies whose business revenue is based on product licenses but whose product still has a low degree of productization. Thus,

some of their revenue still base on product tailoring and customer specific projects.

To find out more interesting characteristics about these groups, we outline their differences in following chapters based on the survey data.

## 6.2 Key Figures

### 6.2.1 Revenue and Profit

In Table 22 we can see that companies with a high degree of productization have, on the average, higher revenue. Their revenue per employee is about the same as that of those companies with a lesser degree of productization. The differences are suggested to mainly be due to the fact that in product licensor and product integrator categories several companies are large, whereas in low productization categories there are fewer large companies.

If we compare median revenue in categories with same degree of productization (i.e., product licensor to product integrator and solution consultants to product tailors) we notice that categories with more emphasis on services have more revenue. This trend has been recently noted by key authors of the software business area, including Cusumano (2004). Neither median revenues nor median profits give hints about profitability being notably better in any group. Looking at the median revenue, we also note that the majority of software companies are relatively small in each category: half of all the studied companies had revenue less than 300 000 (Euros) in 2003.

Table 22. Revenue and Profit

Company type	Average revenue (M Euros)	Average revenue (M Euros)/ employee	Median revenue (Euros)	Median profit (Euros)
Product licensor (n=37)	2.55	0.08	660 000	40 000
Product integrator (n=41)	3.90	0.07	945 000	10 000
Solution consultant (n=41)	1.49	0.07	400 000	22 500
Product tailor (n=26)	1.26	0.09	500 000	0

The low revenue per employee ratio implies that in every group the amount of companies still in first product development phase is lowering the averages.

### 6.2.2 Personnel and Ages of Product Businesses

Table 23 indicates that company categories with productized offering have, on the average, much more personnel than companies with lower degree of productization. However, median number of personnel is relatively small in each category, with the highest number occurring in the product integrator category, which has been typical during the previous years.

In 2003, an interesting result was that businesses whose income is product-based were youngest companies both in median age of company as well as in median and average age of product business. This is no longer true, but now product-based and service-based businesses are mixed in terms of these age results.

Table 23. Number of Personnel, Age of Company and Software Product Business

Company type	Average number of personnel	Median number of personnel	Median age of company	Median age of software product business	Average age of software product business
Product licensor (n=44)	24	8	9	7	8
Product integrator (n=46)	39	15	6.5	5.5	10
Solution consultant (n=47)	19	6	12	8	9
Product tailor (n=26)	12	8	8	5.5	8

Product integrator and product tailor companies are the youngest groups in terms of the median age of software product business. This position used to be held by product licensor companies.

### 6.3 Actual and Estimated Growth

We studied realized and estimated growth based on common data from years 2003 and 2004 which made our sample small, containing only seven companies in the solution consultant and product tailor groups. Thus, results in this chapter are directional.

In Figure 50 and Figure 51, we show average and median growth of sample product businesses. Whereas these businesses did not grow between 2001 and 2002 in median, they grew on average, implying that the largest companies have grown the most. Now (2002-2003), median growth has been highest in the product tailor group, and the average growth has been highest in the product integrator group. Noticeably more growth is expected from the next year both in terms of average and median growth. (Last year, a high median growth was expected but not a high average growth. The expected median growth was realized to a notably lesser extent than estimated beforehand.)

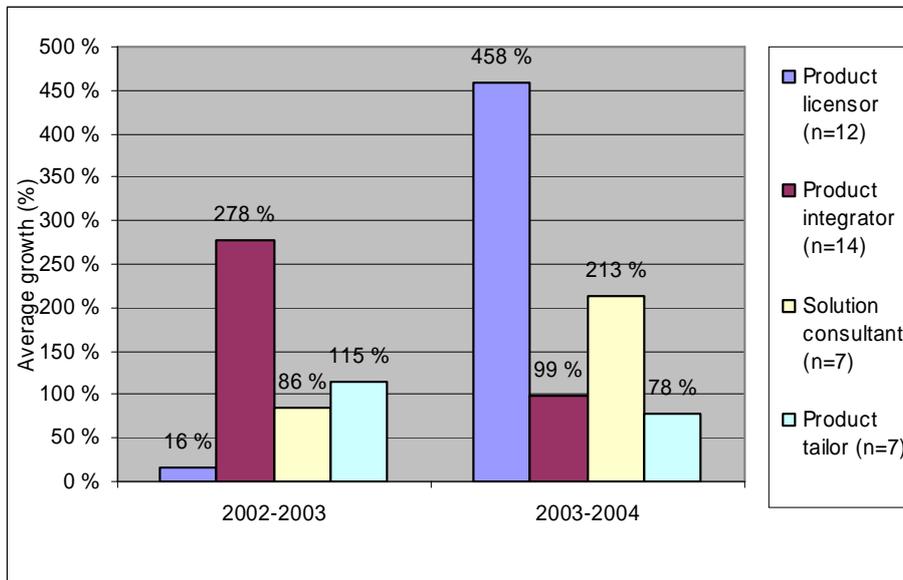


Figure 50. Actual and Estimated Average Growth of Sample Businesses between 2002-2003 and 2003-2004

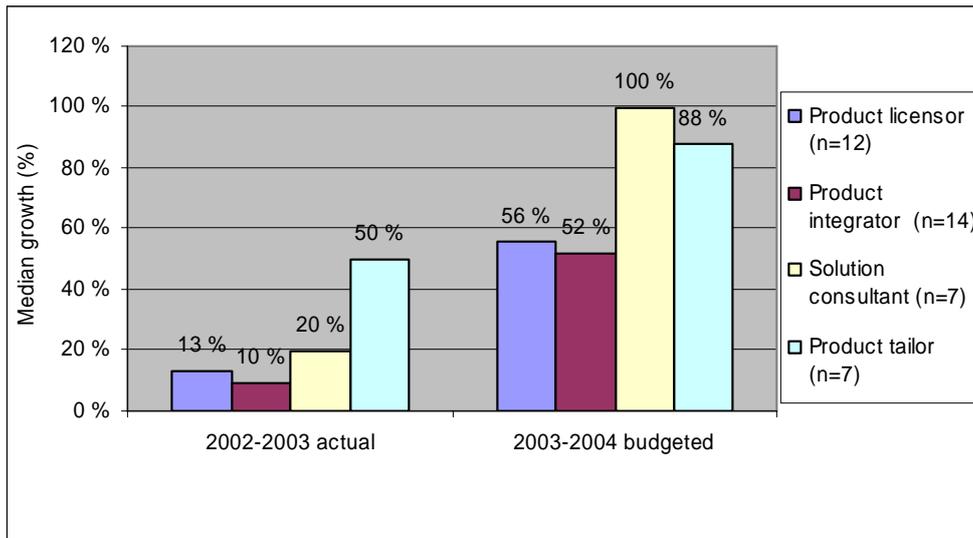


Figure 51. Actual and Estimated Median Growth of Sample Businesses between 2002-2003 and 2003-2004

### 6.3.1 Actual and Estimated Gross Profit

The median company in each group, with the exception of the product tailor group, has had a positive gross profit figure. Product licensor companies had 10% gross profit, being the most profitable category. All groups saw their future positive and believed to be able to raise gross profits –even up to 13% by solution consultant and product tailor companies. Especially the product integrator and product tailor groups viewed the year 2004 future as bright compared with the year 2003.

