Results of the German Software Industry Survey 2012

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1 Executive Summary

The goal of the German Software Industry Survey[1] is to investigate the current state of the German software industry on a yearly basis. Conclusions are made based on grounded data and empirical findings. We hope that this type of research will contribute to the work of both, practitioners and researchers. As a public research institution we keep our respondent's data strictly confidential. We conduct the German Software Industry Survey in the context of the Software-Cluster[2], which is funded by the German Federal Ministry of Education and Research[3] under grant "01IC10S05". The authors take the responsibility for the contents.

Two topics have been the main focus of this year's survey: business models and competitive strategies of software firms. We collected and analyzed more than 500 responses which lead us to the following main conclusions:

- **German firms have a very positive outlook on the next five years, expecting to grow by almost 30% per year.** The growth potential seems significant. However, our results clearly show that large firms have difficulties to keep the fast pace, such that growth rates are considerably lower for large German firms. Even though the number of small firms is much higher, Germany needs to establish truly global software firms in order to position itself toward dominant players from the U.S. Furthermore, the profitability within the German software sector greatly varies. We think that explanations and remedies can be found by analyzing the business models and strategies of software firms, thus separating successful firms from less successful ones.

- **The nature of business models in the German software industry is multifaceted.** We investigate different properties of the firms' business models covering strategic aspects, the revenue model, the solution development, the go-to-market, and the activities during a solution's lifecycle. Most firms follow a differentiation strategy and intend to be perceived as providers of a unique offering. Revenue comes mainly from the end-users. Only a few firms can yield significant revenues from third parties (e.g. through advertising). Pricing is mostly independent of the actual usage. In terms of revenue streams, upfront licenses and recurring subscription models are both commonly applied. Looking at the solution portfolio, application software providers dominate infrastructure software firms in number. With respect to the license model proprietary licenses are more often applied than other license types such as open source. When it comes to operations, on-premise solutions dominate on-demand offerings. Primary platforms are still the traditional servers and desktop/laptop computers. However, our results show that mobile and cloud computing are expected to catch up with the dominating platforms by the year 2013. In terms of customers, we find business customers to be primary target group, organized within three top target industries: information and communication, manufacturing, finance and insurance. Most of these B2B solutions have a certain degree of complexity and require customization to fit the customers' needs. Correspondingly, most firms use sales agents as their primary sales channel.

- **The German software sector is highly competitive.** The numbers of competitors are high and market shares rather low. In such an intense competitive environment strategies focusing solely on low costs or high differentiation appear to be insufficient. The results show firms balancing both strategies to be most successful. The need for differentiation can also be seen from the high degree of vertical integration that we find for both, product and service firms. The latter, however, appear to make more extensive usage of outsourcing to third parties.

This is the first year that the Software Industry Survey is carried out in Germany. A similar survey has been conducted by our cooperation partner Aalto University, School of Science in Helsinki, Finland for more than 10 years. We are currently thinking about publishing an international report and further broadening the survey to a truly international level by including further countries.

In addition to this report, we published an online tool to complement the application of this survey's results: The Business Model Wizard[4] has been developed in the Software-Cluster and allows to configure your software firm's business model and to benchmark the configuration against our business model database. By this means you can analyze similar business models and their performance indicators. We hope that this report as well as the Business Model Wizard support the optimization of your software business. If you are interested in any further aspects of our research, please feel free to get in touch with us at any time. We are more than happy to answer further inquiries and we highly appreciate your valuable feedback.

Anton Pussep, Markus Schief, Peter Buxmann

1 https://www.softwareindustrysurvey.de
2 http://www.softwarecluster.org/en/
3 http://www.bmbf.de/en/
4 http://www.software-business-model.com

2 Overview of the German Software Sector

The state of the global economy remains challenging with the ongoing eurozone sovereign debt crisis and signs of slowdown in China. Despite the worrying macroeconomic situation, Gartner has recently revised their estimate of worldwide IT-spending growth up 5.2% for 2012 (Gartner, 2012). The main drivers for growth of IT spending are tablets, smartphones, and mobile services. While this means that firms serving these markets will most likely see growth, it also means that the growth of traditional software and IT services markets are predicted to grow at a slower pace than overall IT markets. In all, the growth of these two markets remains slower than prior to the financial crisis. Eurostat estimated that the German Software and IT services industry grew 10% in 2011 compared to 2010 (Eurostat, 2012). In line with Gartner's predictions about growth in "post-pc" products and services, there is no shortage of visions about the future of ICT, and how "smart" or "ubique" technology will transform our lives, and what role the German software industry might play in all of this. With this survey, we will focus on the current state of affairs based on empirical data, and at best, look only a few years ahead. This may make our report a less entertaining read, but the conclusions we make are firmly grounded on data, and not mere anecdotes. We hope that this type of research contributes to the work of both, practitioners and researchers.

Before focusing on the results of the German Software Industry, we would like to put the German Software Industry into an international perspective. An interesting source stems from the Business Software Alliance (BSA). By reviewing the results of the BSA (2012) funded IT industry competitiveness index 2011 study, Germany ranked number 15 in the world. Figure 2.1 depicts the scores on the six dimensions of the index: Business Environment, IT Infrastructure, Human Capital, R&D Environment, Legal Environment, Support for IT Industry. While the overall difference between Germany and USA is 16.4 points, the difference between Germany and the second rank, Finland, is only 5.9 points. Consequently, USA dominates the software industry by far and Germany belongs to the pursuers. Having a look at the 6 dimensions, it can be concluded that Germany is particularly strong in the legal environment, however, faces a major challenge in human capital, the R&D environment, and the support for IT industry development. It is worth noting that while the index itself was published in the fall 2011, the data stems from years 2006 to 2010. In the worst case, some parts of the index lag about five years behind the current state.

Rank	Last Year	Country A-Z	Overall Index Score	Business Environment	IT Infrastructure	Human Capital	R&D Environment	Legal Environment	Support for IT Industry Development
1	/	United States	80.5	95.3	76.5	74.1	74.3	92.0	87.2
2	/	Finland	72.0	98.2	71.0	52.1	67.3	89.5	78.6
3	+6	Singapore	69.8	91.0	65.2	51.8	67.2	81.5	82.3
4	-1	Sweden	69.4	90.1	83.3	48.4	54.9	85.0	81.6
5	+1	United Kingdom	68.1	93.2	74.0	57.5	46.7	88.5	80.0
6	+2	Denmark	67.9	95.1	87.2	47.9	42.0	90.5	79.0
7	-3	Canada	67.6	88.3	76.9	53.4	47.6	79.5	85.4
8	+3	Ireland	67.5	96.0	59.3	54.8	55.9	85.0	83.9
9	-1	Australia	67.5	92.3	82.4	60.4	32.7	92.5	82.1
10	+3	Israel	65.8	81.3	64.4	74.2	71.3	73.0	68.1
10	-5	Netherlands	65.8	90.1	84.3	43.8	43.8	90.5	74.8
12	+2	Switzerland	65.4	86.3	89.9	40.7	41.3	88.5	75.0
13	+2	Taiwan	64.4	86.5	54.1	53.7	69.9	74.5	61.4
14	-4	Norway	64.3	87.4	80.2	49.6	36.8	87.0	82.1
15	+5	Germany	64.1	88.3	70.5	46.0	52.5	90.5	65.1

Table 2.1.: BSA IT industry competitive index 2011. Source: BSA (2012)

A further interesting study published by The Truffle 100 (Lykkegaard and Bo, 2011) ranks and analyzes the top 100 European software firms. For the year 2001, they list 5 German software firms among the top 20 (Figure 2.2). Three of them, being SAP, Software AG and DATEV, even rank among the top 5 firms worldwide.

Figure 2.3 depicts the aggregated firm values per country. It shows that Germany's software firms yield highest revenues in Europe. In sum, 50% of European software revenues are generated by German software firms. Thereof, SAP AG contributes by far the highest share of revenues.

Rank	Firm name	Public?	Country of HQ Location	Software Revenues in 2010 (mEUR)	Total Revenues in 2010 (mEUR)	R&D Employees in 2010
1	SAP	yes	DE	12 336.7	12 464.0	14 991
2	Dassault Systemes	yes	FR	1 563.8	1 563.8	3 700
3	Sage	yes	UK	1 542.9	1 688.4	2 076
4	Software AG	yes	DE	919.2	1 119.5	850
5	DATEV	no	DE	684.6	698.6	1 250
6	Autonomy	yes	UK	657.0	657.0	563
7	Asseco	yes	PL	516.4	808.5	2 047
8	SWIFT	no	BE	511.1	538.0	452
9	Wincor Nixdorf	yes	DE	461.6	2 239.0	372
10	Misys	yes	UK	431.2	431.2	1 102
11	Unit4	yes	NL	421.7	421.7	1 150
12	Sopra Group / Axway	yes	FR	354.7	1 169.9	1 000
13	Temenos Group	yes	CH	338.2	338.2	617
14	Swisslog	yes	CH	324.9	444.3	511
15	Micro Focus	yes	UK	322.7	329.2	300
16	Compugroup Holding	yes	DE	312.4	312.4	900
17	Murex	no	FR	310.0	310.0	255
18	Invensys	yes	UK	279.2	2 897.1	1 328
19	Northgate Information Systems	no	UK	269.0	780.9	760
20	IFS	yes	SE	264.0	270.8	524

Table 2.2.: Truffle European Top 20 software firms in 2011. Source: Lykkegaard and Bo (2011).

Country	Software Revenues (mEUR)	% of Total	# of Software Firms
Germany	15 578	50.3%	16
UK	5 752	18.6%	24
France	3 482	11.2%	18
Netherlands	1 093	3.5%	7
Sweden	977	3.2%	4
Norway	436	1.4%	5
Finland	661	2.1%	2
Italy	522	1.7%	8
Switzerland	881	2.8%	7
Belgium	511	1.6%	1
Poland	562	1.8%	4
Denmark	185	0.6%	1
Czech Republic	166	0.5%	1
Spain	117	0.4%	1
Austria	62	0.2%	1

Table 2.3.: Truffle Breakdown by Country in 2011. Source: Lykkegaard and Bo (2011).

We further compare the software and IT sector internationally using Eurostat data. Figure 2.1 shows a growth index for the software and IT services industries in several European countries. The 2010 and 2011 data are still Eurostat estimates or provisional data, and can change when statistics get more accurate over time. The year 2005 is defined as a reference year with index value of 100 for all countries. The growth patterns of all the more developed countries are remarkably similar. The growth rate from 2010-2011 of the German software and IT services industry (10.13%) has been better than the average growth rate of the 27 EU member countries (6.8%). However, in the graph Germany ranges somewhere in the middle (rising from 100.25 to 125.46), thus indicating that the relative growth from 2005 until today hasn't been very impressive overall.

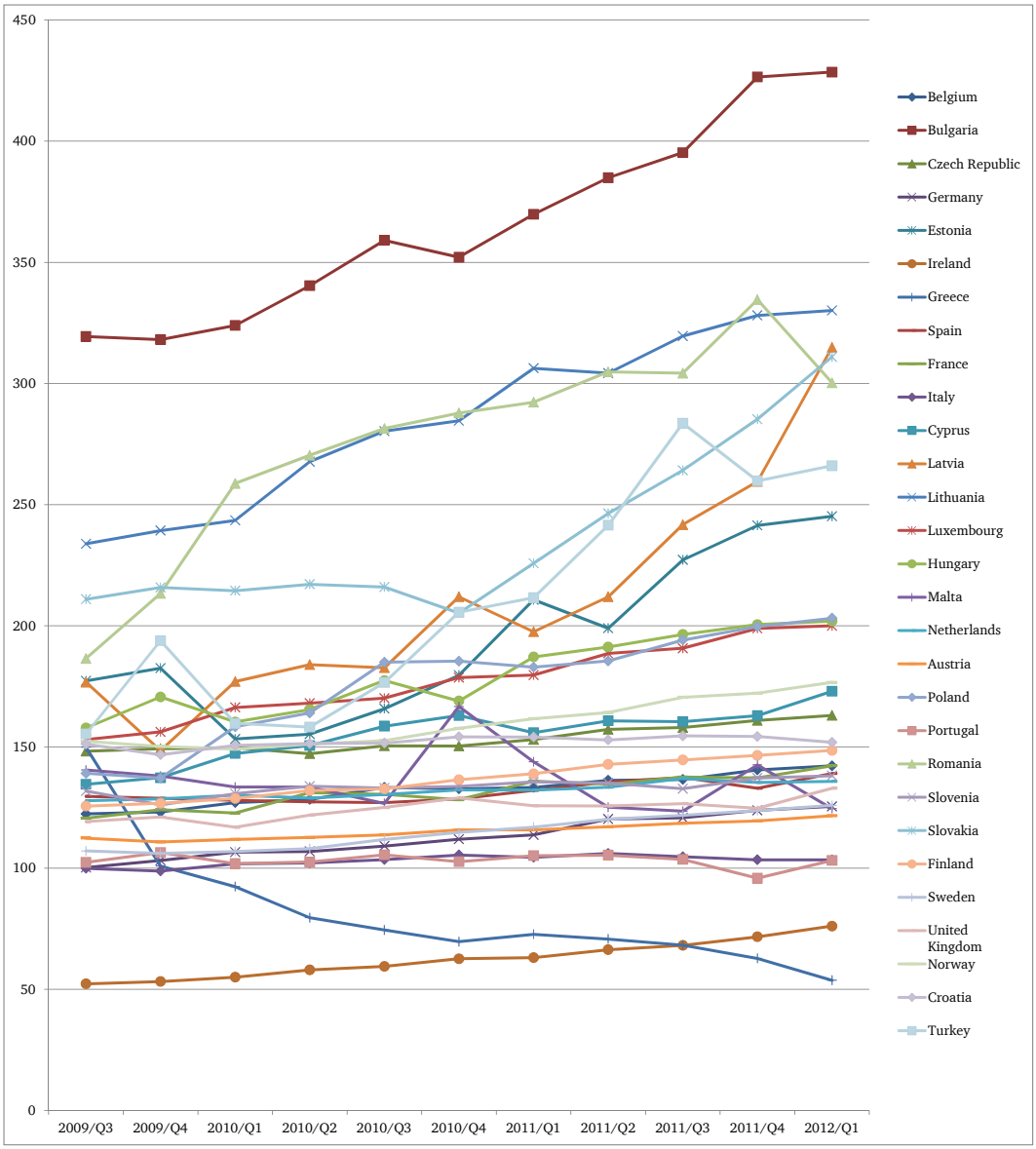

Figure 2.1.: Growth index for the software and IT services industries. Source: Eurostat (2012).

3 Firm Characteristics, Performance and Growth

After discussing the current trends in the European and German software and IT services industry based on public data, we will now shift the focus to the results of our survey. In practice, the study is conducted by contacting a large number of firms that operate in the industry codes that are associated with software development. We believe that the resulting list of firms covers virtually every software firm in Germany, with the exception of those that have been founded too recently to be included in our address list. This year we sent out the invitation to participate to more than 20,000 firms on May 9th. After one reminder that was send by email, we received 259 full and 265 partial responses by July 1st when the survey ended. The rate number equals 2.5%[1]. This is a reasonably good result, as we conduct the survey for the first time in Germany. It shows the interest of German software firms in the survey topics.

The results of this year's survey are discussed in three main chapters. This chapter describes the general firm characteristics of the sample firms and reviews their performance and growth results. The following two chapters cover the two main topics of this year's survey: business models and competitive strategies. Chapter 4 analyzes the business models of software firms, including strategic aspects, revenue models, upstream and downstream characteristics, as well as usage. Chapter 5 focuses on strategic issues of software firms in greater detail, which are only partly covered by what we define as business models.

3.1 Firm Age

Looking at the firm age, our sample firms are 12 years old on average. The distribution of firm age is depicted in Figure 3.1. The oldest firms participating in our survey were founded in 1969. In contrast, 16 firms were started in 2011 and 3 firms even in the first quarter of 2012. In the last ten years, since 2002, 162 firms have been founded. Thus, almost 50% of the respondents to this question are young firms that were founded after the dot-com bubble in 2001. These results are in line with the expectations for an industry that is regarded as a very dynamic sector.

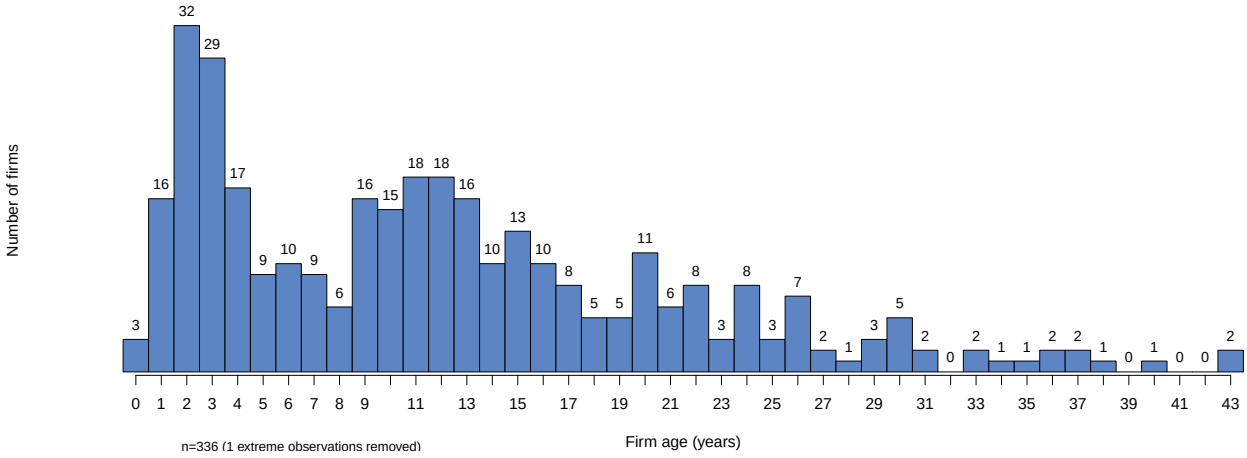

Figure 3.1.: Firm age by year 2011.

