

Knowledge-Intensive Service Activities Facilitating Innovation in the Software Industry

Final report of the KISA-SWC Finland Project (Step 3)¹

Minna-Kaarina Forssén, Matti Heikkonen, Juhana Hietala, Olli Hänninen, Jyrki Kontio

Helsinki University of Technology

Software Business and Engineering Institute

Software Business Research Group

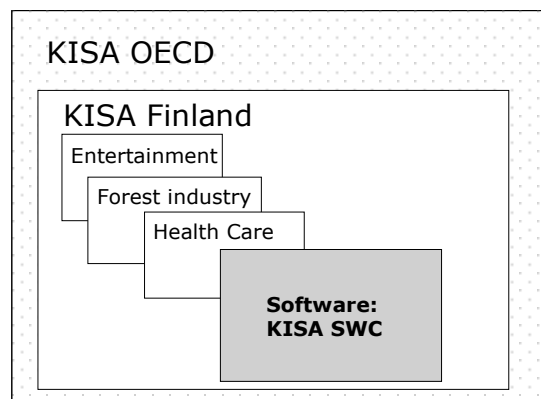
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*Risto Rajala, Mika Westerlund, Arto Rajala, Seppo Leminen,
Kristian Möller, Mervi Rajahonka*

LTT Research Ltd

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¹ Knowledge-intensive Service Activities (KISA) in Software Cluster (SWC)

This document presents the results of **Step 3** of the Finnish contribution to the software element of the OECD KISA-project which consists of the following three steps :

1) 'Profile and Trends of the Software Industry from a KISA / Innovation perspective', provides a statistical review of the Finnish software sector (Step 1).

2) 'Policies and Programmes targeting KISA in the Finnish software industry', provides an overview of the policy measures targeting the Finnish software related services (Step 2).

3) 'Knowledge-Intensive Service Activities Facilitating Innovation in the Software Industry', is a more in-depth case study on software services and related KISA (Step 3).

Finland has also undertaken studies on KISA and healthcare, forenol and leisure in the framework of the OECD KISA-project to explore the role of knowledge intensive services in innovation.

Country reports related to the project are available at www.oecd.org/sti/innovation, see item "Sectoral Case Studies in Innovation" under "*Don't miss*"

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Summary of the main results

The purpose of the present research project is to study the use of knowledge-intensive service activities (KISA) in the Finnish software industry to increase the understanding of the roles of KISA, especially, in supporting and improving companies' innovation activities. It is expected that the importance of using KISA is increasing when companies establish business models where they focus on their core competences and acquire complementary competences from professional service providers.

This research is a part of an OECD coordinated research program studying the role of KISA in various industry sectors. The Finnish software industry (SWC) was selected as the empirical context for this part of the study. We studied both software product and service businesses excluding embedded software business. The Finnish KISA SWC project was conducted by the Helsinki University of Technology and LTT Research Ltd, a research-oriented subsidiary of the Helsinki School of Economics. The project started at the beginning of 2003 by exploring the relevant literature and empirical data was collected during the second half of 2003.

The objectives of the KISA SWC project are to:

- I describe the current situation concerning the supply and demand of knowledge-intensive service activities in the Finnish software business,
- II identify the main characteristics of innovation processes, business models, and value networks in the Finnish software business sector as well as describe and analyze the role and use of KISA from these perspectives, and finally
- III identify potential needs and challenges for developing KISA in order to enhance innovation processes in software industry.

Empirical data was collected by using:

- a qualitative research approach; (a) seven industry expert interviews in organizations providing knowledge-intensive services (KIBS, RTO); (b) theme interviews in seven case companies, including 1-3 interviewees per company; and
- a quantitative research approach; Software industry survey by HUT (n=166), online KISA survey by LTT (n=48)




In the report we describe and analyze the results concerning the role and use of KISA in different innovation processes from the perspectives of various life-cycles, business models, and value networks.

Results of the case studies indicate that the role of knowledge-intensive activities in networks is remarkable in innovation processes in addition to use private or public knowledge-intensive services. These knowledge-intensive activities are accomplished in order to mutually generate or transfer knowledge between companies, customers, subcontractors or authorities of the industry, and the knowledge itself is not an object of trade.