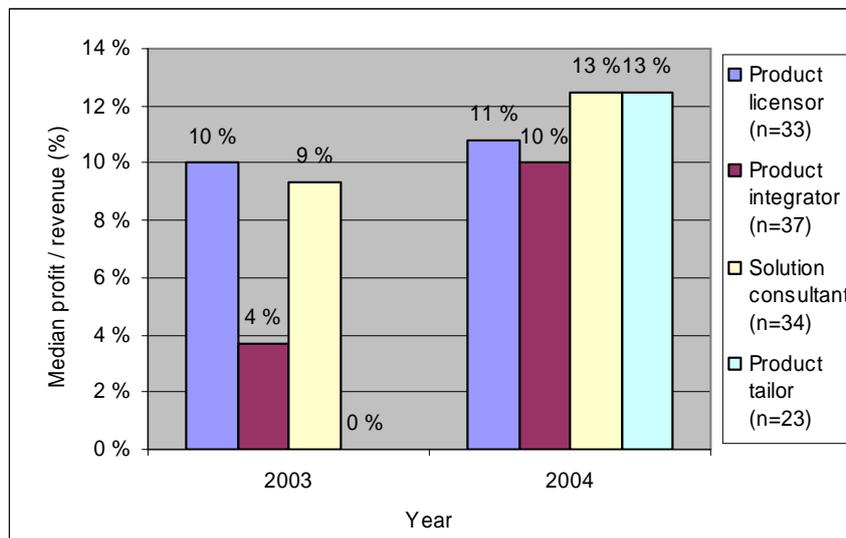


Figure 52. Actual and Estimated Median Profit/Revenue in 2003 and 2004

## 6.4 Business Figures

### 6.4.1 Revenue

Product licensor companies have on average more than 80% of their total revenue acquired from license selling and renting whereas product integrator companies' business is less than 40% product-based. This figure is less than 20% and somewhat more than

60% for solutions consultants and product tailors, respectively. With product integrators, solutions consultants, and product tailors, the share of customer projects and tailoring of the total revenue is significant. With product integrators, this share is about 25%, with solutions consultants as much as about 50%, and with product tailors about 15%.

Solution consultant companies obtain only 12% of their revenue from license sales and their main source of revenue is product based customer projects and tailoring. Compared to solution consultants and product integrators (the groups labeled as having a “service-based business model” in this report), product licensors and product tailors expectedly obtain a significantly high share of their total revenue from license selling and renting. Breakdown of main product’s sales revenues are presented in Figure 53.

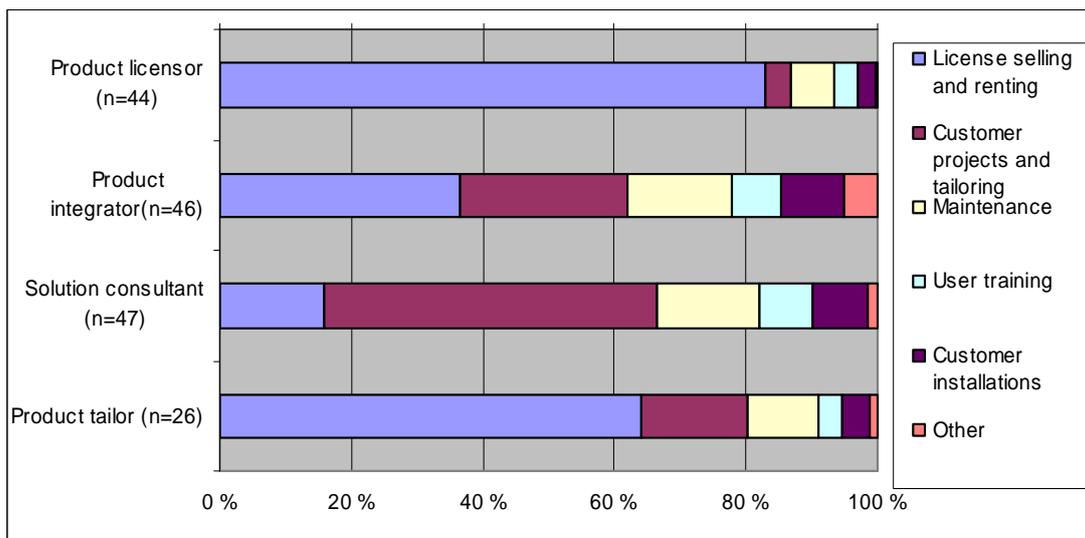


Figure 53. Composition of a Typical Delivery of the Main Product by Software Product Business Revenue in Different Groups

It is worth mentioning that in software business new or newish ideas for revenue logic models are quite possible to employ, e.g., distributing licenses to a large number of customers for free and then charging for training or employing the various revenue sources of open source models. However, there were only a few cases indicating the use of a nontraditional revenue logic.

#### 6.4.2 Personnel

Studying companies’ business revenue provides traces about the allocation of personnel to the functional areas of companies: companies with product-based revenue have a higher percentage of personnel working in product development than do other companies. Their second largest function is sales and marketing. Companies with service-based revenue have also most of their personnel working in product development but the second largest function is services and delivering. The allocation of personnel is presented in Figure 54.

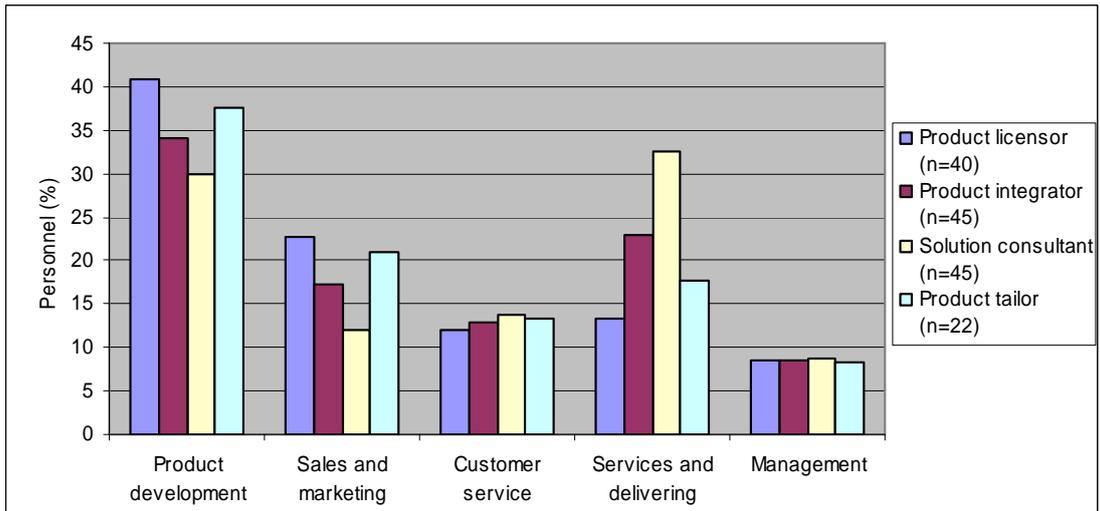


Figure 54. Distribution of Personnel between Functions

### 6.4.3 Sales and Distribution

All groups used direct selling very often. Companies with a high degree of productization used also resellers and agents, which apparently was made possible by their highly productized offering.