3.2 Firm Types

There are two dominating firm types in our sample. Almost every second firm is a software product firm. Beyond the firms relying mainly on products, 40.2% have a stronger service focus by mainly delivering software projects or other software related services. In contrast to these two dominating types, software resellers (3.8%), consulting firms (5.1%), and embedded software providers (1.9%) only play a minor role. Figure 3.2 depicts the size of each group.

[1] The actual response rate and number of contacted firms cannot be easily given, as more than 15% of the contacted addresses did not exist. We further received many responses saying that a firm does not belong to the software industry. Neither of these is reflected in the 2.5% response rate, the actual response rate should be thus higher than that.

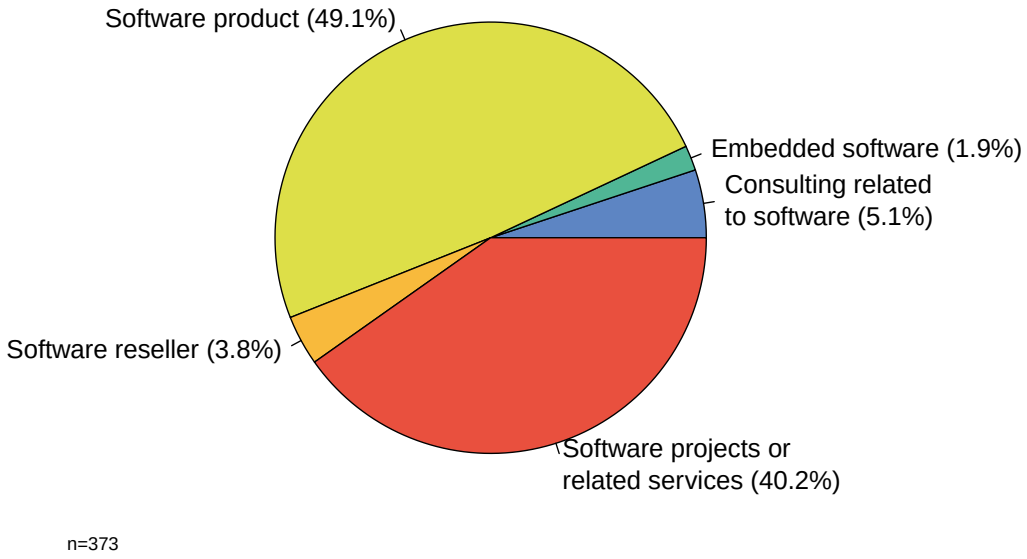

Figure 3.2.: Firm types.

In addition to the firm type we included one further question in order to determine if a firm can be regarded as a software firm. For that, we asked the participants to evaluate whether software development is a major, minor, or nonexistent activity. Figure 3.3 summarizes the results vis-a-vis firm types.

In general, the results are not surprising and thus confirm the validity of our sample. For example, nearly all software product firms regard software development as a major activity. Service firms (delivering software projects or other related services) define software development as a major activity as well; however, the overall importance is lower due to the focus on services. The other three firm types are weakly represented in our sample and thus the results need to be interpreted with caution. However, here the results confirm our intuition: embedded software firms have a lower degree of software development as they additionally focus on hardware, consulting firms hardly engage in major development activities, and software resellers hardly develop own software at all.

Reflecting the firm types and the importance of software development, we can conclude that our sample of software firms is a good representative of the software industry. The majority of respondents classify their business as highly software related and half of the respondents rate software development as a major activity.

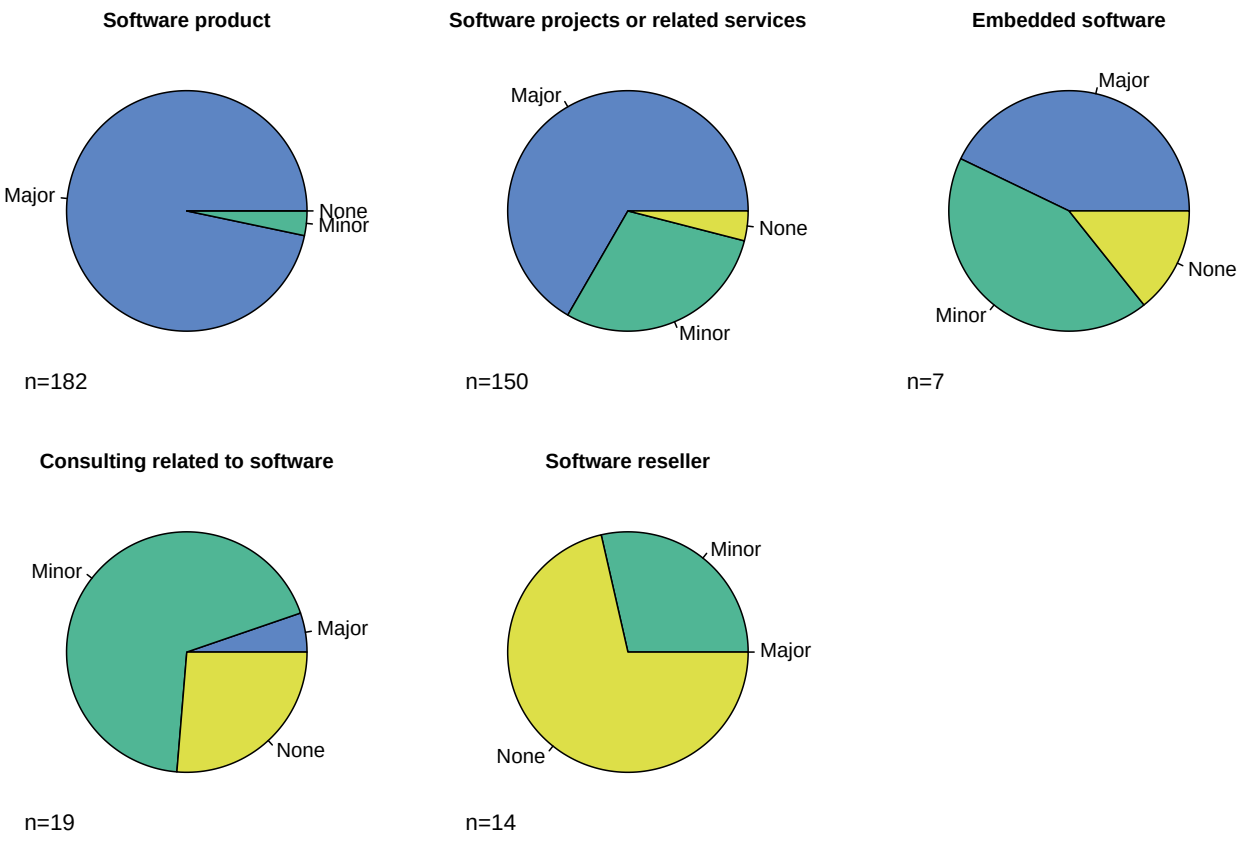

Figure 3.3.: Degree of software development depending on the firm type.

3.3 Number of Employees and Relative Growth Toward Competitors

The number of employees is one of the main indicators of firm size. We distinguish four different classes of firm size as defined in Table 3.1.

Firm size	Number of employees
Large and very large	>250
Medium	51-250
Small	11-50
Very small	1-10

Table 3.1.: Firm sizes as characterized by the number of employees.

The respondents' firm sizes are shown in Figure 3.4. The results show clearly that very small firms dominate the industry in number. In 2010, the average number of employees was 20.1 and the median 6. The large difference between the two values can be explained by a few very large firms in our sample. By 2011, the number of employees increased considerably to the median of 8 employees. Likewise, the mean in 2011 grew to 23.02. Looking at the estimated values for 2016, the median increases to 20 and the mean to 53.69 employees. These results accentuate the firms' growth ambitions.

Analyzing the growth estimations compared to competitors (see Figure 3.5), firms in our sample are neither excessively optimistic nor pessimistic. We find a slightly positive bell-shaped distribution of the firms' growth expectations. Putting these results in the context of the firm size expectations, we come to two conclusions:

- The industry as a whole is expected to grow considerably. Naturally, the speed of growth among firms varies. However, the expectations follow a reasonably bell-shaped distribution, thus indicating rather realistic expectations.

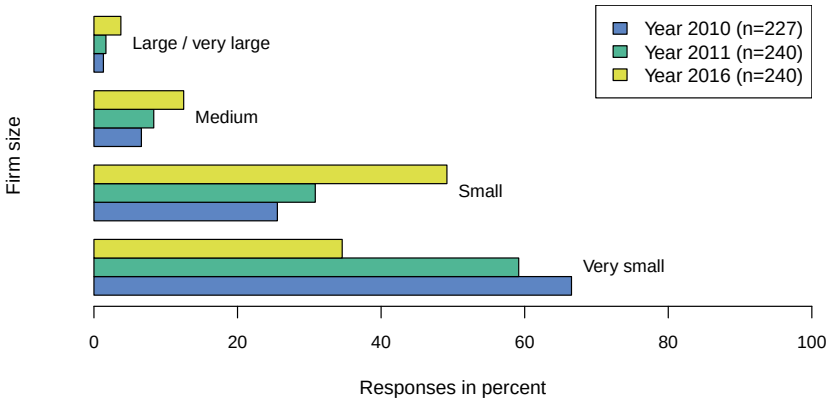

Figure 3.4.: Firm size as measured by the number of employees.

- Looking at the shape of the curve, we notice that on average, firms expect to grow faster than their competitors. Mathematically, the average software firm cannot grow faster than the average itself. Thus, we must conclude that the firms' expectations are somewhat too optimistic. Of course, this only holds under the assumption that our respondents' firms are representative of the industry. If this assumption holds, we have to expect the results presented in Figure 3.5 to be overly optimistic.

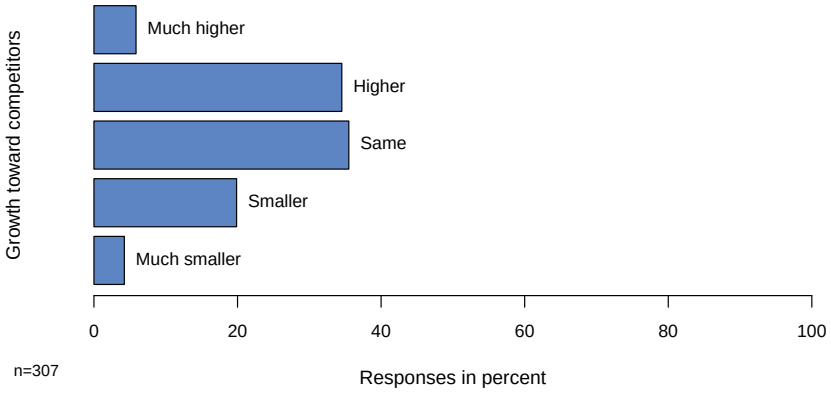

Figure 3.5.: Estimated relative firm growth toward competitors.

3.4 Revenue and Revenue Growth

The revenue distribution provides us with additional aspects on firm size and growth. Figure 3.6 depicts the distribution of the respondents' firms over five revenue classes. In general, the results are in line with the large differences in firm size we could see in the previous section. The results show that two thirds of our sample firms can be classified as small or very small firms. Only 17 firms in our sample yield revenues above 10 million EUR.

The revenue classes are defined in accordance with the classes applied in the Finnish survey. In Finland, even more than 50% of the firms are classified into the very small revenue group. Thus, while the distribution of revenue classes is comparable between Finland and Germany, the Finnish software firms appear to be somewhat smaller. In general, both studies show that the majority of software firms are rather small. We plan to analyze these differences in greater detail in an international report later on.

Figure 3.7 reports the revenue growth for the period 2010-2011. With respect to revenue growth, it differs according to the revenue size. Notably, small and very small firms yield the highest revenue growth rates. Medium, large, and

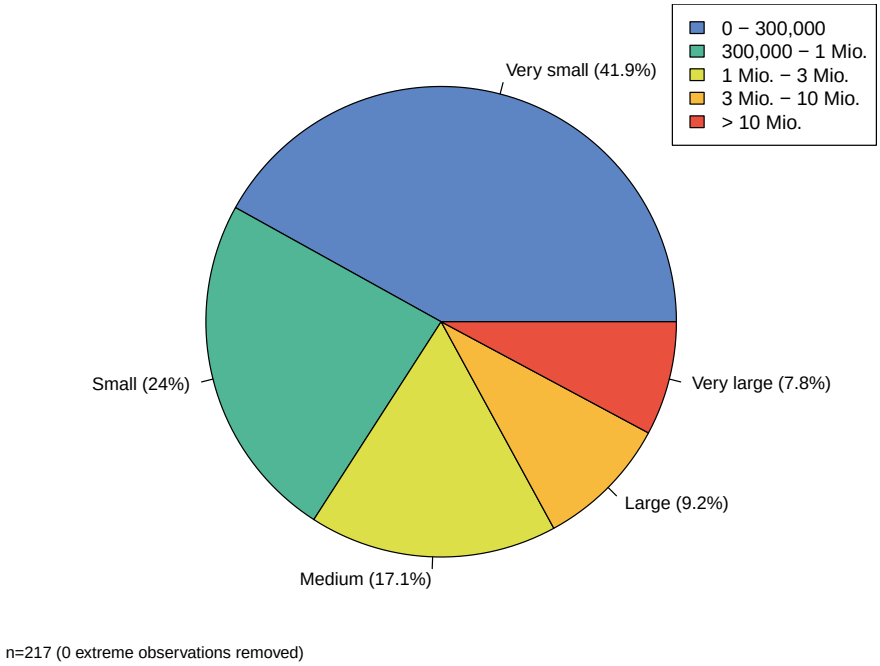

Figure 3.6.: Revenue distribution, classified in five classes (in Euro).

very large firms can be associated with much lower growth rates. With bigger size firms thus appear to have difficulties to keep up the strong growth. From 2010 to 2011, average revenues increased by 24.13%. This exceeds the industry growth figure (10%) reported by Eurostat (see Chapter 2). One rationale may be that Eurostat covers a broader industry definition consisting of software and IT service firms.

Figure 3.8 reports the expected revenue growth for the period 2011-2016. Within these five years, the average firm expects to grow by 29.06% per year. Thus, the average survey's participant seem to have a more optimistic outlook for the coming five years than for the past year. However, this does not apply to all participants. The expectations of very large firms are very low in the long-run, thus raising questions if Germany can keep up with the large firms worldwide.

The differences in growth which can be attributed to revenue classes are even more apparent in the long-run. It can be clearly seen that smaller firms expect a much higher growth than larger firms. This adds to the previous evidence that larger firms have difficulties to keep up the strong growth, which they experience in the beginning.

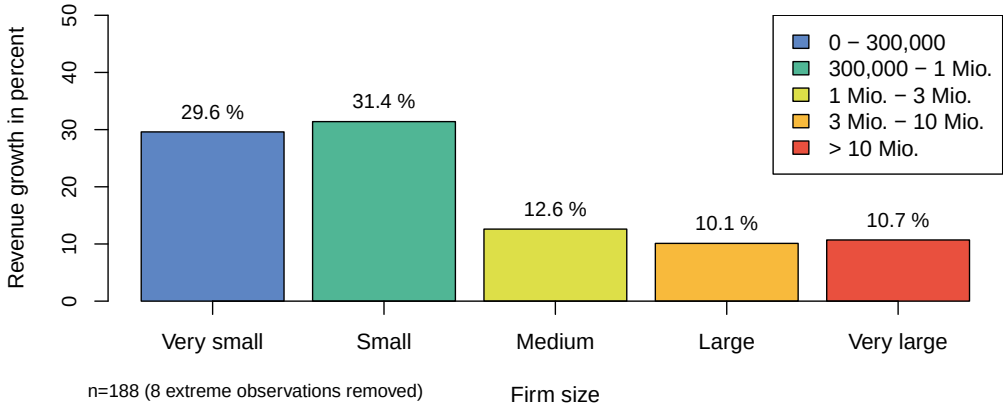

Figure 3.7.: Revenue growth from 2010-2011 for the five revenue classes.