Table 1 shows the use of KISA in the case companies according to the main type of KISA provider. The knowledge-intensive business services providers (KIBS) are clearly used as support functions for business management and development, e.g. training and auditing. The results indicate that KIBS providers and RTOs are needed and used, especially, when expanding into the international markets. KISA take place in networks when emphasis is in the more strategic areas, such as the development of future business and total offerings. In other words, the network KISA seems to be related to the generation of new solutions and include tacit knowledge.

Table 1. Most used KISA according to the type of actor

Activity	KIBS	RTO	In-house	Net-work
Training services	High	Low	Low	Low
Business development	High	Medium	Low	Low
Contract and agreement services	High	Low	Low	Low
Marketing communications services	High	Low	Low	Low
Auditing of the accounts	High	Low	Low	Low
Recruitment services	High	Low	Low	Low
Financial management services	High	Low	Low	Low
Operating services	High	Low	Low	Low
Market research	High	Medium	Low	Low
Product development funding	Low	Medium	Low	Low
Product development	Low	Medium	Low	Medium
Internationalisation services	Medium	Medium	Low	Low
"Wise money" providing strategy and business knowledge	Low	Low	Medium	Low
Total offering development	Low	Low	Medium	Medium
Technology development	Medium	Low	Low	Medium
Establishment of new standard	Medium	Low	Low	Medium
Requirements engineering	Low	Low	Low	Medium
Market sensing	Low	Low	Medium	Medium

Importance: High  Medium  Low 

However, according to the national survey on software product business, the usage of these services was not very common. As on average companies spent only 11 % of their total revenues (median 3 %) on KIBS. The on-line KISA survey study indicates that legal services related to marketing, sales, and distribution are the most commonly used types of knowledge-intensive services followed by financial management services, business and strategy consulting, human resource development, and customer relationship development services.

The results from the service provider interviews indicate, that the main reasons for using provided knowledge-intensive services were 1) lack of in-house competencies (external knowledge needed), 2) lack of resources, and 3) lack of time. Companies tended to use external expertise when they felt that external provider is more capable of completing the task, e.g. in product development. In addition, the main bottlenecks in using services from their point of view were: 1) lack of replicable, best practices, 2) lack of business knowledge, 3) difficulty of finding service providers and 4) comparing service various service providers. However, this might also indicate that the service providers have not been qualified enough to add value, or the service provider and user have simply not been able to find each others.

The use of KIBS providers and RTOs vary according to specific factors, e.g. the type of business model, value network position, the life cycle of the company, the target market (national/international), and the maturity of companies own processes. The results from our case study indicate that companies with business models focusing on the development of customized software, and especially those operating in close collaboration with customers, do not use KIBS extensively. However, in some cases they search new technological competences by participating in research programs financed or run by RTO's and strive for improving management capabilities and internal efficiency by using external consulting services. In some of our cases where the companies' business models were technology-oriented they were striving for keeping all essential value activities (core competencies) in-house, which also resulted in a low level of KIBS use. However, a large number of companies that were developing more standardized product or service offerings targeted for large number of customers seemed to be more eager to use knowledge-intensive services related to business management consulting and market research activities. Case studies also highlighted the essence of organizational culture and values in terms of successful innovation processes. Therefore, the question arise if there are KISA available which can contribute and help companies to develop these issues.

Introduction

In recent years, companies have been faced by the globalization of competition, increased pace of innovations, and fragmented customer needs. To respond to these challenges companies have focused on their core competences and capabilities which, in turn, has called for more networked business behavior. As a result of this specialization, companies need to acquire knowledge outside their own expertise to create and deliver value propositions to their customers. This development has also paved way to companies providing highly skilled and knowledge-intensive services.

The purpose of the present research project is to study the use of knowledge-intensive service activities (KISA) in the Finnish software industry. Especially, we will analyze the roles of KISA in supporting and improving software companies' innovation activities. It is expected that the importance of using KISA is increasing when companies establish business models where they focus on their core competences and acquire complementary competences from professional service providers.