Using a reseller's brand to sell the product or selling product as a part of reseller's product was only used in few cases and the same holds true with bundling and wholesalers. Majority of companies in all categories did not use these sales channels in any situation.

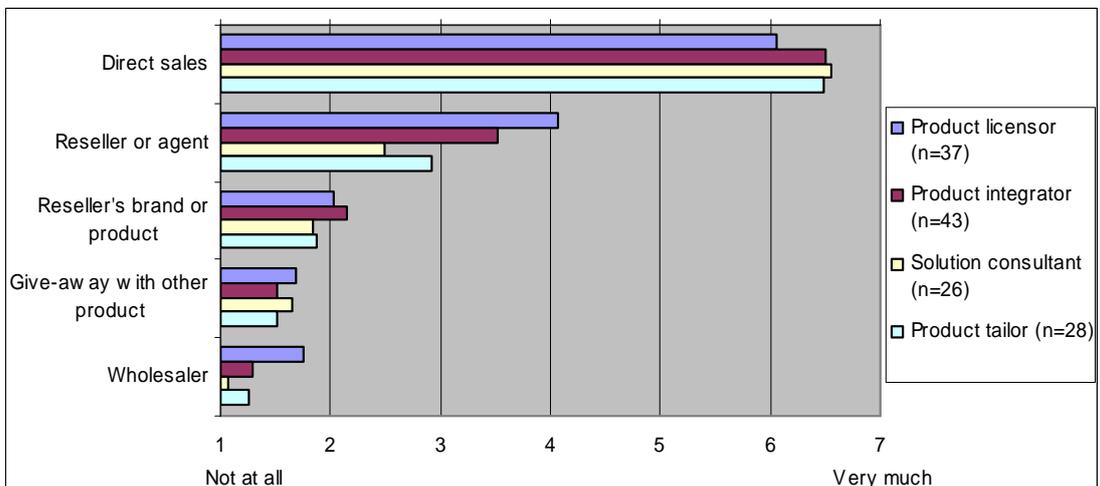


Figure 55. Average Sales Channel Use by Each Category

Electronic delivery through the Internet is the most popular delivery means in all but the solution consultant category. Businesses having a high level of productization used electronic and CD-ROM delivery more often than businesses with a low level of productization.

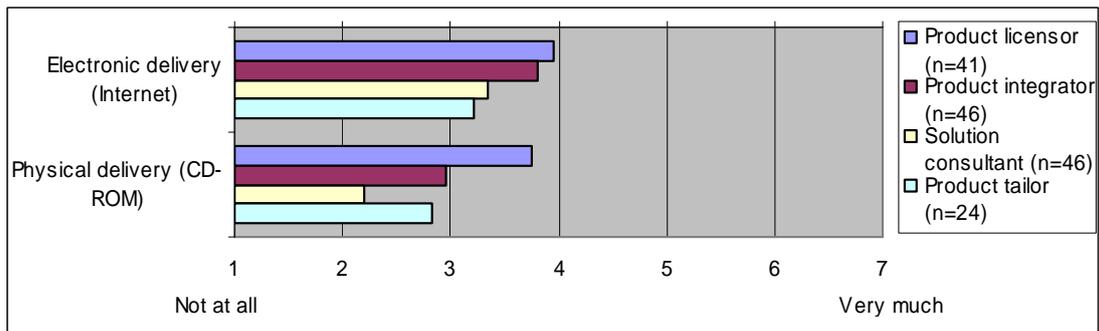


Figure 56. Average Use of Internet and CD-ROM Delivery by Each Category

Only product licensor companies use more extensively delivery methods that can exploit the idea of duplicating the software. Even so, even product licensor companies often have value-adding services that cannot be “shrink-wrapped” and delivered to customers as is.

#### 6.4.4 Customers

The majority of the business is done with other companies and public administration in every group whereas private consumers are the most unusual customers. Product integrator companies had the largest private consumers-share.

Table 24. End Users by Different Groups (Dichotomy Label)

End user	Type of the company			
	Product licensor	Product integrator	Solution consultant	Product tailor
Micro Enterprise	30 %	15 %	9 %	8 %
Small Enterprise	48 %	48 %	51 %	23 %
Medium Enterprise	50 %	62 %	68 %	46 %
Large Enterprise	52 %	57 %	57 %	46 %
Public Administration	36 %	39 %	30 %	31 %
Private consumer	11 %	15 %	2 %	12 %
Total	227 %	236 %	217 %	166 %
Number of cases	44	46	47	26

Companies with a lower degree of productization were most dependent on their key customers: product tailors had 40 % and solution consultants on average 32 % of their revenue acquired from their largest customer. Product licensor companies had an average of 27 % and product integrator companies just 23 %. The average of product licensor companies is relatively high, which could be explained with the fact that some of the companies have not yet fully had a break through in the markets.

#### 6.4.5 Financing

Lack of finance had affected on average one in four software product businesses. More specifically, we asked the companies if the lack has affected their productization, international efforts or something else, the last of which we left open. Significant reduction in both internationalization ability and product development ability were observed as can be seen in Figure 57. Other most often mentioned consequences were the changes in scheduling of the business operations and concentration to selling.

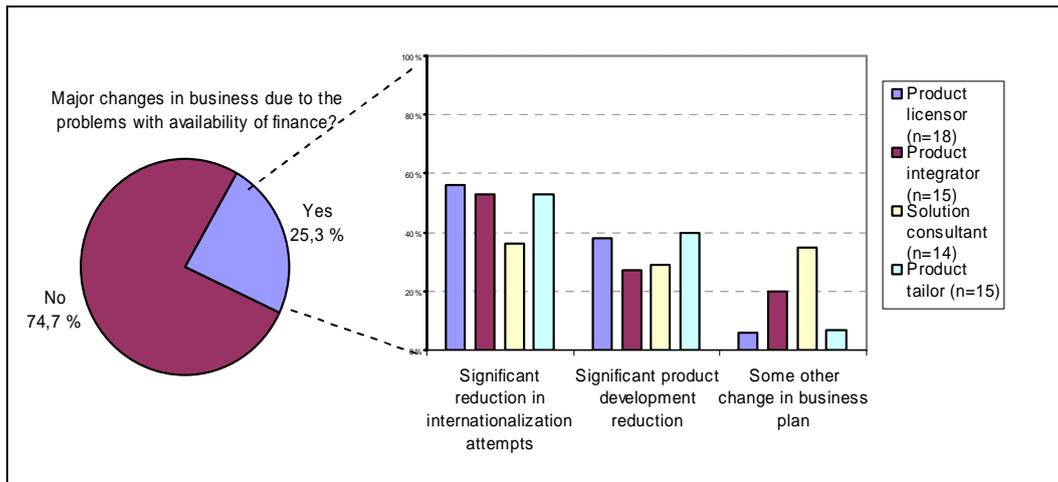


Figure 57. Consequences of lack of finance

In 2003, the degree of productization appeared to be closely linked to the internationalization capabilities of a company so that companies with a highly productized offering had significantly reduced their attempts at internationalization, but now the difference has settled so that the advantage is noticeably smaller.