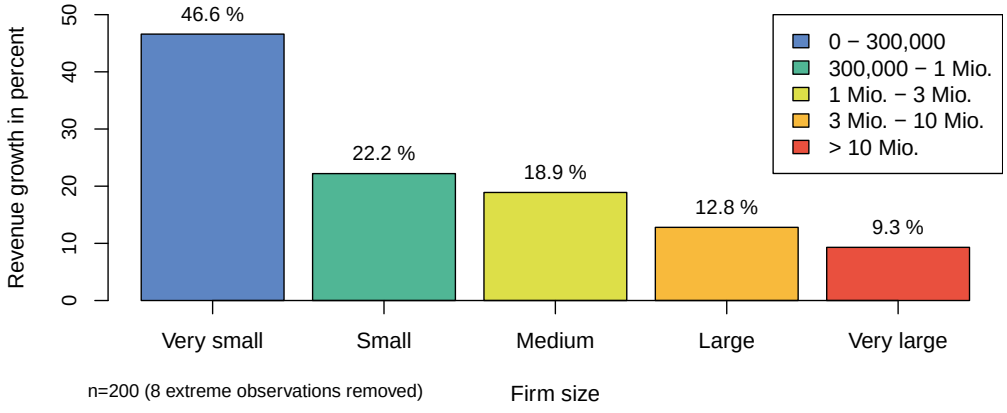

Figure 3.8.: Annualized revenue growth from 2011-2016 for the five revenue classes.

3.5 Key Cost Drivers

Within this report, we analyze how much firms spend on personnel, purchases from third parties, as well as sales and marketing. As will be discussed in Section 5.4, personnel costs are the major cost factor of software firms, whereas purchases are of much minor importance. Within this section we take a closer look at a third cost factor: sales and marketing expenses.

Sales and marketing expenses are spent on selling a firm's product or service. Figure 3.9 show these expenses as percentage of total sales (revenues in 2011). While the ratio of marketing and sales expenses is highest for very small and very large firms, the degree of sales marketing expenses is smallest for medium firms. Thus, it seems that small firms need to invest in business development and larger firms also need to spend significant money to keep their position. Medium firms are in a favorable position and need to spend the lowest margin on sales and marketing costs. Nevertheless, the overall ratio of expenses in sales and marketing, being in the range of one digit numbers, is surprisingly low.

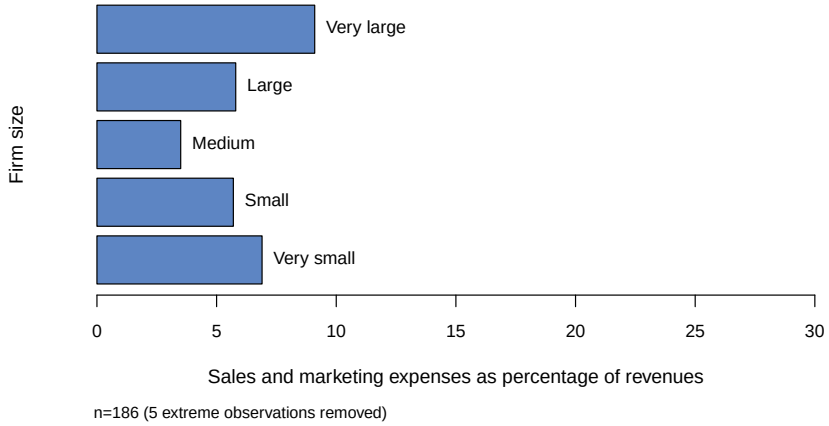

Figure 3.9.: Sales and marketing expenses as percentage of revenues in 2011 by revenue class.

3.6 Operating Profit Margins

As a measure of profitability, we asked the participants to name their operating profit margin. The results are shown in Figure 3.10. In 2011, the average operating margin was 10.4%. While the lowest margin is -23.1%, the top scorer achieves a margin of 40.3%. Interestingly, most firms' operating margin is only between 0 and 5%. Moreover, 22 of 147 firms have a negative operating profit margin and thus generate losses.

Beyond the analysis of firms' operating margins, Figure 3.11 shows the average operating margins depending on firm size (as measured by revenues). Considering the operating margins of different groups, we find that very small firms achieve, on average, the lowest profit margins. In contrast, small and large firms report the highest operating margins. It appears that the size of revenues does not necessarily relate to the size of profits. Likewise, Schief et al. (2012) could not report a significant size/profitability relation in their empirical analysis of software firms. While the impact of size on financial performance is hence unknown, Schief et al. (2012) show that market performance (as measured by the firms' stock prices) is affected by firms size. Thus, capital markets seem to anticpate firms' size, whereas its impact on financial performance (as measured by operating profits) remains unclear. As our data set does not contain capital market performance data, we cannot verify the results reported by Schief et al. (2012).

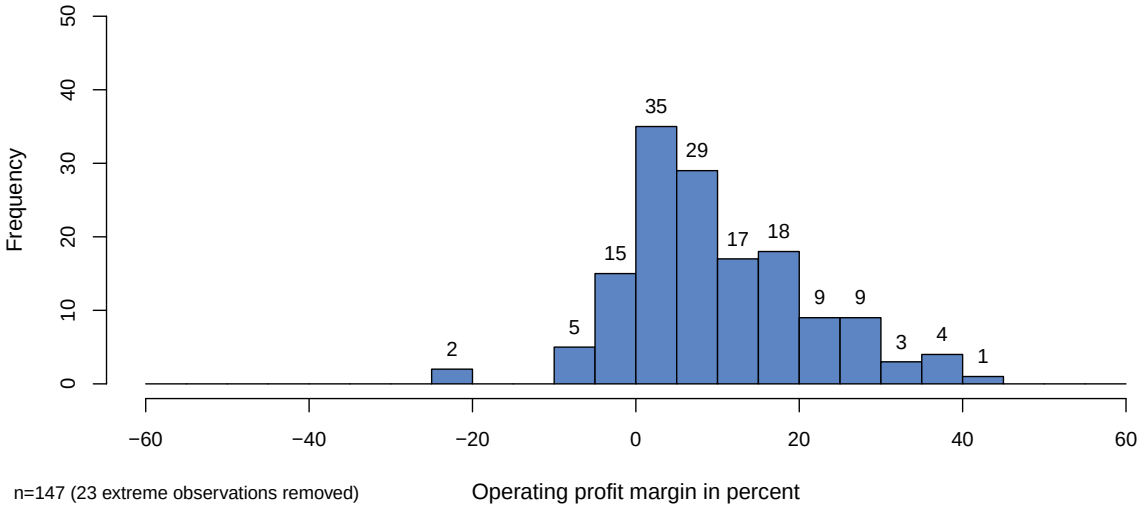

Figure 3.10.: Operating profit as percentage of revenues in 2011.

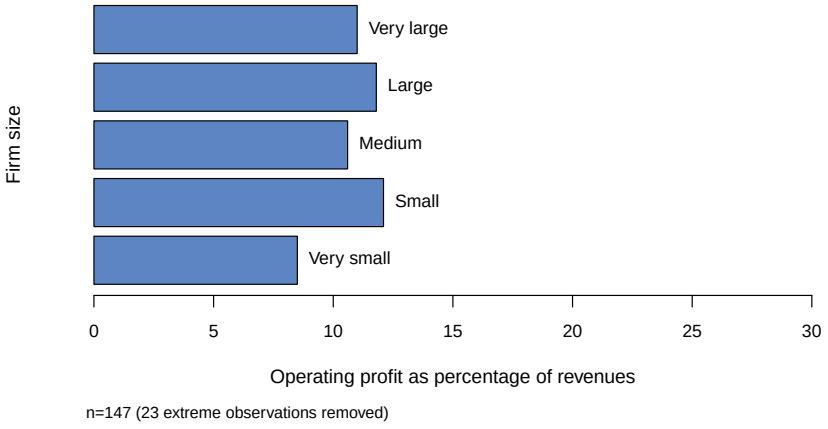

Figure 3.11.: Operating profit as percentage of revenues in 2011 by revenue class.

4 Business Models: The Software Firm's Business DNA

This section analyzes business models of software firms. The concept of business models can be considered as a rather young field that has been rising over the past decade in research and practice. In the software industry, the choice of the right business model is a crucial success factor for sustainable business success. Firms like Google or Apple have quickly become the world's most valuable brands and each has dramatically demonstrated that every technological innovation also requires an appropriate business model. Therefore, business models in the software industry and their underlying mechanisms are examined in this year's survey.

While the term business model is broadly used in entrepreneurial practice, the definition, nature, and structure of business models is still an object of debate among researchers (Burkhart et al., 2011). As terms such as strategy, business model, and revenue model are often used interchangeably, confusion in terminology is common. In the following presentation of results, we build upon an business model concept by Schief and Buxmann (2012) that is specific to software firms.

The overall business model can be divided into five groups as shown in Figure 4.1. Each group in turn consists of business model elements. For each element, a firm has several options on how to instantiate the given element. E.g., within the group "Revenue", a firm has three options to instantiate the element "Revenue source": direct revenue generation from customers, through advertising, or commission.

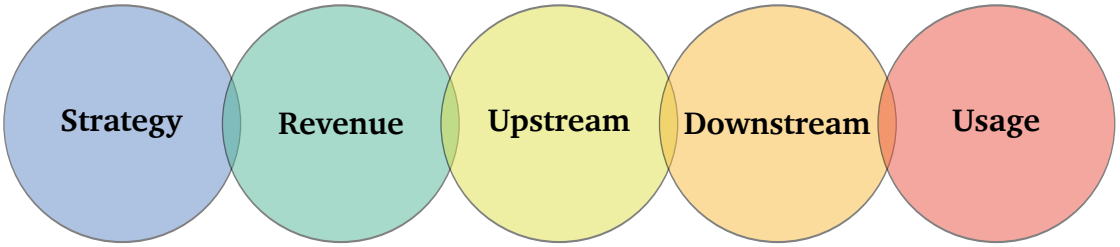

Figure 4.1.: Five groups within the business model concept.

Each group summarizes multiple cohesive business model elements: The group *strategy* describes a firm's strategic decisions, the group *revenue* deals with the pricing model and financial flows, *upstream* covers elements that relate to the definition and development of a product or service, *downstream* considers the target market and the distribution channel, and *usage*, finally, consists of services that are necessary during the usage of a software solution. The detailed business model concept including the five groups and their 25 elements is shown in Figure 4.2.

The following list provides a detailed description of all elements' choice options:

1. Group: Strategy
    - Unique Selling Proposition: This element describes the unique selling proposition(s) of a firm's solution. We differentiate between the two generic competitive strategies "differentiation" (e.g. firm image, quality and features of a product/service, innovation leadership, very tight relationships to customers) and "cost leadership". In addition, we differentiate between "network leverage" (i.e. emphasize a firms ecosystem that offers complementary solutions) and "one stop shops" (i.e. offer all potential solution components - e.g. hardware, software, and services).
    - Investment Horizon: This element deals with the business model's strategic time horizon and financial focus. The goal of "Subsistence" is to survive and meet basic financial obligations, "Income" is if a firm invests to the point that the business is able to generate an ongoing and stable income stream for the principals, "Growth" is an attempt to grow the value of the firm to the point that it eventually generates a major capital gain for investors, "Speculative" is if the time frame is shorter and the objective is to demonstrate venture potential before selling out, "Social" is if a firm does not follow any profit goals, "Cross" finance is if a firm runs a product/service at low margins in order to support the success of a "complimentary" product/service.
    - Value Chain Activity: This element summarizes the main value chain activities that a firm may cover. For detailed explanation of each activity, please refer to chapter 5.3.

Strategy														
Unique Selling Proposition	Image	Quality	Features		Innovation Leadership		Intimate Customer Relationship		Cost Leadership / Efficiency		Network Leverage	One Stop Shop		
Investment Horizon	Subsistence Model		Income Model		Growth Model		Speculative Model		Social Model		Cross Finance			
Value Chain Activity	Research	Develop-ment	Production	Marketing	Imple-mentation	Education	Operation	Maintenance	Support		Replacement			
Degree of Vertical Integration	Low				Medium				High					
# of Cooperation Partners	None			One			Few			Many				
Revenue														
Sales Volume	Low				Medium				High					
Revenue Source	Direct				Advertising				Commission					
Pricing Assessment Base	Usage Based				Hybrid Combination				Usage Independent					
Structure of Payment Flows	Upfront				Hybrid Combination				Recurring Payments					
Revenue Distribution Model	Low				Medium				High					
Upstream														
Software Stack Layer	Application Software			Systems Software			Hardware Control / Embedded Software			(Web) Content				
Platform	Desktop Computers/ Notebooks		Servers		Mobile		Cloud Computing		Embedded Systems		Social Media	Game Consoles		
License Model	Proprietary: Sell Usage Rights			Proprietary: Sell all Rights to Customers			Open Source: Copyleft Licenses (e.g. GPL)			Open Source: Permissive Licenses (e.g. BSD)				
Degree of Standardization	Individual Production				Batch Production				Bulk Production					
Key Cost Driver	Research & Development		Marketing & Sales		Services		Third Party Software Licenses		Hardware		Subcontracting			
Downstream														
Localization	Local (Germany)			EMEA (Europe, Middle East, Africa)			AMERICAS (North-, Central-, and South America)			APJ (Asia, Pacific, Japan)				
Target Customer	Small Organizations			Medium Organizations			Large Organizations			Private Individuals				
Target Industry	All	None	Manu-facturing	ICT	Finance & Insurance	Wholesale & Retail	Pharma & Chemicals	Transport & Storage	Services - Health etc	Construct. & Utilities	Public Sector	Others		
Target Users	Business - Broad Workforce		Business - Dedicated Specialists		Business - Managers		Consumers			Software Developer				
Channel	Sales Agents		Events		Telesales		Online Shop			Retail Stores				
Usage														
Implementation Effort	Low				Medium				High					
Operating Model	On Premise				Both: On Premise & On Demand				On Demand					
Maintenance Model	Daily		Weekly		Monthly		Quarterly		Biyearly		Yearly			
Support Model	Standard Support				Few Support Options				Customer Specific Support					
Replacement Strategy	One Release				Few Releases				Many Releases					

Figure 4.2.: Elements of a software firm's business model. Source: Schief and Buxmann (2012)

- Degree of Vertical Integration: The degree of vertical integration measures how many activities (relevant to your products/services) are performed internally compared to the overall set of required activities. If a firm outsources many activities to partners, this strategy decreases the degree of vertical integration.
- Number of Cooperation Network Partners: "None" if a firm does not rely on any other firm to offer the product/service, "One" if, e.g., the firm is a software consulting firm offering projects based on the software of a dominant market player, "Few" if a firm works with some key partners to offer the product/service, "Many" if a firm develops software that many other firms implement or if it is a software reseller (of various software publishers).

2. Group: Revenue
   - Sales Volumes: This element deals with the number of sold products measured by the number of installations. As one customer may have more than one installation, we refer to installations.
   - Revenue Source: This element investigates who finally pays for a solution. "Direct" means if the customer pays, "Advertising" stands for revenues that stem from third parties instead of the user, and "Commission" refers to cases where a firm receives a percentage (commission) of the money paid by the receiver of a product/service.
   - Pricing Assessment Base: This element asks how prices are derived. In this case we differentiate if the price is determined based on the usage of the product (e.g. used storage or cpu power) or independent of usage (e.g. number of named users).
   - Structure of Payment Flows: This element deals with the point in time when customers pay for a solution. We differentiate between upfront (i.e. when customers buy the product, before usage), or recurring payments (i.e. subscription fees per month).
   - Revenue Distribution Model: This element investigates the percentage of revenues that is shared with stakeholders. For instance, software reseller and app developers usually need to share the revenue with a stakeholder.

3. Group: Upstream
   - Product Portfolio: This element is based on a software stack concept. We differentiate among application software that is designed to help the user to perform specific tasks (e.g. ERP, accounting, office, media, games), systems software (Software designed to integrate information systems, e.g. operating systems, middleware, engineering, security, servers), embedded software (e.g. hardware control, firmware), or (web) content (e.g. legal information or IBAN banking numbers).
   - Platform: This element investigates the technical platform(s) of a solution. The options cover Windows/Linux for desktop computers, mainframe servers, mobile operating systems such as Android or iOS, cloud computing (e.g. Force.com), social media (e.g. Facebook), game consoles (e.g. XBOX), or embedded systems (e.g. firmware).
   - License Model: This element describes the legal regulations associated with the software license. "Sell Usage Rights", when a firm sells the usage rights based on a proprietary license (customers may use the software without revealing the source code), "Sell all Rights to Customers", when a firm sells all software rights (i.e. in custom development projects the code is fully transferred (i.e. usage right and source code) to the customer), "Open Source Copyleft Licenses", when a firm may not use this software to develop software for another license type, or "Open Source Permissive Licenses", when a firm may use this software to develop software that is published under a different license type.
   - Degree of Standardization: This element analyzes if a firm sells a highly standardized product/service or a highly customer-specific one. "Individual Production" refers to tailor-made offerings that require knowledge on processes and technology interfaces, which are specific to each customer. "Batch production" means that a firm can use the same product/service for a few customers. "Bulk production" describes a product/service that can be used by any customer.
   - Key Cost Drivers: This element asks for the key cost drivers. Does a firm spend most of the money on: "Research & Development" (i.e. developing and maintaining the software), "Marketing & Sales" (i.e. salary of sales people and expenditures on advertisement etc), "Services" (e.g. providing support, education, implementation, maintenance, operations services), "Third party software licenses" (e.g. software reseller), "Hardware" (if a firm buys and resells hardware with small software enhancements) or "Subcontracting" (if a firm sells storage access, but outsources the datacenter). While the first three options often refer to salary costs for employees, the latter three options mainly refer to purchases from third parties.