Background

The development of software business has an important role in contributing to employment and national economy, but also in developing other related industries. Software business has remarkable horizontal effects to the manufacturing, service business and retail sector, because information technology systems are essential for their business processes and competitiveness [Toivonen, 2002].

The high growth of software industry seems to combine both an increasing reliance on services and a high level of innovation [OECD, 2002]. In addition, there are changes that will affect the innovation process and the KISA used in it. One such change is the increasing emphasis on customer-orientation. In most industries, product development has shifted from being technology driven to be driven by customer needs. This means that technological innovations alone will not be enough to gain market acceptance, wherefore customers need to be involved in innovation processes in order to produce solutions that best meet their requirements. The cycle times of product development have also been reduced because of competitive pressures and demanding customer expectations. This puts a high pressure to the entire innovation process: the elapsed time from the conception of an idea to the delivery of final product offering to the market must be shorten.

According to earlier studies (e.g. [Heeks *et al.*, 2002; Mowery, 1989; Nukari *et al.*, 1999]), the national innovation support systems and emerging service business, especially knowledge-intensive services are one of the key factors enabling the development and innovativeness of the software business.

The importance of knowledge-intensive service activities (KISA) is two-fold. Firstly, they contribute both to an overall economic growth and the growth of specific industry clusters. Using external service providers companies are able to focus their scarce resources more effectively on their core businesses. Secondly, external services are used to exploit better knowledge and capabilities as part of the business processes [Strambach, 2001]. Accordingly, it can be argued that KISA providers can have an important role in the creation and implementation of new products, services and processes. They are crucial as carriers, shapers, facilitators and creators of both technological and managerial innovations [Kuusisto *et al.*, 2003]. The knowledge-intensive activities, whether provided by public (i.e. national innovation support systems), semi-public, private non-profit, or fully commercial organizations, as well as the development of national innovation support system are to be taken into account as attempting to improve the conditions of innovation in companies in many different ways and to enforce the development of the potential software companies. [Kuusisto *et al.*, 2003; Hales, 2001; Nukari *et al.*, 1999].

Interactive networking of actors that are involved in the creation of value related to software products and services, was seen as one of the success factors in growing software businesses in India, Ireland and Israel [Heeks *et al.*, 2002]. Meanwhile, internal and external activities and processes of Finnish Software industry need to be improved to exploit the existing growth potential [Autere *et al.*, 1998].

Software Business in Finland

In 2002, the Finnish software product industry generated revenues of 1 000 M€, of which 40 percent (400 M€) came from foreign markets, and employed 10,000 professionals. The overall revenue of the industry grew by 13 percent, which is considerable in the current economic situation. However, the recession of the global economy kept exports at the 2001 level and growth was achieved from the domestic markets. Despite the current economic situation, companies still hold an optimistic view of the future and expect the growth to continue in 2003. The overall profitability of the industry was moderate, as 25 % of the companies generated losses and 60 % made a close-to-zero result. [Hietala *et al.*, 2003]

In Finland, the whole software industry is still relatively small although it has grown rapidly during the 1990s. The total revenues at the end of 2002 have been estimated around 3 500 M€ [Seppänen *et al.*, 2003]. European companies long lagged behind the U.S. –based firms in the packaged software segment due, for example, to small and diverse home markets, low degrees of standardization of offerings and internationalization, and weak links to universities [Malerba *et al.*, 1996]. These facts seem to fit Finnish software companies as well. The trend, however, indicates that software companies are in increasing manner emphasizing the standardization and internationalization of their products. This means that instead of developing customized products targeted to local markets software providers put more emphasis on developing more standardized products for global markets [Nukari *et al.*, 1999; Hietala *et al.*, 2002; USA commercial Service, 2003].

In addition, more than two out of three Finnish software companies develop and produce traditional ICT software. The international software vendors have, however, rapidly increased their shares on the Finnish market. This trend is expected to continue in the next five years, forcing the Finnish software houses to search for other business opportunities that are based on utilization of the latest technologies [USA commercial Service, 2003].

The Finnish software business is characterized by the following trends [USA commercial Service, 2003]:

- expanding focus and application areas beyond traditional ICT software market
- fast-growing number of new start-up software companies
- increasing role of web-related software
- fast-growing role of embedded software
- increase in software exports
- consolidation of the software industry (mergers, acquisitions)
- increase of mobile software.