## 6.5 Main Product

### 6.5.1 Characteristics of Main Product

The most considerable differences in characteristics of main products' business were that products with high productization degree were most often associated with leveraging that productization. Prevalent was that companies thoroughly knew the properties of their markets and users and that they tried to leverage the degree of productization.

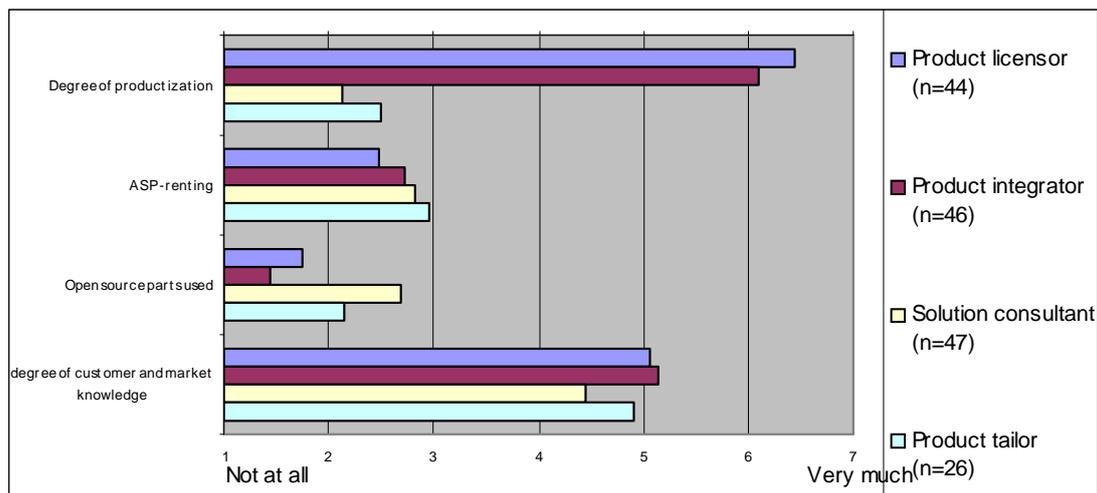


Figure 58. Characteristics of the Main Product's Business

### 6.5.2 Releases

Releases of the main product were done most often based on customer need in the case of companies with a low productization degree, and on an irregular basis or on a pre-defined basis by high-productization degree companies. Low productization degree companies were expectedly those that had marked that they release "in every customer

delivery". Solution consultants, expectedly, only rarely did releases on a pre-defined basis. The basis of release was asked at a dichotomy label and the reason for a release is often a combination of several factors. Release strategies are presented in Figure 59.

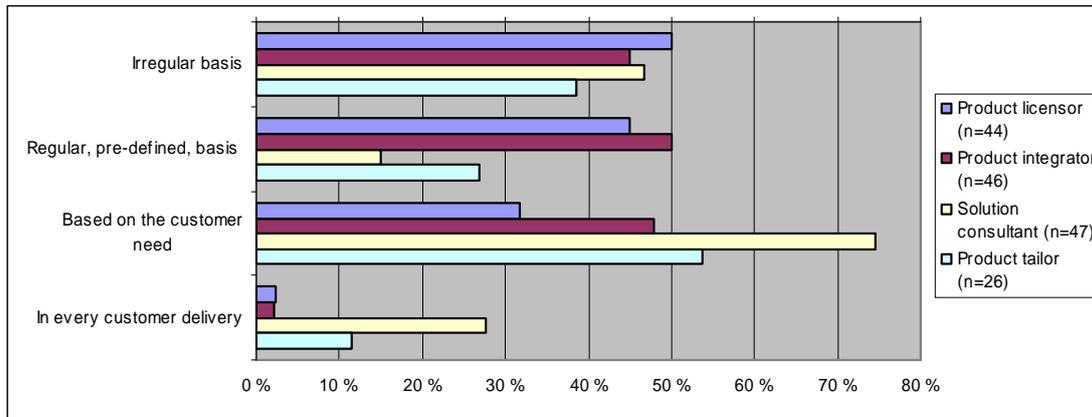


Figure 59. Release strategies for main product by different groups (dichotomy label)

### 6.5.3 Product Development Investments

There are huge differences in investment to product development between categories and especially between companies: for instance, in 2002 a product licensor company had invested two times and another product licensor company four times their revenue to product development.

Product licensor companies and product tailors, companies that get most revenue from product, were also the most eager to invest on product development. However, for the year 2004, it is estimated that product licensors will fall behind product integrators. In 2003, we made the observation that younger companies and younger product businesses invest more in product development than do older companies and product businesses. This might explain in part the general decrease in investments from 2003 and 2004, a trend that was also visible for the years 2002-2005 in the 2003 survey results that presented 2002 actual figures and estimates for 2003 and 2005.

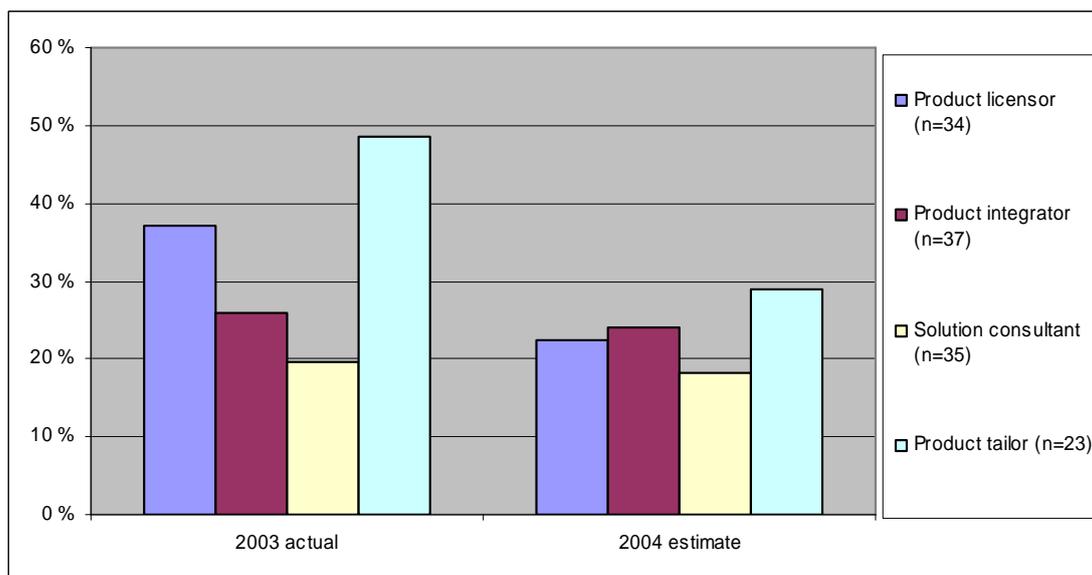


Figure 60. Product Development Costs as Percentage of the Total Revenue

## 6.6 Internationalization

### 6.6.1 Number of Countries

More than half of the companies in each category except product licensors were domestic in their product business. All groups had roughly 30% of companies in which the number of foreign countries where the company ran operations was 1 to 5. Notably in the product licensor category, there was a significant share (nearly 30%) of companies that had product business in more than 5 countries abroad. In the rest of the categories, less than 15% of the companies had product business in more than 5 countries abroad. Only the categories with a high degree of productization had companies with product business in more than 20 countries abroad. The observation that product licensor companies are the most international ones has been often documented in prior studies.