4. Group: Downstream
    - Localization: This element investigates the geographic areas that are mainly responsible for the revenues. Local market (i.e. Germany for the Software Industry Survey participants), or one of the other regions.
    - Target Customer: This element differentiates between private individuals and the size of organizations. The latter can be small, medium, or large firms.
    - Target Industries: This element describes industries that a software firm may address. As categories we use the main sectors that we revealed in this year's survey.
    - Target User: Software can be used by different types of users. In the business segment we differentiate among the Broad Workforce (e.g. travel reimbursement), Dedicated Specialists (e.g. controlling, graphics), and Managers (e.g. dashboards). Further, consumer use the software for personal use and software developers run the software to develop own software artifacts.
    - Channel: Based on general sales channel types, we define options applicable to software firms. For instance, Sales Agents personally get in contact with customers.
5. Group: Usage
    - Implementation Effort: This element asks for the effort for installation, configuration, adjustment, and business process reengineering. For instance, low effort if the software quickly installs without further need for action before using the software.
    - Operating Model: This element analyzes how your software product is mainly operated. While the traditional operating model of software emphasizes on premise installations, on demand models are gradually increasing. We differentiate between "On-Premise" (i.e. installation and execution on local systems) or "On-Demand" (i.e. installation and execution on a central hosting platform supporting the access via Internet, e.g. SaaS).
    - Maintenance Model: For this element, we refer to the release frequency. It deals with the number of available releases at a time.
    - Support Model: This element describes the type of support contracts offered by a software firm. In general, software firms offer one single, few different, or various customer specific support options.
    - Replacement Strategy: This element deals with the number of available product releases at a time. From all customers running on the same release (One Release), to customers running on very different (older and newer) release levels (Many Releases).

4.1 Strategic Aspects of Business Models

While in our definition business models cover many strategic aspects, we devote an own main chapter to them. Please find a detailed analysis of software firms' strategies in Chapter 5.

4.2 Revenue Models

One fundamental dimension of business models deals with revenues. In terms of revenue, multiple elements need to be considered. In our study we focus on three primary elements: A software firm's revenue source, its structure of payment flows and its pricing assessment base. Figure 4.3 shows the results of all three aspects across all survey firms. For each element, the respondents could choose which of the two given options applies best.

With respect to the software firms' revenue sources, the majority of firms yield their revenues through end-user fees. Only less than 10% mainly yield their revenues through third-party fees. This division of revenue sources means that German software firms predominantly tend to rely on the well-established revenue source instead of exploring new revenue sources such as advertising. In the light of firms such as Google and Facebook, which have demonstrated how to make use of third party payments as primary source of revenue, this seems to be challenging for most other software firms.

In terms of payment flow structure, the division of results is more equally distributed. Though single payments are still applied as the dominating payment flow structure, roughly one third of the respondents mainly refer to recurring payments. As referring payments are often associated with software-as-a-service, it remains of interest how this distribution will evolve over time. Notably, more than half of the respondents report that they follow hybrid models combining initial upfront payments with recurring payments. For instance, customer initially pay for the license and pay continuously for maintenance and support services.

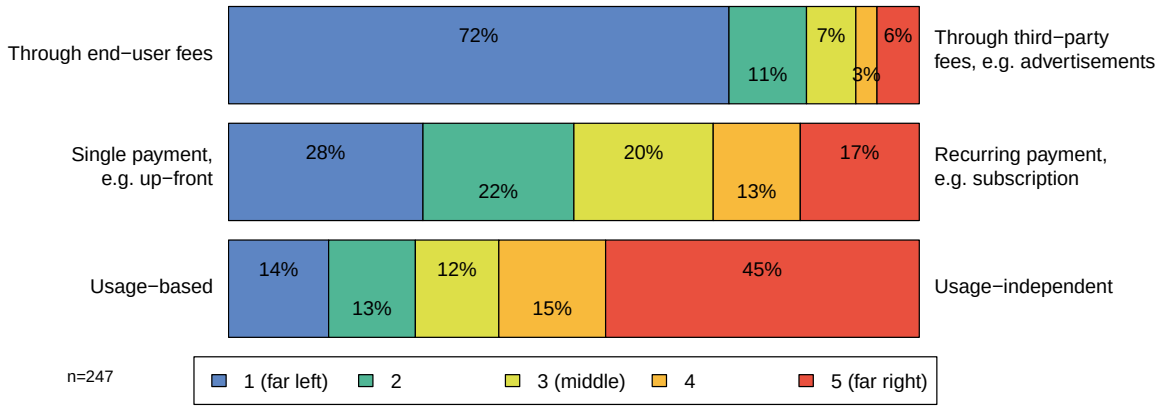

Figure 4.3.: Elements of the revenue group within the business model concept.

With respect to the pricing assessment basis about half of the sample firms charge usage-independent prices. Pure usage-based pricing strategies are only followed by 14% of all firms. These results go in line with the findings of Lehmann and Buxmann (2009). They report that only 14% of software vendors prefer a usage-dependent pricing assessment base. This number is expected to rise with the increasing number of software-as-a-service (SaaS) offerings. SaaS solutions being operated by the provider allow easier implementation of usage-based pricing strategies. However, the share of usage-dependent pricing remains below expectations.

All in all, the majority of revenue models still follows well-established strategies. Software firms tend to yield revenues through end-users and charge single payments based on usage-independent prices. Nevertheless, revenue and pricing strategies may evolve in the light of the rising trends such as cloud computing.

4.3 Upstream: The Solution Composition

4.3.1 Solution Type

Upstream elements mainly deal with solution properties. When investigating the properties of software solutions, one fundamental aspect is the type of software that is offered. A very common classification schema is based on a software stack concept (Gao and Iyer, 2006). Software solutions range from low level infrastructure software up to the highest level of application software. The rationale behind this concept is that upper layers build upon the lower level layers. In other words, to run application software, lower level software (e.g. operating system) is required. In Figure 4.4 we investigate the distribution of software solutions according to the mentioned software stack concept. The results show that half of the respondents focus on pure application software. In contrast, only 13% classify their solutions as pure infrastructure. Roughly one third of the solutions is somewhere in between. Thus, solutions span several layers according to the software stack concept.

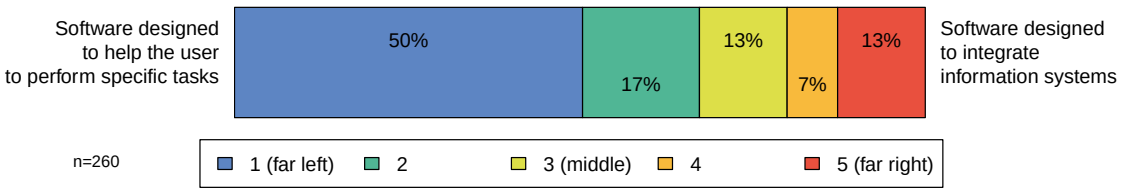

Figure 4.4.: Solution type of the offered product or service.

The high rate of application software firms compared to infrastructure firms makes sense as typically various application software solutions are offered on top of one infrastructure platform. The number of infrastructure solutions

hence tends to be lower than the number of application software solutions. Nevertheless, the potential of infrastructure solutions is often enormous as they can attract multiple providers of on-top applications.

4.3.2 License Model

The license model differentiates the firms' solutions from a legal perspective. The results to this question are shown in Figure 4.5. In our sample, more than 60% of the firms rely on proprietary licenses, i.e. they sell usage rights of their software without disclosing the software code. About 20% of the firms follow a proprietary license strategy; however, these firms transfer all rights to their respective customers. This license type is most common in custom-development projects. Finally, less then 20% rely on open source license models. Thereof, the copyleft licenses are more commonly applied than permissive open source licenses. Firms reyling on open source hence tend to prefer that their developed software remains open source without supporting commercial license opportunities.

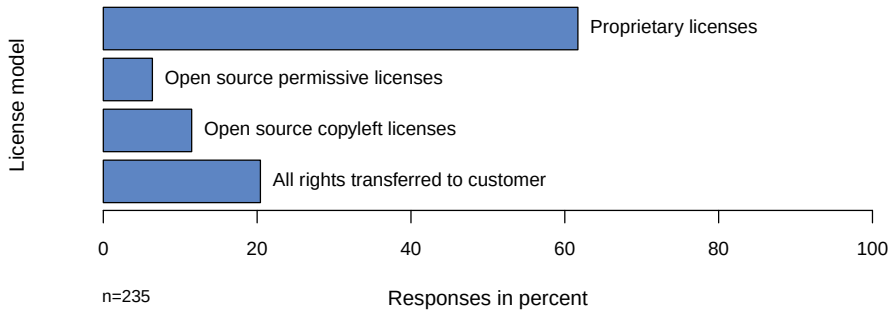

Figure 4.5.: License model of the offered product or service.

4.3.3 Platform

The number of platforms has gradually increased in recent years. Particularly, mobile and cloud computing are well-known trends that shift the traditional platform focus of software solutions. While in the past software was mainly installed on servers and desktop/laptop computers, other platforms have become more and more popular. While these trends are highly cited in press, it is very interesting to analyze the actual market penetration of these platforms.

Figure 4.6 shows the distribution among the different platforms. We start by analyzing the results of 2011. In our sample, game console platforms are hardly used for software deployment. Also software based on social media platforms and embedded systems is offered by less than 20% of respondents. The well-known trends of mobile and cloud computing achieve between 20 and 30% for 2011. The traditional platforms, servers and desktop/laptop computers, dominate the platforms by far. More than half of the software solutions run on servers and even more than two third of the software runs on desktop or laptop computers.

In contrast to the 2011 results, the estimate values for 2013 are very interesting. The results show that the traditional platforms (i.e. servers and desktop/laptop computers are supposed to shrink) and the trend platforms (i.e. social media, mobile and cloud computing) are supposed to increase significantly. While cloud computing comes close to the level of servers, mobile computing almost achieves the same level as desktop/laptop computers. In other words, cloud computing is expected to substitute traditional server platforms and mobile is supposed to become the new desktop/laptop.

All in all, these results provide interesting insights. As of today, the dominating platforms are still the traditional platforms (i.e. servers and desktop/laptop computers). Nevertheless, expectations of software firms show that even in 2013 emerging platforms (i.e. mobile and cloud computing) may catch up with the traditional platforms. The question will be if these expectations will be realized by 2013 and if this speed of growth will continue in the years after. As of now, it seems that the current kings of the hill struggle to keep their positions.

Beyond the comparison of different platforms, we analyze the platform wars within one platform segment. In this year's study we focus on mobile operating systems. The results are shown in Figure 4.7. There is a considerable gap in available apps for Windows Phone when compared to the well-established platforms iOS and Android. Closing this gap would give rise to network effects and help establish Windows Phone as the "third ecosystem". The Appcelerator / IDC Mobile Developer Report indicates that Windows Phone has reached the third place among software developers. Current results from Germany and Finland support this finding. They further find evidence for an even brighter future in the case

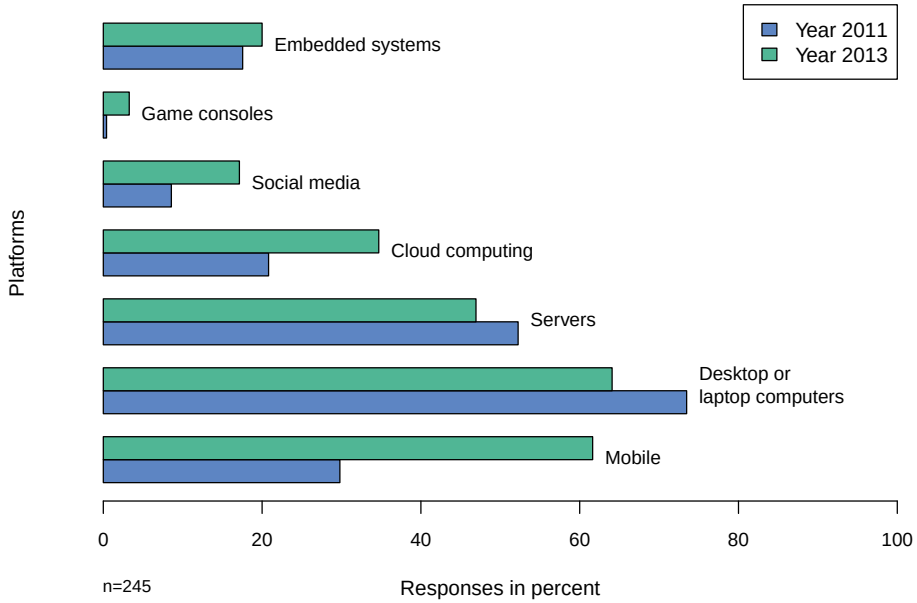

Figure 4.6.: Platforms for which the product or service is offered.

of Windows Phone. Preliminary results from the Software Industry Survey in Finland suggest that in 2013, Windows Phone will have established itself as the third ecosystem. Excluding iOS for iPad, Windows Phone and Android will even be far ahead of iOS for iPhone. Our preliminary results for Germany point to the same direction. The following figure shows the percentage of app developers for the particular platforms among all app developers in our data:

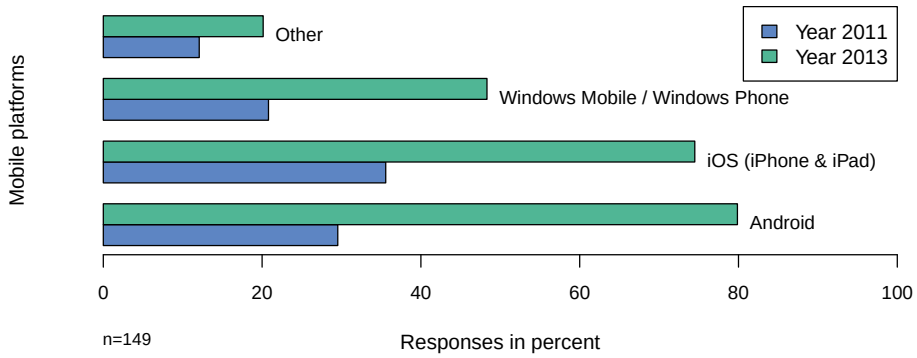

Figure 4.7.: Mobile platforms for which the product or service is offered.

In general, 30% of the respondents indicate to develop software for mobile systems. This number is supposed to strongly increase to 80% in 2013. In 2011, 36% of these firms develop for iOS, 30% for Android and 21% for Windows Phone. Interestingly, strong growth rates are to be expected for all three mobile platforms. Notably, Android is even expected to surpass iOS by 2013, while Windows Phone will have established itself as the third ecosystem.

4.3.4 Standardization

Last but not least, we analyze the degree of standardization of software products. In general, standard software providers can be differentiated from customer specific developers. In our study, we measure a solution's degree of standardization by three means (see Figure 4.8). We investigate if the solution requires knowledge on technology interfaces and processes specific to each customer and we ask if the solution is tailor-made.

Interestingly, more than 70% of the respondents provide solutions that require knowledge on technology interfaces specific to each customer. The same holds true for knowledge about the customer's processes. While software solutions

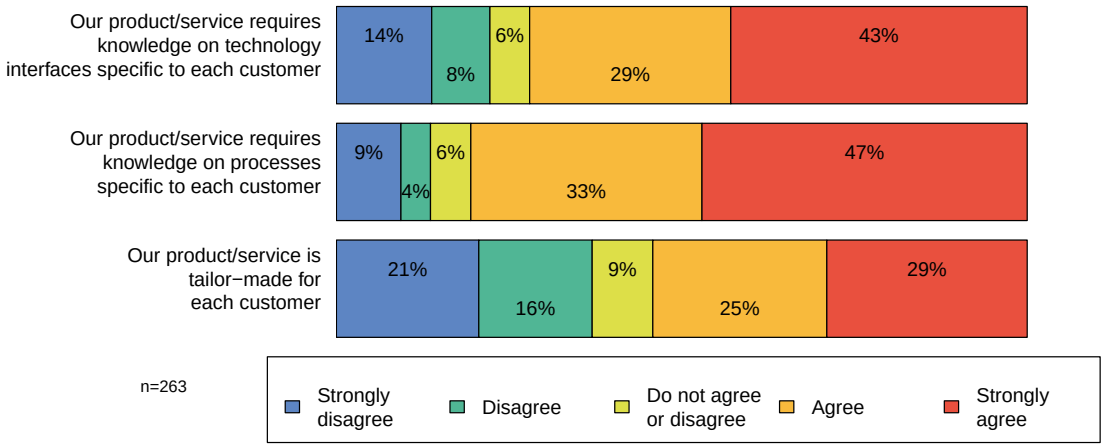

Figure 4.8.: Standardization of the offered product or service.

hence tend to require a certain adaptation to the customer domain, only half of the respondents judge their solutions to be tailor-made for each customer. In other words, even though most of the time solutions need to be adapted to the customer context, not all of the providers develop unique tailor-made solutions. So, many software firms position themselves in the middle between a pure standard software provider and a highly customer specific developer.

Reflecting these results in the context of the platform findings, it turns out that cloud computing faces an important challenge. As solutions often require process knowledge and technology interfaces specific to each customer, cloud computing providers need to include modification and enhancement functionality into their offerings. Technological interfaces, in particular, need to be considered. Cloud computing providers must allow and even support the technical integration of customer specific third party systems. Having said this, the expected rise of cloud computing will depend on its ability to cope with such kind of challenges.

4.4 Downstream: The Go-To-Market

4.4.1 Customers

One of the main dimensions of each business model is the target customer. In our study, we differentiate three main customer segments. We first distinguish between private consumers and organizations. Within organizations, we distinguish small and midsized firms from large firms. The type of organization (e.g. business, public administration etc.) is not reflected in this analysis.

Figure 4.9 shows that the majority of customers can be assigned to the organizations' segments. Only few software firms target the private consumer segment. Notably, in this chart we focus on the main customer segment of our respondents. Thus, software firms may also sell to other segments, which cannot be seen from these results.

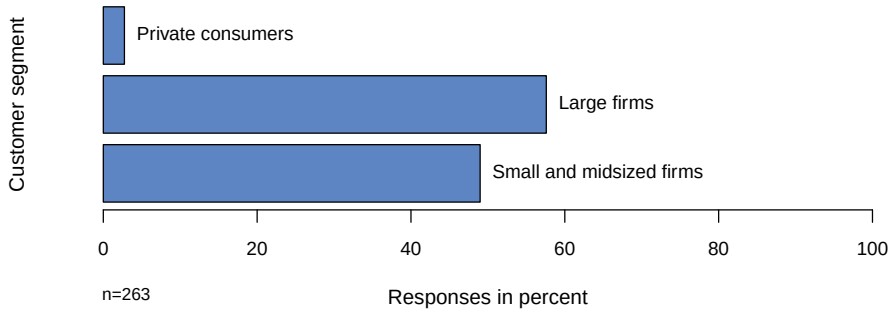

Figure 4.9.: Main target customer to which the product or service is sold.

4.4.2 Users

While the previous section deals with the main customer segment, this section focuses on the end-users to which the product or service is offered and who actually use it. The results are shown in Figure 4.10. Note that for this question the respondents could select multiple target users. The results show that 9 out of 10 software firms target non-software developers as their users. Thereof, three groups dominate our sample. More than 70% provide software for users that are dedicated operational specialist (e.g. accounting software). Roughly 50% offer software for the broad workforce (e.g. travel reimbursement software). More than 40% offer solutions that support managers (e.g. reporting dashboards). Private consumers are only addressed by less than 20%. This finding goes in line with the distribution of customer groups in our sample. While most firms focus on the business segment, only a few target private consumers.

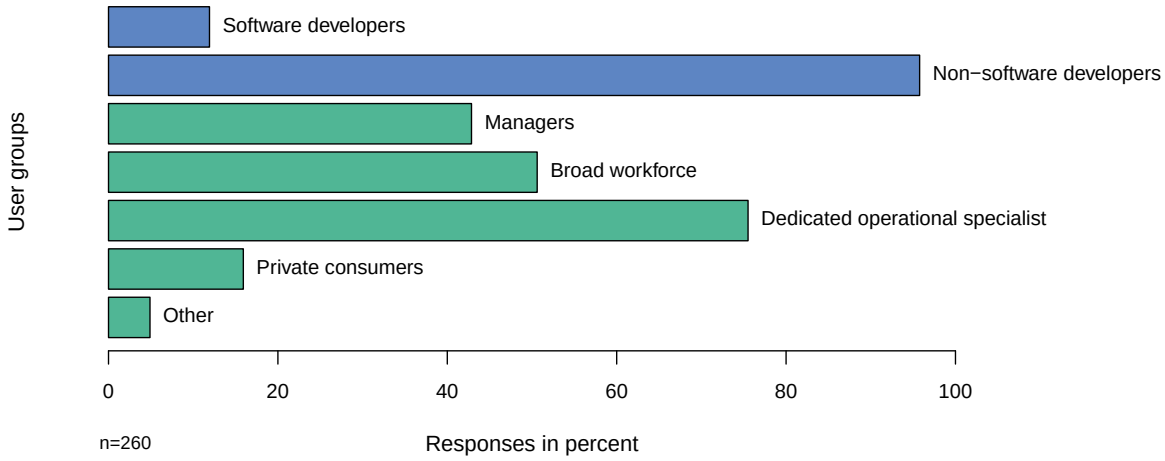

Figure 4.10.: Target users for which the product or service is offered. The top two bars distinguish software developers from non-software developers as target users. The bottom five user groups (in green) are a detailed breakdown of the non-software developers group.

4.4.3 Industries

This section deepens the analysis of the business customer segment. Figure 4.11 depicts the distribution of target industries. Please note that respondents were allowed to provide multiple answers.

The two dominating industries are manufacturing, as well as information and communication. Both are served by one third of the respondents. While the information and communication industry implies that many software solutions are provided to firms within the broader context of the software sector, the rationale for manufacturing may refer to the

German industry structure. Manufacturing comprises industries such as the Automobile sector and is hence one of the dominating industries in Germany. The third place goes to the finance and insurance sector (23% of respondents). So, it seems that this industry is also very attractive to software firms. Notably, more than 20% of the respondents' firms offer software to industries that do not fit into any of the predefined categories. This speaks for a certain degree of diversity. In other words, software is offered to various heterogeneous industries. The last place in our results goes to the agriculture, forestry, and fishing industry (2% of respondents). Again, this may refer to the German industry structure where these sectors have strongly diminished over the years.

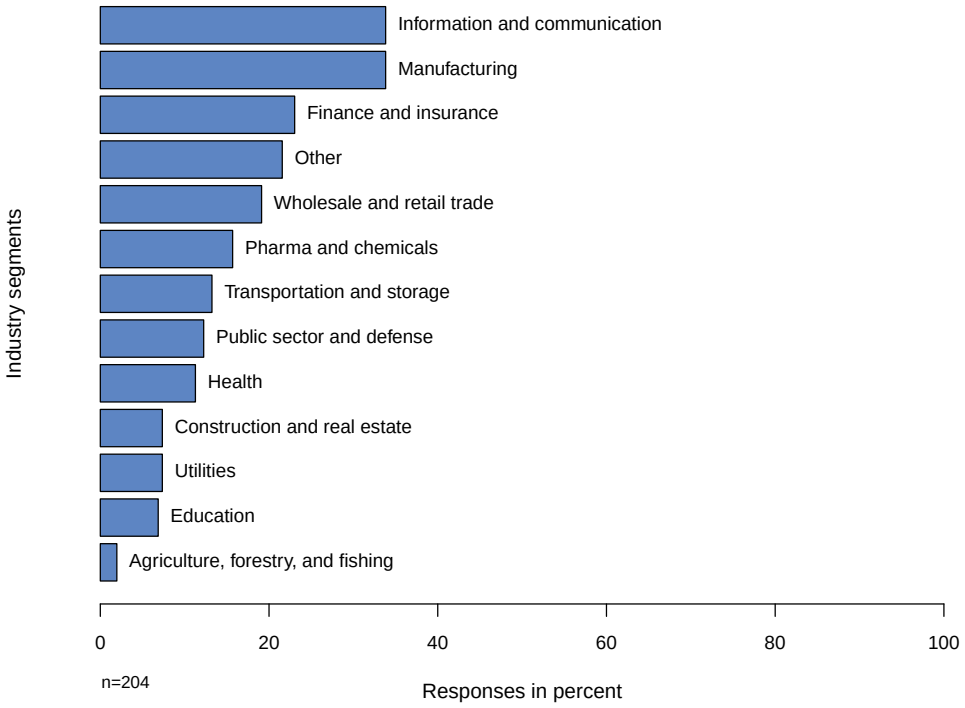

Figure 4.11.: Target industries for which the product or service is offered.

4.4.4 Globalization

Beyond the target industry, a further important aspect deals with the globalization of software firms. Figure 4.12 depicts the main geographic sales regions of the respondents. Thus, for each firm, this figure only shows the geographic region where the major share of revenues is generated.

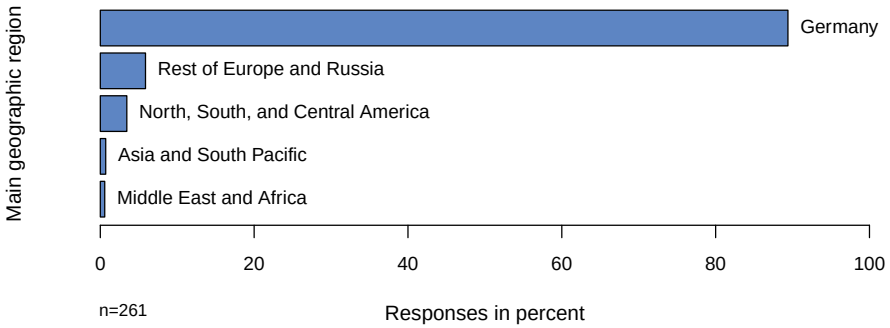

Figure 4.12.: Geographic region where the main share of revenues is generated.

Not surprisingly, Germany is the main target market for about 90% of the respondents. Among the remaining 10%, rest of Europe and Russia, as well as North, South and Central America, are primary target markets. Asia and South Pacific, as well as Middle East and Africa, are stated by less than 1%. Thus, for most of the German software firms, Germany is also the primary target market.

In addition to the main geographic region, we investigate all regions where revenues are generated in Figure 4.13. Not surprisingly, Germany is served by almost all firms. Second place goes to the rest of Europe and Russia. Thus, geographic proximity seems to matter in internationalization strategies. Among the three remaining geographic areas, North, South and Central America is served by more than 20%. Middle East and Africa is served by the lowest number of German software firms. The results of the Finnish software industry survey shows similar results. Apart from their home market, most of the Finnish software firms achieve revenues in European countries. In contrast, Middle East and Africa is only served by 17% and 16% respectively.

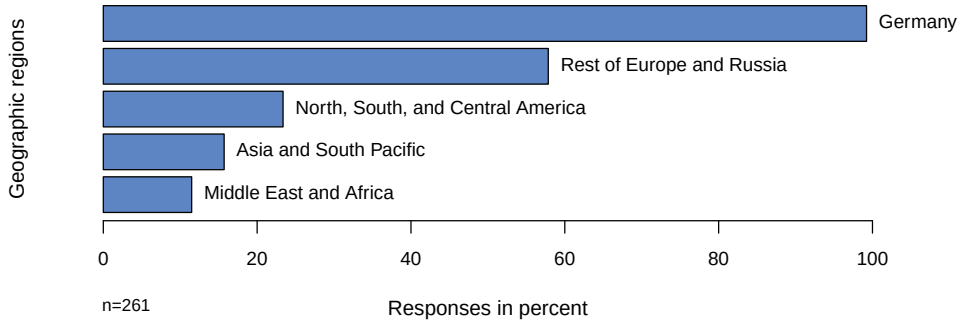

Figure 4.13.: Geographic regions where revenues are generated.

4.4.5 Channel

After reviewing the different target market properties, one further crucial element of a business model is the appropriate sales channel. According to Figure 4.14, about half of the respondents' firms rely on sales agents as their primary sales channel. Referring to the fact that most of the firms in our sample sell business software, the dominance of sales agents is not surprising. Among the other channels retail stores do hardly matter. Again this fact refers to the low representation of consumer software firms in our sample. Interestingly, the usage of online shops as the primary channel is not that important. Reflecting the (as of today yet) low number of mobile and cloud computing offerings, this result can be justified. Nevertheless, assuming high growth rates in these platforms, distribution channels are expected to be affected. Particularly mobile solutions are usually mainly sold through online stores. Events and telesales are used by 20% as the primary channel. Both channels allow a direct customer contact at lower cost than personal sales agents. With increasing number of customers, these types of channels usually become more important.

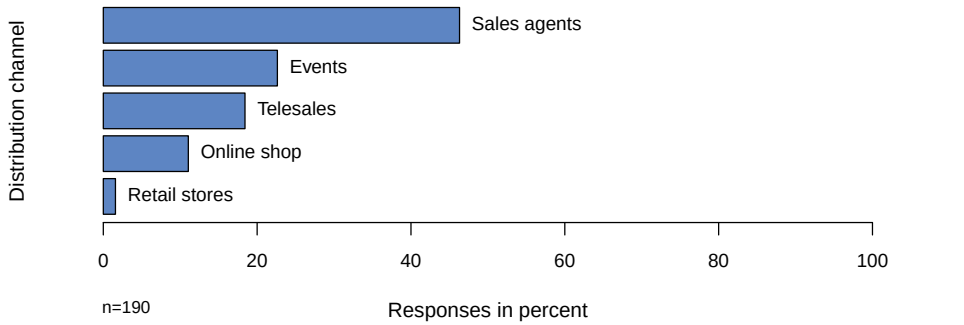

Figure 4.14.: Channels which are used to distribute a firm's product or service.

4.5 Usage: The Solution Lifecycle Management

4.5.1 Implementation and Operation

Implementation and operation of software solutions become relevant in later phases of a products' lifecycle, when it is near to its actual usage or is in use already. In this year's survey we asked the respondents how their firms operate their product or service and how high they would rate the implementation effort (for a definition of implementation, please refer to Subsection 5.3.1). The results are shown in Figure 4.15.

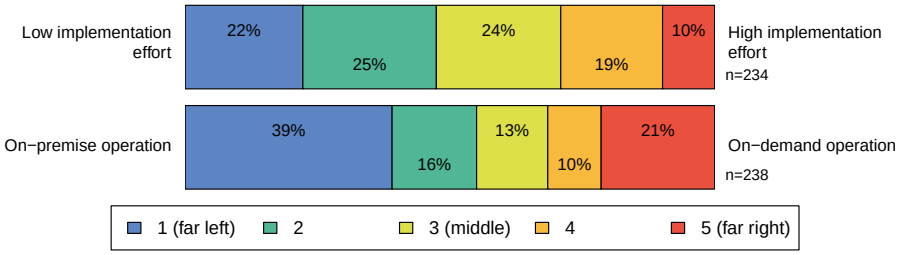

Figure 4.15.: Operation and implementation effort of the offered product or service.

Whereas solutions, which are operated on-premise are best comparable with the traditional way of installing and using a software, on-demand solutions are provided over the internet. Thus, we view on-demand solutions and what is termed cloud computing. Given the hype around cloud computing, we were interested in the actual share of on-demand solutions. The results show that only 21% can be classified as pure on-demand solutions, whereas on-premise accounts for 39%. Even though the difference is considerable, it is smaller than we expected.

Many solutions require implementation effort before they can be actually used. Our results indicate that the implementation effort varies. 47% of the solutions are regarded as requiring low of very low implementation efforts. We thus take a closer look in order to determine which factors influence the implementation effor of a solution. For that, Figure 4.16 show the implementation effort of on-demand solutions vis-a-vis on-premise solutions. We would expect that on-demand solutions should require less implementation effort as they are often advertised as more standardized and easier to use. However, the results do not show much difference with regard to the required implementation effort. The often stated assumption that on-demand solutions require less implementation efforts seems hence to be questionable.

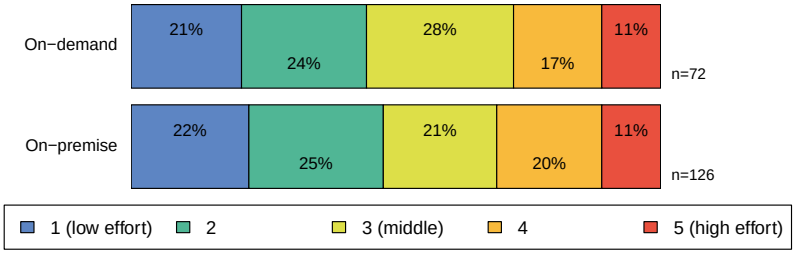

Figure 4.16.: Implementation effort of on-premise and on-demand solutions.

In addition to the operating model and the implementation efforts, we analyze the number of releases that are available on the market at a time (see Figure 4.17). Most of the software firms (44%) offer 2-3 releases at a time. This means, customer usually run on 2 or 3 different release versions. 32% even have customers running on more than 3 releases at a time. Roughly 25% manage to keep all customers on the same release level. In terms of operating and maintenance efforts, a lower number of parallel releases is beneficial.