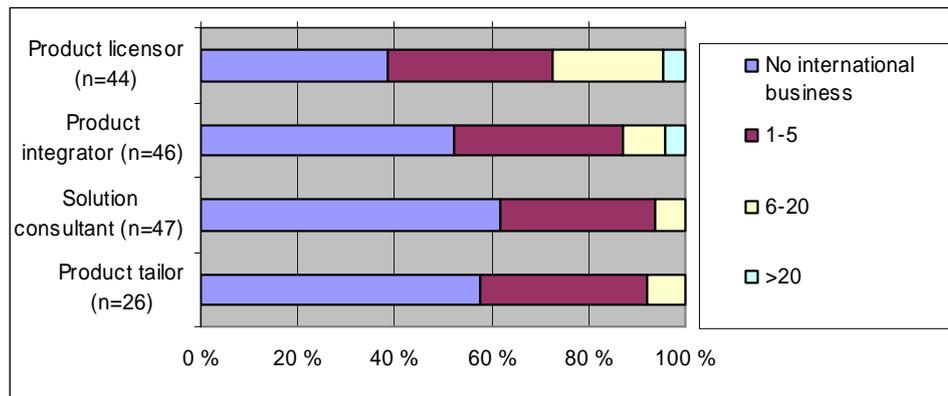


Figure 61. The Number of Foreign Countries in Which the Company is Running Product Business

### 6.6.2 Internationalization Strategy

A direct sale, most used in domestic sales, was also the most used sales strategy in international markets in all categories. Reseller or agent was the second most used sales strategy. The strategies of selling under a reseller's brand or product, and subsidiary and joint venture were only rarely used compare with the two strategies mentioned above. Selling under a reseller's brand was most notably used by product integrators. A subsidiary strategy was most notably used by companies with a high degree of productization. The prevalence of a joint venture strategy was strikingly common with product tailors compared with its prevalence with the three other categories.

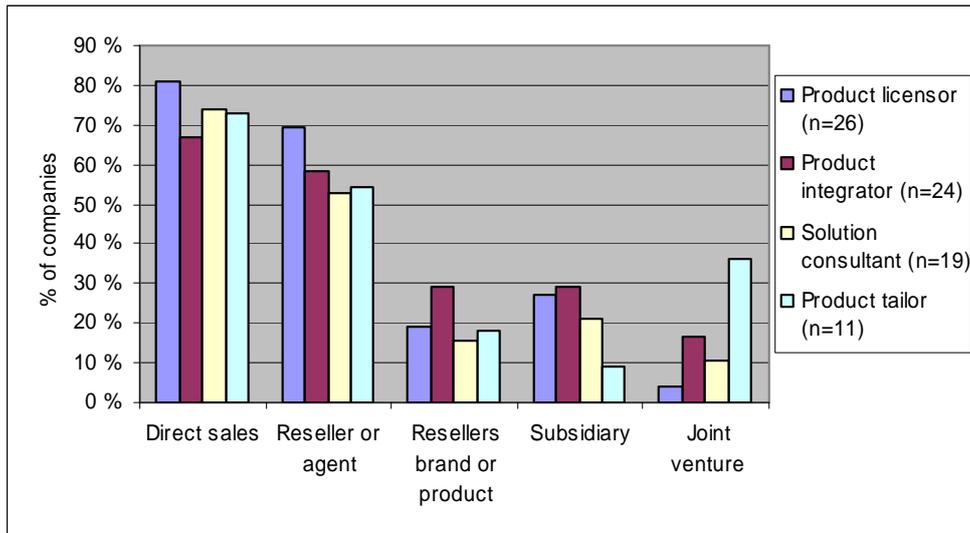


Figure 62. Percentage Used Sales Strategies of International Companies

## 6.7 Conclusions

To conclude the chapter on business models, it is reiterated that we classified companies to four groups: product licensor companies, standard solution (“product integrator”) companies, solution consultant companies and product tailoring companies. The grouping was based on the degree of productization employed and the share of product-based business of total business. Common characteristics of the four groups are outlined in Figure 63.

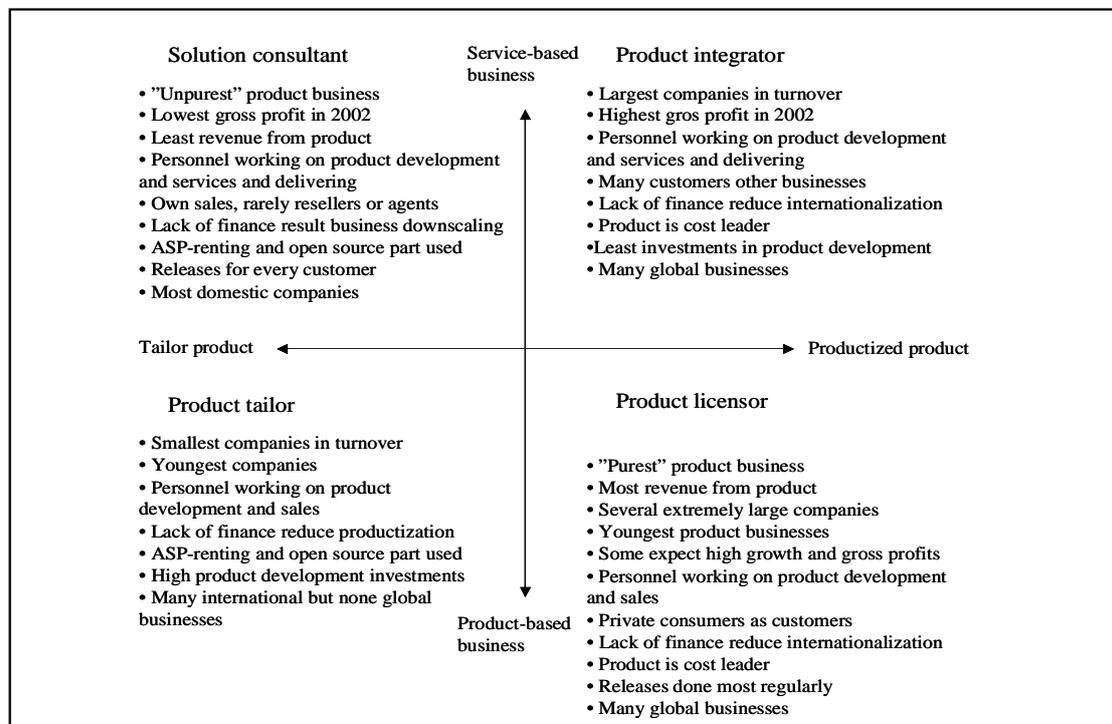


Figure 63. Categorization of Software Product Businesses

All groups were internally diverse: each had both small and large companies as well as both profitable and non-profitable ones. However, the groups have their special characteristics that underlie this fourfold clustering and that were important to our analysis in this chapter.