The following Table 4.1 shows the number of parallel releases depending on the applied operating model. We can conclude that the number of parallel releases tends to be lower for on-demand solutions. Providers of on-demand

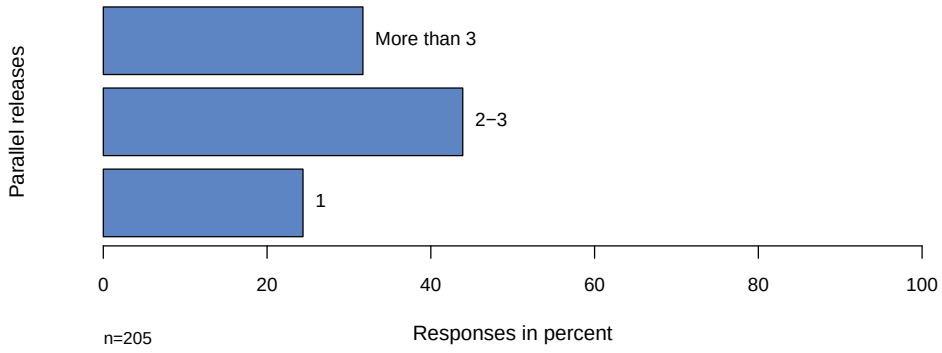

Figure 4.17.: Parallel releases in the marketplace of a product or service.

software can migrate their solution easier and thus maintain a lower number of parallel releases. Nevertheless, also 27% of the on-demand vendors have customer running on more than 3 release versions. So, while on-demand providers can on average decrease the number of releases, only one third of providers manages to decrease the number of release to one at a time.

Operation model	Parallel releases			n
	1	2-3	>3	
On-premise	18.75	45.54	35.71	112
On-demand	34.38	39.06	26.56	64

Table 4.1.: Parallel releases of on-premise and on-demand solutions. Columns 2–4 are given in percent, last column is the absolute value of responses.

4.5.2 Maintenance and Support

In terms of maintenance and support, we analyze several aspects clustered in two dimensions. On the one hand, we examine the maintenance strategy of software firms by measuring their release frequency. On the other hand, we investigate three support properties of our sample firms.

The release frequency as depicted in Figure 4.18 shows that most firms (28%) offer new releases once a year or even less often. Less than 10% follow an agile release delivery principle and publish new releases weekly or even more often. Among the other three categories, quarterly release cycles are most common. The results show that the release cycles are highly spread among the sample firms.

The support provided by the firms is analyzed based on three properties: contract standardization, channels of support access, and nature of customer issues. The results are shown in Figure 4.19.

The first property deals with the standardization of the support contracts. Firms with standardized support contracts will benefit from economies of scale, whereas individualized contracts allow for more differentiated customer treatments. We can see that both extremes are about equal (25%). There is just a very slight tendency toward standardized support contracts (44% in the two left-most fields and 40% in the two right-most fields).

The second property deals with the channels through which support is made available to customers. A single point of access (e.g. phone) speaks for a very standardized support, whereas multiple channels need to be provided in a more individualized setting. The results show a clear tendency toward one or few support channels, thus showing a tendency toward standardized support.

The third property deals with the nature and range of customer issues. Products and services rasing a high diversity of customer issues indicate a less standardizable support, whereas standard issues allow for a standard support. Here the results clearly speak for a high range of customer issues.

Taken together, the three support properties do not favor any of the two extremes. It rather appears that the diversity is rather high and no single conclusion can be drawn for the industry as a whole. Further analysis is required to find differences within the industry.

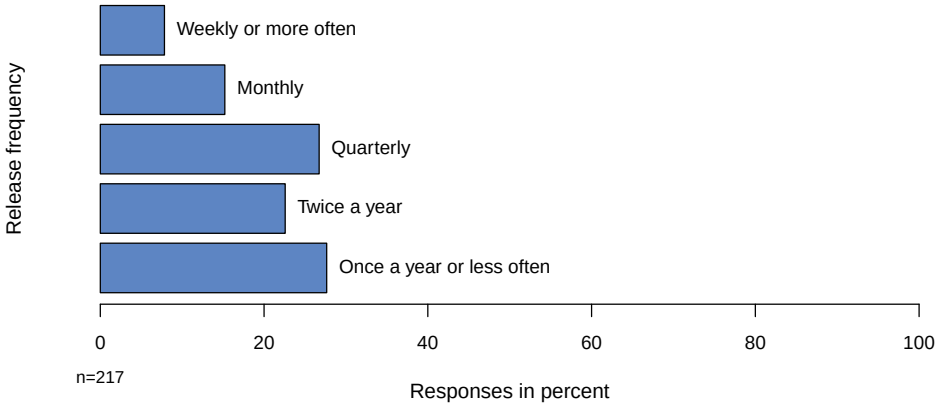

Figure 4.18.: Release frequency of the offered product or service.

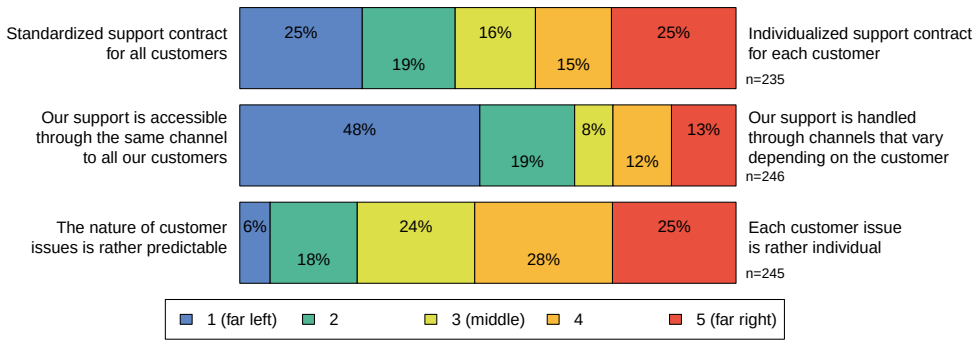

Figure 4.19.: Characteristics of the support offered.

5 Firm Strategies: Competing for Superior Performance

What is strategy? Clearly, there is no single answer to this question. From a high-level point of view, "the essence of strategy formulation is coping with competition" (Porter, 1979). We dig deeper into certain aspects of strategy:

- Competitive environment: Success does not only depend on the firm, it also depends on the environment: competitors, customers, suppliers, entry barriers and substitute products. (Section 5.1.)
- Generic strategies: Firms position themselves relative to their competitors. Two generic strategies can be applied: low cost or differentiation. (Section 5.2.)
- Value creating activities: Firms perform activities in order to create products and services. Relevant activities need to be identified and performed. (Section 5.3.)
- Make or buy decisions: Firms can choose to perform activities themselves or let others do it. There is a tradeoff between the two options. (Section 5.4.)
- Mergers and acquisitions: When organic growth is not sufficient, firms engage in mergers and acquisitions as part of their strategies. (Section 5.5.)

All these aspects can be considered as strategies in their own right. However, they all shape how firms compete and thus provide a holistic picture of strategies in the software industry.

5.1 Competitive Environment: Forces Shaping Strategy

A firm's profitability not only depends on the decisions a firm makes, but also on the environment in the particular industry. For example, competing in an industry with low margins will have an impact on all firms, including those who find successful strategies and outperform their competitors in general. These environmental characteristics that impact profitability within an industry are referred to as *competitive forces*. Porter (1979) identified five forces in total. Taken together, the forces determine the *competitive environment* the firm competes in. In the following, we review three forces: power of suppliers, power of customers, and competitive rivalry.

Figure 5.1 shows the indicators for the two forces power of suppliers and customers. Both are measured in terms of how dependent firms are on them. That is, a firm which purchases all its supplies from just one supplier, is highly dependent. The supplier has a high bargaining power because the firm cannot easily risk to lose its only supplier. Of course, a similar argumentation applies to customer power.

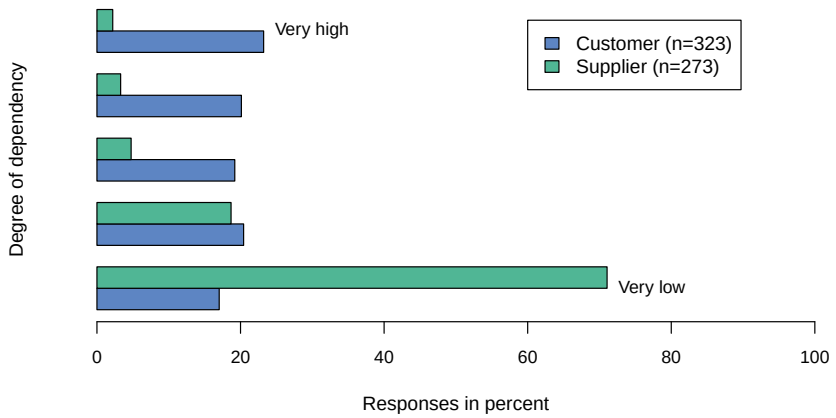

Figure 5.1.: Customer and supplier dependency as indicators for the two forces power of customers and suppliers.

Our results show that most software firms are not dependent on their suppliers. This is indicated by the high percentage (71%) of "very low" responses. The result appears to be interesting, because in such a knowledge intensive industry as

software we would expect suppliers to be important. If a supplier has knowledge of your firm that cannot be easily transferred to a new supplier, switching costs are high. However, it appears that suppliers are of low importance to software firms in general, as will be shown in Section 5.4. We thus conclude that the overall weak relevance of suppliers determines the low supplier power in the software industry.

With respect to customers' power, the results are less straightforward. For each degree of dependency, the amount of responses was about equal. No dominating effect for the industry as a whole can be concluded from this data. It seems that customer dependency is very firm-specific. This can be explained by the wide variety of possible customers. They can differ in sizes (small or large organizations), in firm type (private, firms, government), as well as in other characteristics such as product types. More detailed analysis is required to give a more differentiated view on customer power.

Competitive rivalry is analyzed by looking at the number of competitors and the market share of the firm. Rivalry is supposed to be high when there are many perceived competitors and when the market shares are small, thus leaving little space to unrivaled competition.

Figure 5.2 shows the perceived competition. Apparently, firms face a high number of competitors as indicated by more than 50% of firms responding to have 10 competitors or more. However, 19% of the firms have less than 4 competitors and less than 5% have no competitors at all. It seems that there are some niche markets where rivalry is not that strong, but the overall opportunities are rather small. These results indicate an intense industry rivalry.

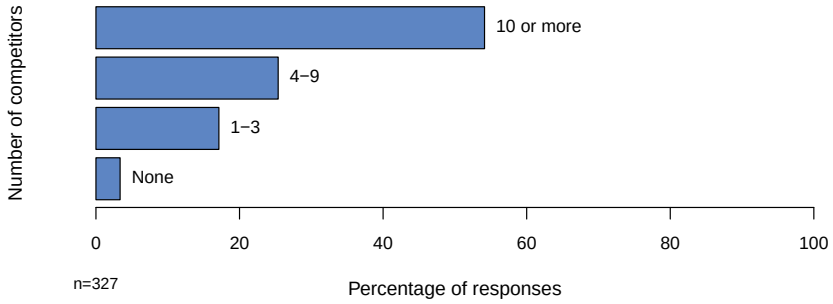

Figure 5.2.: Number of competitors as one indicator for the force competitive rivalry.

Figure 5.3 shows the market shares of our respondents' firms. Almost half of the firms achieve market shares below 10%. Only about 20% of the firms achieve market shares above 50%. In line with the high number of competitors, the low market shares indicate an intense rivalry in the software industry.

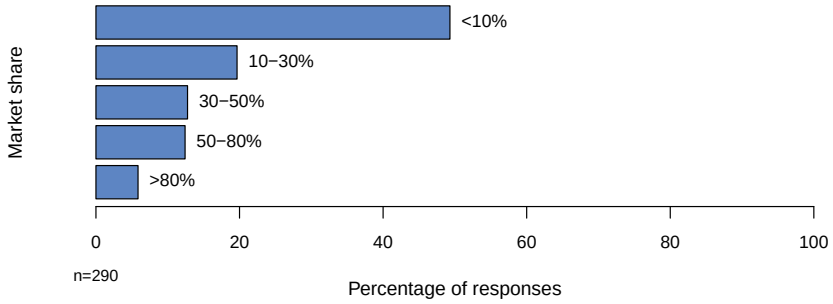

Figure 5.3.: Market share as one indicator for the force competitive rivalry.

From the three forces we conclude that the overall competitive environment is rather difficult. Even though power of suppliers is low, they are just of little importance to our software firms. The results on power of consumers are mixed, indicating that there are niches with both, mild and intense consumer power. Depending on the niche a firm competes in, this results in high or low profitability. The results on competitive rivalry are more clear as they indicate an intense rivalry. We thus conclude that the environment is difficult, but there are niches to exploit.

5.2 Generic Competitive Strategies

Whereas competitive forces determine the overall profitability within an industry, the relative positioning of a firm toward its competitors determines whether it will perform below or above the industry average. If a firm can position itself well it can earn above-average returns at the expense of its competitors. For that, a firm must establish and sustain a *competitive advantage*, which is a strength toward its competitors.

Though there are plenty of different strengths and weaknesses one can look at, Porter (1980) suggested two particular sources of competitive advantage, which he called *generic strategies*: low costs and differentiation. As both strategies are quite abstract, they can be associated with different properties that, taken together, characterize a firm's strategy. Figure 5.4 presents the results for the properties of generic strategies. The first four elements refer to a cost leadership strategy, whereas the last three questions refer to a differentiation strategy. These questions were also included in our Finnish sister study, and will be analyzed further in a joint report about the surveys.

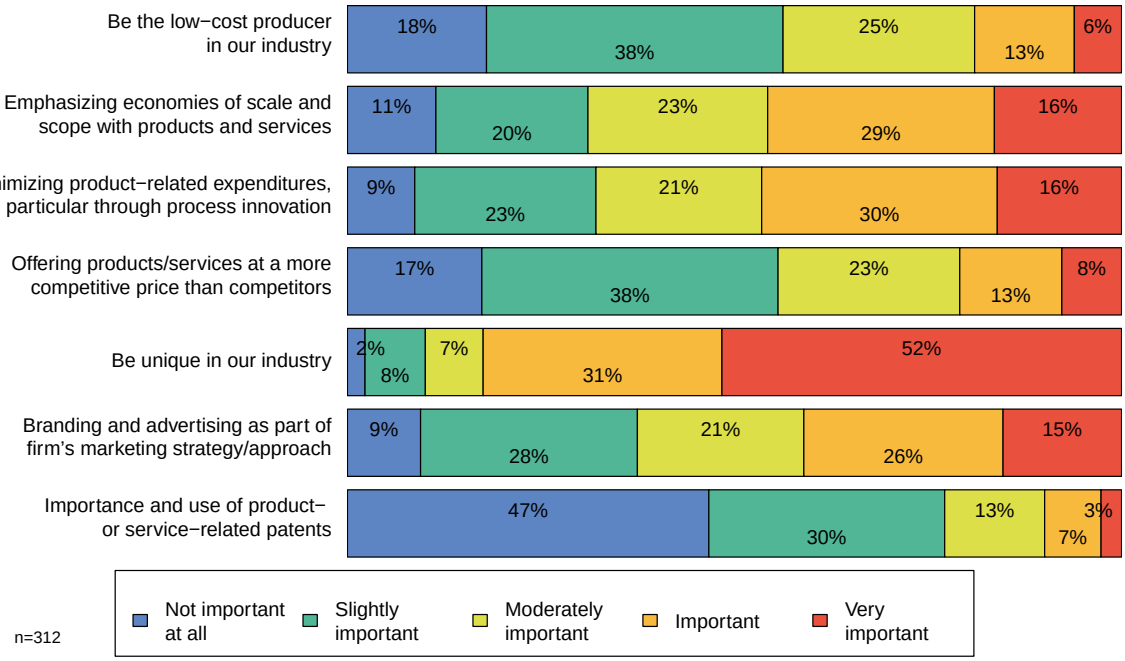

Figure 5.4.: Importance of single properties that characterize the two generic strategies low cost and differentiation.

For more than half of the survey participants being the low cost producer is not or only slightly important. Accordingly, for most firms it is not important to offer their solutions at a more competitive price than competitors. Most firms hence do not judge themselves and do not want to be perceived as low cost providers. On the other hand, many firms are very conscious about their costs. Almost half of the firms focus on minimizing their product and service costs. Thus, efficiency seems to play an important role.

With respect to differentiation, more than 80% strive to be unique in their industry. So, most firms aim at being perceived as unique and highly differentiated. Notably, while branding and advertisting are judged as source of differentiation, only 10% of firms value patents as an important source of differentiation. We think the reason for the low value of patents is due to the large number of small firms. These firms can hardly effort patents and thus do only rarely engage in such activities.

All in all, it can be concluded that most of the firms strive on being perceived as differentiated in their market. Being the low-cost producer and offering products and services at a lower price than competitors is not that important. Nevertheless, many firms express that they are anyhow very cost conscious and try to focus on efficiency. We thus conclude that firms actually attempt to follow-up both strategies: low cost and differentiation.

Porter (1985) added a third generic strategy in addition to low cost and differentiation: scope. It can be viewed as a second dimension as shown in Figure 5.5, were firms can decide on their competitive scope as well as on their source of competitive advantage. Firms with a narrow scope compete for particular segments. In this survey we identify firms with a narrow scope by looking at their revenues from particular industries. Firms with more than 50% coming from a single industry are regarded as firms following a focus strategy.