## 7 CONCLUSIONS

### 7.1 The Current State of the Finnish Software Product Industry

The Finnish software product industry's revenue remained at 1 billion Euros in 2003. In 2004, companies are still expecting to continue their growth and expectations for the future are regarded more positive as some years ago. Companies' profitability increased from the previous year and amount of employees in software product business increased at the same time. In particular small companies increased their revenues and personnel. We have observed many positive signs of development of the Finnish software product industry in 2003. However, we have observed also that Finnish software product industry has still the same main challenges as in previous years. Despite the fact that there are already some fully internationalized and mature companies, majority of the companies are still rather immature. This can be seen in moderate revenue, in low revenue per employee ratio and in low degree of productization. According to this survey, many companies are still in a relatively early product development phase and majority of internationalized companies have very low share of revenues coming from abroad.

Raising the degree of productization is one of the most important issues for software product companies. At the difficult economic times, this is especially challenging, as companies have to find a balance between long-term productization aims and short-term need for cash (often done by customizing and customer projects). In order to find a balance, good and clear vision and strategy for the products and business is needed in addition to suitable and flexible software production processes.

Current capital market situation is particularly limiting the operational possibilities for young companies which are developing their first software product. However, software products are difficult to produce without capital, which enables companies to focus on developing the product instead of doing customer projects. An increase in external financing plans due to the increased growth prospects emphasizes even more the crucial role of the venture capitalists and the public capital.

### 7.2 Points to Consider

The study brought up some issues that we think need further discussion. These included financing, raising the degree of productization and mastering product development, networking, and internationalization. In the following sections we discuss each of these issues and suggest some recommendations or implications for the policy makers and government (titled *Policy Implications*) and for the management of software companies (titled *Management Implications*).

#### 7.2.1 Financing and Ownership

Finnish software product companies have very conservative financial structures with little debt or outside equity compared to Finnish biotech companies or SMEs in general. While good for survival, such conservative capital structures are not optimal for rapid growth and internationalization, which is crucial for the long-term viability and growth of the industry. A positive sign is that the percentage of software product companies seeking external finance (41 %) has increased significantly compared to the year 2002 (30 %) as a result of increased growth expectations. Overcoming the barriers for growth and internationalization success is crucial for tapping the growth and job creation potential of the industry.

Problems in the availability of external finance are most serious for growth-oriented, young, small, and negative cash-flow companies. These companies would need it most. These companies are significantly more pessimistic than older companies concerning the lack of financing preventing the emergence of new software product companies. The current financial environment discourages capable potential entrepreneurs from starting new growth-oriented ventures or existing entrepreneurs from investing in growth. Public policy measures should be targeted to make the environment more rewarding for growth-oriented new ventures and their investors.

Internationalization success is imperative for growth, wealth creation and successful exits for investors, which are necessary conditions for them to make risky investments in software product companies. Foreign investors appear to provide highly valuable internationalization support for their portfolio companies, thus complementing in a valuable fashion domestic investors. However, foreign investments are still relatively in Finnish software product companies. In addition to adding to the supply of risk capital, attracting more foreign investors in Finnish software product companies could help the industry also by improving the internationalization success leading to both increasing growth expectations and subsequently increasing supply and demand for domestic risk capital. The participation of foreign investors in creating globally successful Finnish software product companies should be encouraged.

Based on the above discussion, we are suggesting the following implications:

FINANCING AND OWNERSHIP	
<i>Policy implications</i>	<i>Managerial implications</i>
<ul style="list-style-type: none"> <li>• Improving the tax and legal environment and other support for private value added investors to stimulate the functioning of the risk capital market</li> <li>• Removing the barriers for foreign investors to invest in Finnish venture capital funds and ventures</li> </ul>	<ul style="list-style-type: none"> <li>• Improving the capability and willingness to take risk and target growth markets as well as accept external investors to support the growth</li> <li>• Developing the 'investment readiness' of the companies, i.e., making the companies more professional and accessible by external investors</li> </ul>

## 7.2.2 Productization and Product Development

As this study shows, the majority of the companies still suffer from an inadequate productization level, a problem typical for the European software industry. Raising the level of productization is a complex and challenging issue that influences most aspects of a software product company, from business models to internal processes and to technologies and architectures used. Possible means improve productization capability for the industry include changes in university curricula to emphasize productization issues, and the provision of consulting services. As majority of the Finnish software product companies are technology-oriented, professional business management from the very beginning could improve the productization intentions. Therefore, importance of experienced executives who have the knowledge and understanding of market needs, in addition to technological capabilities, is essential.

It is interesting to notice that R&D and productization remain the main problem of companies of all ages. Only those companies that have yearly revenue of over two million Euros do not rank them as main problem areas. There might be two underlying factors behind this phenomenon. Firstly, the youngest companies are struggling to get their first R&D projects completed. Secondly, those companies that have already

brought their first products to the market find that the prospected customers want to have modifications and further features in the products.

More professional project management can ease the potential problem of getting R&D projects completed. Typically, small companies developing new products are rather optimistic about the amount of time and resources needed to build a complete product, often falling into the trap of believing that once the code is written, the product is ready for mass marketing. Many young companies seem to have inadequate conception of productization. Finding appropriate delivery channels, ways of marketing the product and positioning the product to the market area some areas that have been neglected. To help companies in understanding the effort and time needed for productization, industry statistics as well as models of productization are needed.

The problem of making the product features meet customer needs fast is one of the very core competencies of any high-technology firm. Efficiency of the process of agreeing on the roadmap in which order to build different features many times may define the success or failure of the enterprise. Some of the potential ways how to improve the efficiency are that (1) the process is explicitly defined; (2) the customer and market intelligence feedback is fed into the process already in the early product development phase besides only knowledge on technical possibilities; and (3) top management participation in the process.

Even though the most efficient way to increase the level of R&D project management and product management is to have experienced people taking care of them, there are other possibilities for improvement. Collecting information of industry best practices and distributing the finding to small companies in Finland can also help them to manage products and R&D better.

Based on the above discussion, we are suggesting the following implications:

PRODUCTIZATON AND PRODUCT MANAGEMENT	
<i>Policy implications</i>	<i>Managerial implications</i>
<ul style="list-style-type: none"> <li>• Higher innovation expectation</li> <li>• More thorough revision of early stage technology investment ideas</li> <li>• Providing more education on productization</li> <li>• Improved and increased services needed for productization</li> <li>• Branding and networking of technology programs internationally</li> <li>• Assistance and support in finding distribution channels and partners</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement of software processes so that with productization can be made during customer projects with limited separate funding</li> <li>• Segmentation based on product essentials</li> <li>• Emphasize the marketing perspective: total offering and delivery concept</li> <li>• Preparation for fast growth: early and sufficient investment and preparation for growth and international operations</li> <li>• Market information: use already in the early phase of product development and venture capital information</li> </ul>

### 7.2.3 Networking

Networking and partnering were considered crucial by our respondents. Particularly smaller companies saw networking as a very important improvement area in 2003. The availability of technology centers seems helpful in this respect. Partnering in software business is not easy, and issues like software development in company networks, and business and revenue sharing models require further study and development. Especially

in difficult economic times small companies struggle with establishing themselves as credible vendors. Such credibility can be enhanced by networking adequate resources through partnerships. It is also evident that as a small nation, we must face the fact of our limited human resources. Creating new models for global development operations is of importance in parallel with flexible solutions needed for attracting skilled workforce into our country. Public interventions could be targeted to promote and facilitate international collaboration with key actors relevant for the internationalization of the Finnish software product companies.

Based on the above discussion, we are suggesting the following implications:

NETWORKING	
<i>Policy implications</i>	<i>Managerial implications</i>
<ul style="list-style-type: none"> <li>• Infrastructure for global networking. Public organizations and technology programs could facilitate the international networking of new ventures with global players in the industry</li> <li>• Networking support: enable and support industry specific networks</li> <li>• Improvement of university and industry networking: researcher networking to international research community and international companies</li> </ul>	<ul style="list-style-type: none"> <li>• Obtain critical mass and credibility by active networking</li> <li>• Focus on globally best partners</li> <li>• Management, "orchestration" and creation of de facto standards</li> <li>• Identify and leverage value-adding products that major partners can support and benefit from</li> </ul>

#### 7.2.4 International Operations

50 % of Finnish software product firms reported to be present and have sales on foreign markets. However, only quite a low share of revenue came from abroad on average. Moreover, when looking at the distribution of foreign revenue share, there is a significant gap between initial sales abroad and full internationalization.

Internationalization correlates with high growth potential. Internationalized firms reported much higher revenue and growth expectations compared to their counterparts limited by the by the small domestic market. However, internationalization is also highly risky. Despite of the average profitability of domestic and international firms being similar, there were significant differences in their distributions. While domestic firms reported relatively balanced profitability, internationally operating ones formed two clusters of well profitable ones and ones in losses. Our analyses suggest that early internationalization can be very rewarding in terms of growth, but there is also high risk associated with that.

Generally, firms in Finnish software product industry find their products and services suitable for international markets and foreign markets attractive. The problems preventing most of them from internationalization are the costs and risks associated with international expansion and the availability of financing for internationalization.

Overall, internationalization resembles a chasm for many of the firms. Crossing it can significantly expand growth potential and also enable access to new resource markets. However, a firm can also fall during this crossing into serious financial instability endangering its viability.

The software product business is volume based and international expansion is necessary step for every ambitious and growth oriented firm. Necessity of internationalization accelerated by industry dynamics and saturation of Finnish market, combined with the

risk associated with it indicates how crucial this step is for further viability of business. With respect to these, targeted internationalization programs oriented on financial bridging and risk redistribution should be considered.

Based on the above discussion, we are suggesting the following implications:

INTERNATIONAL OPERATIONS	
<i>Policy implications</i>	<i>Managerial implications</i>
<ul style="list-style-type: none"> <li>• Provide dedicated support for born global companies</li> <li>• Need for a practical internationalization model that can be applied to firms in different business situations</li> <li>• Promoting the Finnish software product industry internationally in key markets to enhance overall credibility of Finnish companies</li> </ul>	<ul style="list-style-type: none"> <li>• Position immediately to global markets and operations requirements</li> <li>• Early stage identification of domestic &amp; international</li> <li>• Presence in international markets: being close to customers</li> <li>• Finding right markets for the product &amp; company</li> </ul>

### 7.3 Concluding Remarks

Three large exporting countries, India, Israel and Ireland are examples of very successful software exporters. One thing all these countries have in common is that there has been a national strategy to promote their software industries generally and software exports in particular. All these countries have actively promoted and facilitated the internationalization of software product companies. The existence of a national strategy for software exports can, therefore, be recognized as an important part of software export success (Heeks et al. 2002).

The detail of strategies for achieving the visions set varies. Common strategies have been governments acting to stimulate the supply of working and venture capital to software firms. All these three countries have used a raft of tax breaks, marketing subsidies, grants, loans, and a combination of both liberalization and promotional intervention. Also, all three countries have invested in software-related research and development directly via government and indirectly via tax breaks for private sector R&D.

In addition, a comparison to other software exporting countries that have not succeeded that well, to Russia, China and the Philippines revealed that either these countries had no national strategy at all or it had no focus.

Finland is a country of limited resources. Therefore, it would be vital for the industry to create a focused strategy to support activities of software product companies. According to the results of this survey, the focus of government strategy could be towards companies creating highly productized software. There have also been some initiatives towards this kind of approach in order to support the software industry.

Productization, risk capital, and internationalization are three interrelated, critically important issues that should be simultaneously improved to enable growth and creation of wealth and employment. Without sufficient availability of risk capital, it is hard for software product companies to focus on productization if their operations need to be

financed by customer projects. Without success in internationalization, which is imperative for growth, wealth creation, and successful exits for investors, private investors will not have incentives to invest risk capital in software companies. Without sufficient level of productization, it is hard to enter and conquer global markets. Public and private sector should work closely together with their international counterparts to remove the barriers for internationalization success of the Finnish software product companies.

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# APPENDIX I: RESEARCH METHODS

## Sampling

Because software product business is not classified as a line of business or industry in Finland, defining the target group was a challenging task. We used following approaches in order to reach the target groups.

We used a commercial company Mailer Oy for selecting appropriate industry codes, which assumedly contained software product companies. We ended up to using Mailer instead of other commercial companies (i.e. Statistics Finland), because Mailer was providing industry codes on five-digit scale instead of normal three scale. The industry codes selected were thoroughly checked out by the experts.

Table. Industry Codes Selected for the Mailing

Industry code	Explanation
642021	Data transferring service companies
642022	Tele communication companies
64203	Software transfer service companies
72100	Computer hardware consulting companies
722001	Computer software companies
722002	Other computer service companies
722003	Computer consulting companies
723001	Computer service centurms
723002	Computer recording companies
724001	Database companies
724003	Network service companies

In earlier surveys (till the year 2001), the target group was defined by a company database gathered by the Centre of Expertise for Software Product Business. However, since it is not known, how well this database represents the Finnish software product business companies in Finland, we opted for another approach. In the year 2001 survey we used Statistics Finland to gather addresses. However, this approach resulted in mailing the questionnaire to some 4452 companies, because Statistics Finland only can offer industry codes on three-digit scale (72200 software developing, manufacturing and consulting).