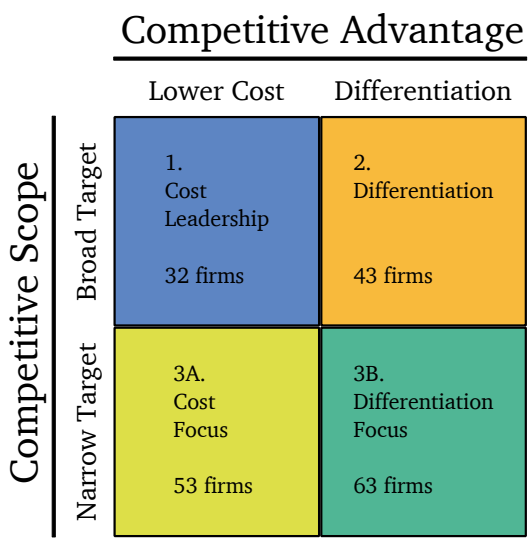

Figure 5.5.: The two dimensional strategy matrix by Michael Porter.

Figure 5.5 shows the number of firms that follow-up particular generic strategies. These results indicate that focus is the most popular strategy. Again, this might be due to the large number of small firms, which often need to focus on particular industries and few customers. Also, this results provide a more differentiated view on the generic strategy differentiation. It is more preferable in the software industry than a strategy of low cost and its popularity is independent of the particular scope.

As a remark to this section, we would like to add that dividing generic strategies in the given categories is not that clear-cut. Firms can follow up multiple strategies at the same time. Porter (1985) termed such a situation as "stuck in the middle" and described it as inherently unfavorable. However, our previous analysis of preliminary data indicates that "stuck in the middle" is actually the most successful strategy, with performance being measured based on perceived relative growth (toward competitors), revenue growth, and personnel growth.

5.3 Value Chain: Value-creating Activities of Software Firms

The *value chain* is a widely used framework introduced by Porter (1985) as a tool for developing and sustaining competitive advantage of a firm. *Value chain analysis* decomposes a firm into activities. Each activity contributes to the creation of a product or service and adds value to it. Thinking of a firm as a set of connected activities allows for a better understanding of cost behavior and sources of differentiation. Figure 5.6 shows the value chain of a typical software firm. The activities are defined in the following subsection.

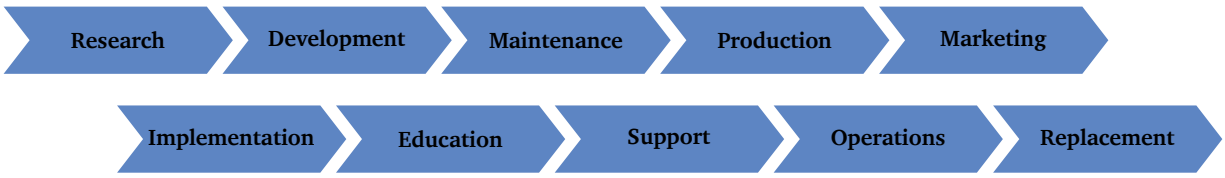

Figure 5.6.: Ten typical activities of a software firm's value chain.

5.3.1 Activities and Value Chain Definition

For our research, we defined a value chain specific to the software industry, we refer to it as the *software value chain*. It comprises the ten activities shown in Figure 5.6: research, development, maintenance, production, marketing, implementation, education, support, operation, and replacement. Detailed activity descriptions are given in Table 5.1.

It is important to note that each firm has its own value chain as the actual activities at hand depend on the product or service created. Furthermore, not all activities will be equally important to all firms and the level of granularity (the detail and number of activities) may differ. However, we define the software value chain as an analysis tool for all software firms. For that, the value chain is designed such that it covers the most relevant activities of a generic software firm. For details on how we derived the activities please refer to our scientific publication Pussep et al. (2012b).

Activity name	Constituting subactivities	Detailed description
Research	(1) Development of a product vision, (2) fundamental research of algorithms, (3) decision upon major technologies and subsystems, and (4) proof of concept.	This activity comprises fundamental product research. A product vision is developed and fundamental algorithms are researched. Major technologies and subsystems are selected. A first proof of concept is provided through a prototype or analysis of algorithms, technologies and subsystems. The result is a product idea, algorithm or proof of concept. Unlike in the following activities, no code is created here which becomes part of the actual product.
Development	(1) Requirements engineering, (2) software design, (3) coding, (4) subsystem testing, (5) subsystem integration, (6) system testing, (7) user documentation, and (8) provisioning.	This activity comprises the actual software development process. Based on requirements, a software design is created. The entire system is decomposed into subsystems. Subsystems are programmed and tested separately, before they are integrated and tested as a combined system. The user documentation is created and the product is compiled to an executable and versioned product. The result is an executable version of the product.
Maintenance	(1) Requirements engineering, (2) software design, (3) coding, (4) subsystem testing, (5) subsystem integration, (6) system testing, (7) user documentation, and (8) provisioning.	Same as development, but the focus is on bugfixing and enhancing an existing product, whereas the activity development aims at the creation of a new product. Within maintenance, disruptive changes are not allowed. Instead, incremental changes are made by the product maker to an existing product in the marketplace.
Production	(1) Assembly, (2) printing, and (3) packaging.	Within assembly, software and respective documentation are bundled to one package. The assembled software package is printed to a physical medium and the documentation is printed on paper. In packaging the physical product artefacts are packaged in a physical package. The result is a product with all attributed artifacts, which is ready for shipment.
Marketing	(1) Launch, (2) price, (3) place, (4) promotion, (5) bundling, and (6) brand management.	Providing a means by which buyers can purchase the product and inducing them to do so, such as sales and promotion. The result is readily marketed product in the marketplace, such that customers are aware of the product and the product is available for purchase or has been purchased already.
Implementation	(1) Installation, (2) configuration, (3) adjustment, and (4) business process reengineering.	The installation comprises the transmission of the packaged binaries to the customerŠs information system. Moreover, it ensures that the binaries can be executed without runtime errors. Configuration allows the setting of software parameters and software modifications according to the customer's needs. Finally, adaptations can be performed that modify or enhance the functionality of the software product and employ business process changes.

Table 5.1 – continued from previous page

Activity name	Subactivities	Detailed description
Education	(1) Training and (2) certification.	Training of users and third party firms. In addition, certifications attest users and third party firms a certain degree of seniority in the handling of a software product.
Support	(1) Primary support and (2) development support.	Support can be differentiated in primary and development support. While the first sub-activity deals with the support of users, the second activity relies on deep technical knowledge and implies code reviews.
Operations	(1) Hosting, (2) monitoring, (3) backup, and (4) upgrade.	The operations activity ensures the execution and management of a product on an information system during actual usage by customers. By monitoring the system behavior can be analyzed and supervised. To minimize damages through data loss, regular data back-ups need to be planned, run, and administered. Finally, the information system needs to be upgraded to new releases during its lifecycle.
Replacement	(1) Alternatives, (2) migration, and (3) shutdown.	First, replacement deals with the decision if the product (once it becomes outdated and reaches the end of it's lifecycle) shall be replaced by an alternative system. If the decision for an alternative is made, data needs to be migrated from the legacy to the new system. Subsequently, the legacy system is shutdown. A seamless transition to the new system is the main target at this stage. After the irrevocable data destruction of confidential information, the shut-down activity is completed.

Table 5.1.: Activities of the software industry specific value chain.

5.3.2 Execution of Activities: Relevance, Offering, and Performance

The software value chain is defined such that it encompasses all activities, which are relevant to software firms in general. Clearly, as there are many different software firms out there, not all of them will regard the ten activities as equally relevant. Some activities will be irrelevant to single firms altogether. However, once an activity is relevant, we are interested in how this activity is *executed*. For that, we differentiate two characteristics:

- Offering: Relevant activities must be offered in the marketplace. A firm can offer the activity in its own name (internal offering), or it can rely on third parties to do so (external offering).
- Performance: Relevant activities must be performed by someone. For that, a firm can rely on its own employees (internal performance), or it can rely on third parties, e.g. subcontractors (external performance).

These characteristics result in a four field matrix as shown in Figure 5.7. Note that one field is irrelevant to us, as we take the perspective of one firm. For the firm, it is irrelevant how third parties perform their activities. Table 5.2 shows detailed statistics on how firms execute their activities. Columns 3–5 show the statistics for all three fields from Figure 5.7. The last two columns show the percentages for firms for which the corresponding activity is relevant. Note that columns 3–7 are given as percentage values based on relevant activities. Thus, in case of research, 69.19% of the firms think research is relevant to them. Out of the 69.19%, 94.90% offer the activity internally. Thus, taken together, we can conclude that 65.66% of all firms offer the activity internally (69.19% multiplied by 95.90%).

In general, the results show that activities research, production, and replacement are not as relevant as the other activities. With only 40.87% production is the least relevant activities. As software can easily be distributed without any physical media, this result does not come as a big surprise. However, firms that regard these three activities as relevant, offer them internally. From that we conclude that not all products and services require these activities, but when the activities are required for the product or service at hand, firms are reluctant to leave these activities to third parties and prefer internal offering instead.

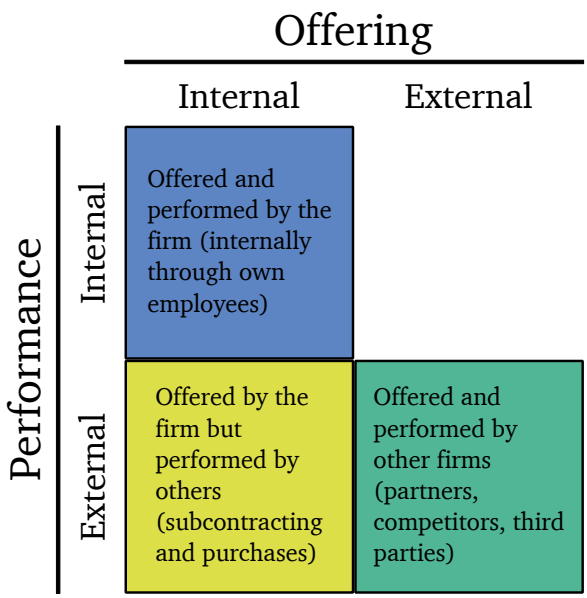

Figure 5.7.: Three means by which a firm can execute a relevant value chain activity.

Looking at external performance, we can see that firms often (in the sense of above-average) leave three activities to be performed by third parties: production, marketing, and operation. This provides a more differentiated picture on production. Firms offer the production of their product but often leave the actual performance to third parties. The results are somewhat surprising when it comes to the marketing activities. It appears that firms are keen to leave those to third parties, probably hiring specialists for marketing campaigns. Finally, operation is the most widely externally performed activity. This indicates that software firms are focusing on the core competencies being software creation and leaving the operation to specialists, who can make use of economies of scale and are assumed to be better able to provide the required security.

We further compared the execution of activities between two types of firms: software product firms (*product firms*) and firms that delivers software projects or other related services (*service firms*). The empirical results are given in Table 5.3.

In general, it appears that the relevance of all activities is lower for service firms. Even though we did expect to find characteristic differences with regard to activities, the results do not allow us to differentiate product from service firms based on their value chains. However, the results prove that the software value chain describes the activities of both firm types well and can thus be applied for analysis of both.

Another result is that service firms are more keen to offer activities internally and perform them externally. Even though the difference is smaller than expected (about 3 percentage points), it is big enough. This also results in a higher overall ratio of externally performed activities. From that we conclude that service firms are seeking a competitive advantage by outsourcing activities.

As a conclusion, we regard the software value chain as a valuable framework for software firms. It allows for a high-level separation of a firm's activities, these can be used to design processes and analyze costs based on activities. The empirical results further suggest that service firms should pay high attention to which activities they can perform externally.

Activity	Relevance	Internal offer and performance	Internal offer, external performance	External offer and performance	Total internal offer	Total external performance
Research	69.16	87.90	7.01	5.10	94.90	12.10
Development	97.88	93.51	5.19	1.30	98.70	6.49
Maintenance	97.88	93.51	5.19	1.30	98.70	6.49
Production	40.87	64.71	22.35	12.94	87.06	35.29
Marketing	88.84	72.86	12.56	14.57	85.43	27.14
Implementation	96.09	90.05	4.07	5.88	94.12	9.95
Education	88.55	87.56	5.47	6.97	93.03	12.44
Support	98.71	92.58	4.37	3.06	96.94	7.42
Operation	88.64	54.36	25.64	20.00	80.00	45.64
Replacement	74.13	90.60	4.70	4.70	95.30	9.40
Mean	84.07	82.76	9.66	7.58	92.42	17.24

Table 5.2.: Relevance, offering and performance of value chain activities for the major software product or service. All numbers are given in percent. Sample size is 237 firms.

Firm type	Relevance	Internal offer and performance	Internal offer, external performance	External offer and performance	Total internal offer	Total external performance
Product firms	87.34	84.92	8.23	6.85	93.15	15.08
Service firms	79.44	82.21	11.12	6.67	93.33	17.79

Table 5.3.: Relevance, offering and performance of value chain activities for the major software product or service per firm type. All numbers are given in percent. Our sample comprises 119 product firms and 97 service firms.

5.4 Make or Buy Decisions: Diversification and Vertical Integration

Firms face a fundamental decision on how many products and services they want to include in their portfolio. This decision has many aspects such as the number of products and services (*diversification*) as well as the degree of product and service activities they want to create within their own firm (*vertical integration*). Driving up diversification and vertical integration will increase a firm's size, whereas a focus on few products and services make it easier to maintain a firm's core competencies. Obviously, there are many more problems and merits of these strategies. In this section, we analyze to what degree software firms apply them.

Diversification is measured by looking at the product and service offering of a firm. Two characteristics of diversification are differentiated: the number of products and services (*broadness*) and their *unrelatedness*. A firm with a broad number of mostly unrelated products and services is said to be highly diversified. Figure 5.8 depicts the distribution in terms of the broadness of the portfolio and the relation among the portfolio elements. While most firms claim that their portfolio elements are highly related, there is no dominant strategy in terms of the broadness of the portfolio. By combining both questions, it can be derived that, on average, firms are rather less diversificated.

Vertical integration can be measured in multiple ways. From the results in Section 5.3 we can see that in general, most firms prefer to offer and perform activities by themselves. A previous study based on the same method showed similar results (Pussep et al., 2011). This is a strong indicator of a high vertical integration in the software industry. There are more quantitative measures pointing in the very same direction. For example, a recent study analyzed more than 44,171 software firms worldwide. Based on their accounting data an average vertical integration of 48.84% could be derived. That is, almost half of a software firm's product's or service's value is purchased from suppliers or is performed through subcontractors, rather than being actually added by the firm itself. Even though this value is lower as indicated by the values obtained through the value chain, it is high when compared to other industries (Pussep et al., 2012a).

The previously mentioned study was based on data obtained from a database. With our survey we attempt to confirm the results based on primary data. Two indicators of vertical integration are used:

- Personnel costs: High personnel costs indicate a high vertical integration, as in such a knowledge intensive industry as software there a hardly any physical goods to be exchanged between firms. Rather, most value is created through personnel.

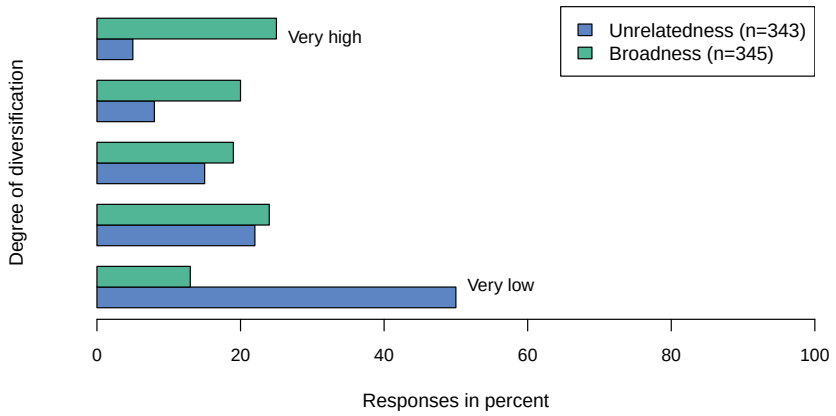

Figure 5.8.: Diversification of software firms as measured by broadness and unrelatedness of their products and services.

- Purchase costs: High purchase costs indicate a low vertical integration, as a considerable share of a firm's product or service seems to be obtained from suppliers.

Figure 5.9 confirms the previously obtained results. The personnel costs appear to be rather high, whereas purchase costs are low, thus both pointing to the same direction of a high integration. Most of the software firms spend less than 30% of their total costs on purchases from third parties. In contrast, for the majority of software firms personnel costs are the dominating cost position in their profit and loss statement. Consequently, all previous studies and the results of this survey indicate a high vertical integration in the software industry. We think the results point to the direction that software is a good that is hard to divide between different firms when compared to other products. Furthermore, the properties of software favor economies of scale and scope when integration increases.