This year we combined the contact addresses gathered by the Centre of Expertise for Software Product Business with the addresses received from Mailer. We mailed the questionnaire to all companies that were listed under the industry codes presented in Table above. In order to reduce "double-mailings" we checked out the company list and removed such listings, where the same company had two or more addresses. Overall, we mailed the invitation to 2480 companies.

We included those companies in the target population that had the minimum of 1 % of their total revenue acquired from their own software product business.

## Carrying out the Survey

The implementation of this survey can be divided into four phases: planning the survey, gathering the data, analyzing the data and reporting the results.

### Planning the Survey

Planning of the survey was done in December 2003-March 2004. The questionnaire used in the survey was designed in February-March 2004. Several software product business specialists were involved in the process of forming the questionnaire. The questionnaire was also tested in March 2004.

## Gathering the Data

Gathering of the data was done in March-May 2004. The invitation to web-survey was mailed in March and a follow-up emailing which was carried out in April 2004.

After data gathering 196 software product companies were reached. Most of the large enterprises had not answered the survey because of the legislation of public limited companies. In order to gather at least the numerical data the major companies were phoned and/or their annual reports were studied. Information of 20 companies was gathered in other ways, mostly by phone but also using the Internet and companies' annual reports.

## Analyzing the Data

The analysis was done June-August 2004. SPSS (Statistical Package for Social Sciences) 11.5 for Windows -software was used in the analysis. We used simple statistics like frequency counts, averages as well as regression and factoring among other statistical analysis tools.

We used correlations to describe linear dependencies of the variables. We used Pearson correlation if variables were measured at least on interval-scale and Spearman correlation if variables or only one of them was measured on ordinal-scale.

## Reporting the Results.

The results were reported in July -September 2004.

## Questionnaire

The questionnaire (Appendix A) totaled 6 pages, and had four introductory questions and six main sections: 1) the main software product and business related to it, 2) international business, 3) corporate financing and ownership, 4) general company information (revenue, personnel and development of business), 5) corporate strategy, product development and networking and 6) respondent demographics.

The first introductory questions defined company's own software product business, other software product business and other business activities and asked for the percentage of company revenue that originated from these, respectively. Second introductory question asked about company's intention to start software product business in 2004. Third introductory question asked the year the company had started its own software product business, in case it had. Fourth introductory question asked that is company selling its main product as embedded software.

The first part focused on the main software product and the business related to this product. We asked questions related to the number of customers, the degree of customizing, markets and end users, as well as the business models used by the companies.

The international business section asked on the importance of international business, as well as the most important export countries. The amount of personnel in foreign countries, internationalization strategies and distribution channels were also covered. We also asked the companies about their intention to growth their business in domestic or international markets.

The ownership and financing section asked on the ownership distribution of the company. We also asked the intention of the company to acquire funding in 2004-2005.

In order to get basic statistics on the companies, we asked for information on revenue as well as profits and product development investments. We also asked about the allocation of personnel and possible

challenges in recruiting. In addition, we asked about most and least important areas of development in the business.

In the corporate strategy, R&D and networking section, we asked questions about common strategy, importance of the product business and about the R&D activities.

Finally, we asked for information on the respondent, including position, tenure, and share in the company, as well as contact information.

The questionnaire ended with an open question for questions, improvement proposals and ideas regarding the questionnaire or other issues that the respondent might want to bring up.

We tested the questionnaire with four software product representatives before mailing it. We learned that it took some 25-35 minutes to fill in the questionnaire. We changed the wordings of several questions, as well as shortened the questionnaire based upon the feedback from the testing.

## Evaluation of the Results

### Reliability of the Study

The reliability of the construct was strengthened by several systematic checks that answers are logical and in line with other answers of the company. Because of the relatively large amount of companies, it is quite hard to verify the answers companies have given. Often companies want to give more positive views of their situation than the actual condition is. Also, companies often tend to have very optimistic views on future that may not always be quite realistic. To assist in the interpretation of the data, we have presented the data and findings to industry experts in order to understand the phenomena better and validate the conclusions. These experts are consultants and analysts that study the sector.

### Validity of the Study

Validity relates to how well questions asked measure the actual phenomenon –not something else. Questions that were not understood homogenously in the testing phase of the questionnaire were changed or removed. Also, we obtained secondary assessments of knowledge intensity from industry experts in order to reduce the chance of a systematic error. Overall, we believe that the validity of the study is relatively good. However, it seems that in the survey we did not reach very well companies of very small size for some reason. This can bias the results, since companies not able to grow their business have not responded the survey and, therefore, the results may have seen too optimistic in general.

### Response Rate

Overall, 275 companies participated in the survey. The overall response rate is 11 %. According to professional estimates, there were about 1100 Finnish software product companies at the end of 2003.

Thus, we approximately reached 18 % of the whole industry (196 software product companies). However, the sample is not a direct cut from the whole industry: the amount of large companies is oversized because of more accurate searching of the large companies. In addition, we did not reach the smallest companies as well as expected.

### Suggestions for Future Research

The findings and limitations of this research suggest several areas where further research would be interesting and beneficial. First, this study is based on quantitative survey, where a typical respondent is at high executive position. This naturally narrows the areas covered in the survey, e.g. software

engineering and product development processes were hardly covered in this study. Also, the method of using quantitative survey does not enable to gain deeper understanding of actual processes and drivers in the companies, with case studies this knowledge could be dramatically improved.

This kind of data could be compared to other software product industry surveys conducted abroad, where further conclusions of the current state of the Finnish industry could be formed.

The original idea for the need of the software product industry research came in the mid- 1990s and one main reason behind this reasoning was to prove, that the software product industry is an industry with national significance or at least has the potential to become one. A question could be stated, whether the goals of this kind of survey should be refocused in the near future. The current "heavy" questionnaire is quite demanding for the busy CEOs and response rates have been dropping. By gathering the basic statistical information such as revenue and personnel amount from other resources (this would basically require an industry code of its own), this survey could focus more on a few chosen topics and hopefully gather deeper knowledge of these areas.

## APPENDIX II: RECENTLY FINISHED OR ONGOING RESEARCH PROJECTS RELATED TO THE FINNISH SOFTWARE PRODUCT INDUSTRY AND OTHER INTERNET LINKS

### Research projects

- Internationalization capabilities, processes, and support mechanisms for creating successful global new ventures  
<http://www.tuta.hut.fi/units/Isib/research/cgs/cgs.php>
- Knowledge Intensive Business Services in software business  
<http://www.soberit.hut.fi/kisa/>
- Software engineering management system for small and medium-sized enterprises  
<http://www.soberit.hut.fi/sems/>
- Software subcontracting and distributed software development  
<http://www.soberit.hut.fi/veto/>
- Freeway to Internationally Competitive Software Product Business  
<http://www.soberit.hut.fi/frisbee/>

### Other internet links

- National Technology Agency (Tekes)  
<http://www.tekes.fi/>
- Finnish Software Business Cluster  
<http://www.swbusiness.fi/>