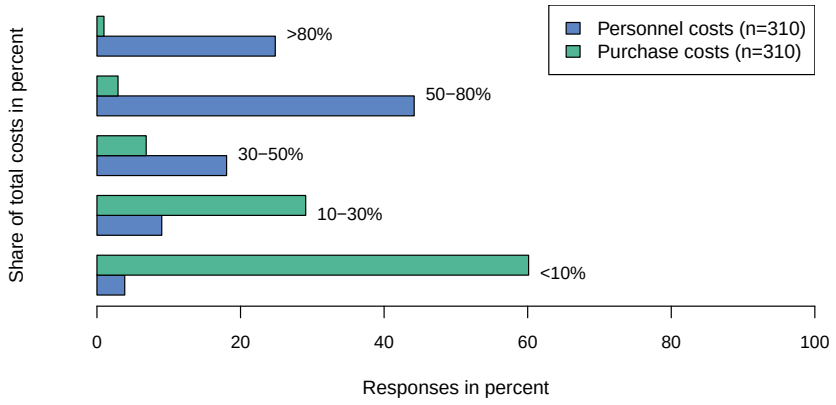

Figure 5.9.: Vertical integration of software firms as measured by the share of personnel and purchase costs on total costs.

5.5 Mergers & Acquisitions: Inorganic Growth of Software Firms

The degree of vertical integration and diversification, as discussed in the previous section, is often subject to change based on mergers and acquisitions (M&A). By acquiring another firm, a firm can increase the degree of vertical integration or diversify its activities. This section analyzes this strategy and reviews the respective results of our survey respondents. Notably, M&A have become one of the main trends in the software industry, as represented through the very high number of deals. According to Mergerstat, the number of M&A transactions in the software industry outperformed all other industry sectors (Buxmann et al., 2011). In terms of cumulated transaction volumes, the software industry achieved second place in the U.S. and sixth place in Europe. Thus, M&A seem to be a viable strategy for many software firms.

For this topic, we investigate three different aspects of Mergers & Acquisitions. Haleblian et al. (2009) differentiate three main dimensions for the analysis of M&A. Accordingly, we start by examining the M&A activity of the sample firms. Then, we review potential impact factors determining the success of the transactions. Finally, we examine the performance of the M&A deals.

5.5.1 The Degree of M&A Activity

We start by analyzing the degree of M&A activity. The goal is to investigate if M&A is an important strategy for our sample firms as indicated through the official M&A statistics. We measure the degree of M&A activity by the three following means (5.10). About two thirds of the sample firms do not prefer M&A over strategic partnerships. More than 70% do not plan to acquire one or more firms within the next two years. Likewise, most firms do not judge M&A as a key part of their growth strategy. In sum, only one out of twenty firms regards M&A as a strategically important topic. These results indicate that M&A is not a very hot topic for most of our sample firms.

Nevertheless, this finding is very interesting. Since software is the industry with the highest number of M&A transactions, this result seems to be contradictory at first. However, one rationale may be the nature of the sample firms. As most firms in our study are rather small, they do not seem to drive the M&A mania. In contrast, the dominating big firms seem to be responsible for the high importance of the topic. Major deals such as the takeover of Skype by Microsoft achieve high recognition in press, but are not representative for the strategies of most software industry firms. The majority of firms, particularly the small ones, seem to prefer organic over inorganic growth.

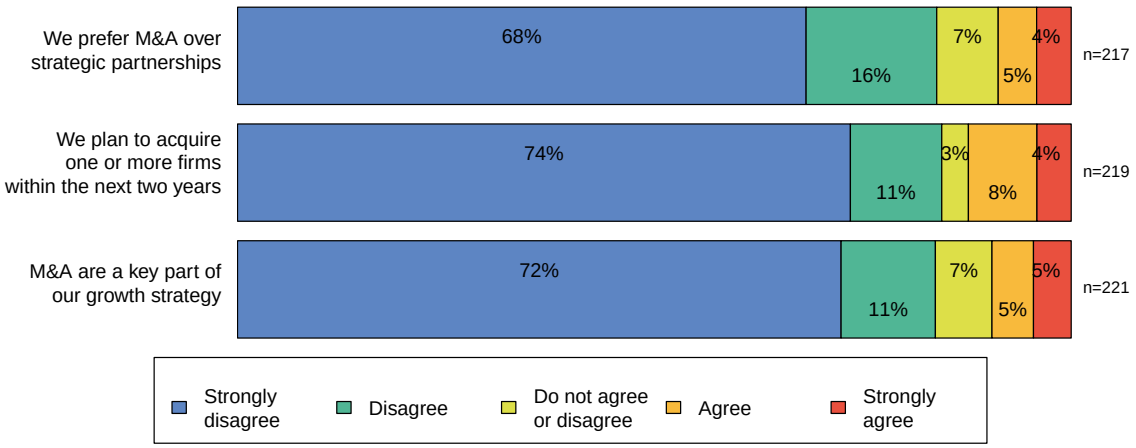

Figure 5.10.: Merger Activity

5.5.2 Determinants of M&A Success

The next aspect deals with the execution of mergers and acquisitions as it has a significant impact on the performance of a transaction. For that we ask the respondents four questions (see Figure 5.11). More than 70% thoroughly investigate the target firms during the due diligence process. In contrast, about 8% do not agree with this statement. Thus, the M&A execution seems to offer room for improvement in some firms. The next three questions investigate the aspects that firms may look for in analyzing takeover candidates. While the generic strategic fit seems to be important for most of the respondents (82%), the two more precise questions deliver more divers results. While compatibility seems to be very important, the results for complementarity are not as strong. 85% judge compatibility as important or even very important, whereas only 70% emphasize the importance of complementarity. So, compatibility seems to be more important than complementarity when investigating takeover targets. Nevertheless, the majority of respondents emphasize that a strategic fit is important and that they conduct a thorough due diligence process.

5.5.3 Analysis of M&A Success

While in the previous section, most firms confirmed that they investigate their takeover targets thoroughly, particularly with a focus on the strategic fit of the firms, we now analyze the perceived performance. 66% would perform most

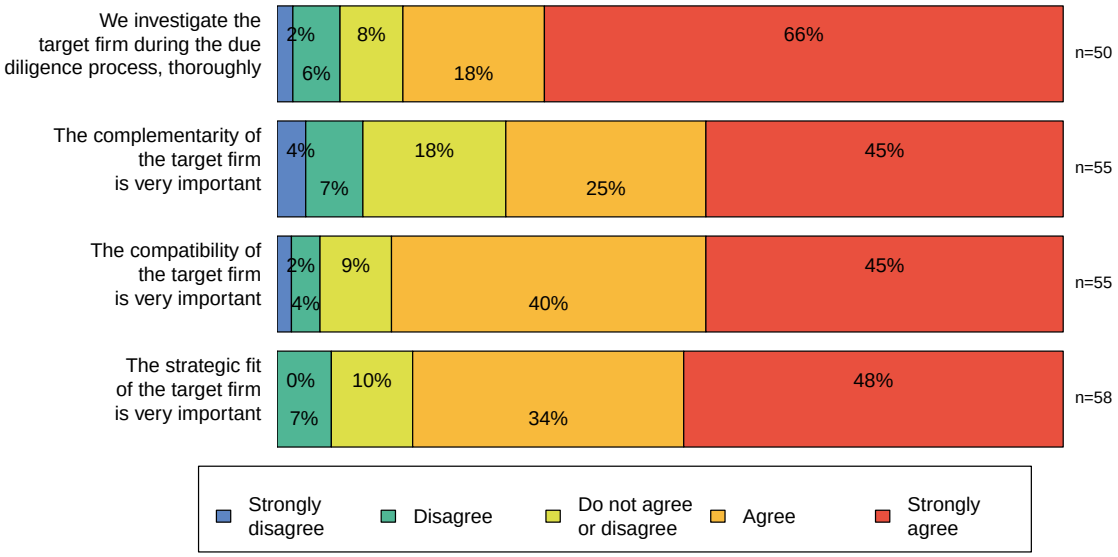

Figure 5.11.: Determinants of M&A Success

of their acquisitions again. In contrast, about 21% disagree with this statement. When comparing the performance to competitors' M&A transactions, the results are more unambiguous. About 45% judge their M&A as outperforming. 13% rate their M&A performance as being worse. The third category investigates if the transactions exceed expectations. Only 42% of the software firms report that the transactions exceeded their expectations. In contrast, 26% did not agree to this statement. So, even if most respondents would do their M&A transactions again, the results are more heterogeneous when it comes to the evaluation compared to competitors and in terms of expectations. While the overall tendency is still positive, at least two of the success indicators are not that unambiguous.

All in all, the results show that respondents in our sample have positive attitudes toward M&A. Nevertheless, the M&A activity seems to be much lower for small firms as for the big ones that are often cited in press. Further, most of the respondents thoroughly analyze the target firms and emphasize the strategic fit. Finally, most respondents are satisfied with their transactions. However, compared to competitors and to expectations, the indicators are not that unambiguous. While there is no final truth in evaluating the success of mergers & acquisitions, the list of failed and overpriced transactions is long. So when participating in the M&A mania, firms should thoroughly consider their investment decisions.

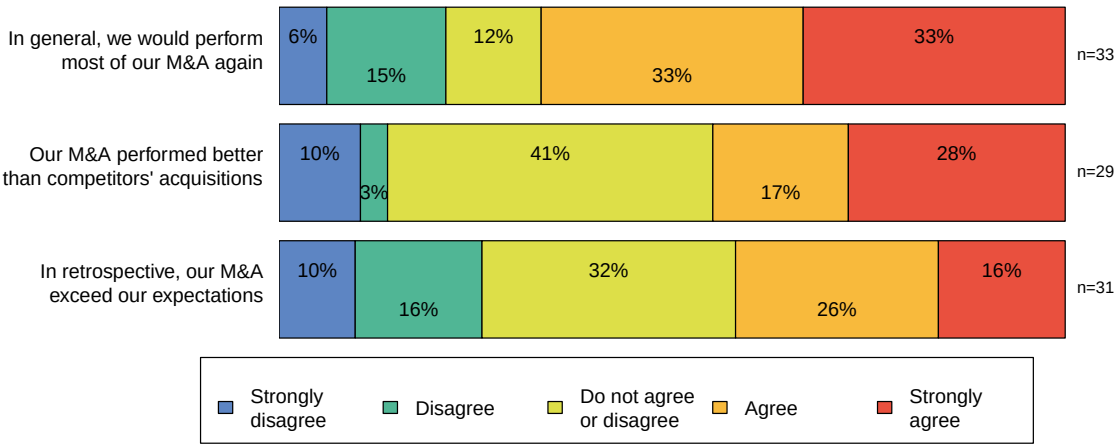

Figure 5.12.: Merger Performance

6 Conclusion

The goal of the German Software Industry Survey[1] is to investigate the current state of the German software industry. The survey is carried out by Technische Universität Darmstadt[2] in cooperation with other European research institutions. Through collaboration we plan to establish the survey as a yearly international mirror of the European software industry.

The findings are based on empirical findings and conclusions made are grounded on firm data. We hope that this type of research contributes to the work of both, practitioners and researchers. Keeping the data confidential and only publish it in an anonymous and aggregated manner is our core responsibility.

This year's survey has been conducted for the first time in Germany, breaking new ground. Two topics have been the main focus this year: business models and competitive strategies of software firms. Being the first time running this survey in Germany, we achieved a reasonably good participation rate. In total, we received 524 responses (259 full and 265 partial). Various interesting results could be obtained:

1. The German software industry is mostly comprised of software product firms and software service firms. They are dominated by small and very small firms, only few are very large firms on a global scale. The majority of the firms has been founded in the recent decade. All in all, the German software industry showed strong growth rates from 2010 to 2011. Even stronger growth of almost 30% per year is expected by this survey's respondents in the following five years, thus indicating an overall positive outlook.

2. The nature of business models in the German software industry is multifaceted. The firms' business models are hence investigated based on several characteristics. Revenue comes mainly from the end-users. Only a few firms can yield significant revenues from third parties (e.g. through advertising). Pricing is mostly independent of the actual usage. Upfront licensing and recurring subscription fees being most commonly applied. Whereas the number of on-demand solutions (e.g. software as a service) is significant, it is clearly dominated by traditional on-premise solutions. This can also be seen by looking at the primary platforms, being traditional servers and desktop/laptop computers. However, our results show that mobile and cloud computing are expected to catch up with the dominating platforms by the year 2013.

   Most firms offer application solutions rather than targeting the infrastructure layer. Most of these solutions are targeted at business customers in three top target industries: information and communication, manufacturing, finance and insurance. Most solutions in the B2B market have a certain degree of complexity and require customization to fit the customers' needs. Correspondingly, most firms use sales agents as their primary sales channel.

3. Software firms in Germany compete in an intense environment. Strategies focusing solely on low costs or high differentiation appear to be insufficient in such an environment. The results show that most successful firms balance low costs and high differentiation toward their competitors. The need for differentiation can be seen from the high degree of integration that we find for both, product and service firms. The latter, however, appear to make more extensive usage of outsourcing to third parties and focusing on core competencies.

This report is accompanied by the online tool Business Model Wizard[3], which has been developed in the Software-Cluster. It is designed for software firms to review, communicate, analyze, and benchmark their business models. We hope that this survey and the Business Model Wizard can be powerful tools in support of the German software industry. All participants in this year's survey will receive an individualized report in the upcoming months. Also, we are currently thinking about publishing an international reports with other survey partners. We will keep everyone interested up-to-date through our website: https://www.softwareindustrysurvey.de

1 https://www.softwareindustrysurvey.de
2 http://www.tu-darmstadt.de
3 http://www.software-business-model.com

A Appendix: Research Methods

A.1 Developing the Contact List

The primary data for this study was collected from the German software industry using a web questionnaire. We aimed to cover the entire software industry including also firms that did software business, but are not necessarily classified as software firms in the official industry classification. We used two main sources of data to compile the sampling frame and to get up-to-date contact information and financial data:

- Hoppenstedt database
- Orbis database

After completing these steps, the long list of firms included more than 20,000 firms. The entire list was screened to exclude firms to which we felt that it was not appropriate to send the survey. After eliminating firms that were no longer active, removing non-software firms, and combining firms that were actually just one firm (e.g. corporations with subsidiaries or holding firms), a total of 21,583 firms were included in the contact database. During the course of the project, several hundred firms were removed since they reported not being active or not being in the scope of the survey. Missing e-mail addresses were collected from firm websites. We mostly contacted the firms through their general contact addresses.

A.2 Data Collection Process

The survey was implemented following a modified version of the so-called tailored survey design method. The data collection process began by sending out the main survey package to 21,583 firms on 9th May 2012. The roll-out mail contained information about the survey and instructions on how to participate in the survey. The delivery status of the emails was recorded, and a second batch of emails were sent on 4th June 2012. In the second emailing, all non-functioning emails in the first round (i.e., emails that bounced from the receiving mail servers) were removed or substituted with new untried email addresses, if available.

During the emailing of the survey, we were informed of several firms who had moved, whose contact person was no longer working for the firm, or who were not operating as an independent firm anymore. All undelivered emails were analyzed, and where possible, the contact was repeated using new contact information of the firm.

Several approaches were taken to convince the informant of the importance of the survey. Many organizations closely linked to the software industry were asked to endorse the survey. The survey was conducted on behalf of the Software-Cluster, which is funded by the German Federal Ministry of Education and Research. In addition, we promised to provide firm-specific reports of the responses as a further incentive to respond.

The total number of complete responses was 259. Besides complete responses, we obtained responses in which the response was only partially; that is, responded to some questions but not proceeded to the end of the survey form. These partial responses were obtained from 265 firms.

Though investigating the German software industry, our sample may include some firms from abroad. The rationale for this effect is that some firms are listed as German software firms though being a subsidiary of an international parent organization. When investigating the structure of our sample we identified a few firms that may fall into this category. Nevertheless, as this only occurs very rarely, we see our sample still as a good proxy for the German software industry.

A.3 Development of the Survey Instrument

The survey was developed in cooperation with our cooperation partners from Aalto University, who have been conducting a survey in Finland since 2002. Whenever possible, we adapted questions from their previous survey or from scientific publications. Whenever this was not possible, we conducted our own lists of possible measurements and selected appropriate measures after discussions in our research group.

The survey was conducted in German and English. The original questionnaire was designed in English and then translated to English using an adapted back-translate procedure (Brislin, 1970). Two members of the research team who haven't been involved in the development of the questionnaire have been asked to translate the questionnaire. The first translated the English questionnaire to German. The second used the translated version and translated it back to English. These translations have been reviewed by the two main designers of the questionnaire in order to identify good translations, but also to identify questions which lead to misunderstandings.

A.4 Data Preparation and Analysis

Prior to data analysis, all data form this year was combined into one database. Actual data preparation and analysis was carried out using R statistic software.

In addition to the first elimination of clerical errors and outliers, we performed separate elimination of outliers for each analysis. In most cases, we used five standard deviations as a threshold for determining outlier values (an exception is e.g. firm age, where we could review the responses and verify that the outliers are correct data). This rule was applied iteratively until no more values were eliminated. The amount of data used in each analysis is presented with the results after outliers have been eliminated.

Statistical analyses that were used are explained in text or in the footers of results tables and figures. Since all of these methods are de-facto standards for this kind of report and good descriptions are available elsewhere, the description of these methods is omitted from this report. In this study the effect of non-response was not systematically analyzed due to lack of resources, unless otherwise noted under individual analyses.

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