The statistical description of the Finnish software sector is presented in TEKES report [Lith, 2003]. However, the data is from the industrial classification NACE 722 (computer and related activities), which does not include all software business companies, but on the other hand, includes companies from different industries than software industry. It shows some interesting information about the current state and trend. Firstly, companies providing computer and related services purchase only minor sub-contracted services of their own sector or other business services from external service provider. Secondly, 70 % of the companies in the NACE 722 sector had been involved in innovation activities (own R&D, innovation related investments, education and training) which is clearly more than in all sectors on the average (44%) [Lith, 2003].

Thus, one problem in defining Finnish software industry and business by volumes and statistics is that software industry has not any statistical industrial classification code of its own in Statistics Finland, EU or OECD. This far, the statistics have been collected by separate projects. For example, the on-going OKSA project of TEKES (managed by University of Jyväskylä and University of Oulu) is studying the software business in general and will deliver the final report in autumn 2003.

The best statistics of individual segments of the software business are found in software product business. The national software product business has been studied by a survey, which has been commissioned by the Finnish Centre of Expertise for Software Product Business since 1998.

A particular challenge for the Finnish software industry is that the software companies are small and they have a limited risk-taking capability and there are little financial tools available for them. Given the international markets and competition, these constraints may be a major potential hurdle for growth in the sector.

On the other hand, the Finnish software industry can also benefit from some of the strong industry cluster that the country has, e.g., mobile telecommunications and forestry sector. As some of the companies in these sectors, such as Nokia, and Metso, are world-wide leaders in their field, small software companies can find synergy benefits with the brands, distribution channels and market presence with these companies.

Objectives of the Study

The present project focusing on the knowledge-intensive service activities in the software industry, KISA-SWC Finland, started in the beginning of 2003 and it will be finished at the end of 2003. The project is conducted by Helsinki University of Technology (the main coordinator) and LTT Research Ltd. This research is a part of an OECD coordinated research program studying the role of KISA in various industry sectors (Figure 1).

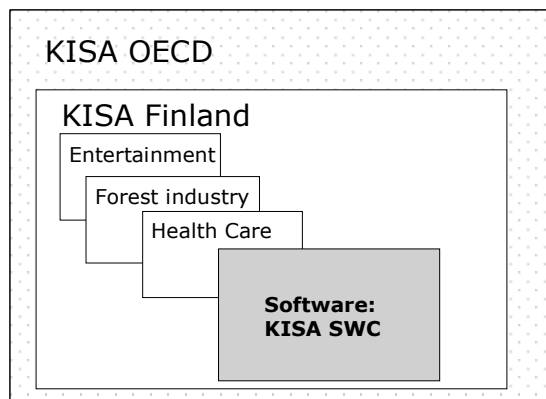


Figure 1. KISA-SWC as a Part of the KISA Finland and KISA OECD Projects

The purpose of the KISA-SWC project is to study the role of knowledge-intensive service activities in the Finnish software industry, especially, from the innovation management point of view. The selected software segments cover both software product and service business and customized project and solutions business. Embedded software is an important part of the software business as well. However, the embedded software business is excluded because of the limited resources and the scope restrictions posed by the National Technology Agency of Finland. The objectives of the KISA-SWC project are to:

- I describe the current situation concerning the supply and demand of knowledge-intensive service activities in the Finnish software business,

- II identify the main characteristics of innovation processes, business models, and value networks in the Finnish software business sector as well as describe and analyze the role and use of KISA from these perspectives, and finally
- III identify potential needs and challenges for developing KISA in order to enhance innovation processes in software industry.

Research methods and data

This research project is set up to investigate the nature and use of KISA in innovation at the firm level in the Finnish software industry. On one hand, a quantitative research approach as a main approach is selected to identify existing KISA in the software industry. On the other hand, a case study approach is used to better understand the particular patterns of innovation activity and the role and use of KISA in specific situations.

Research methods and data collection

The research approach is summarized in Table 2 **Error! Reference source not found.** The table shows that this project is based mainly on case studies. The quantitative data is available from the annual Finnish Software business survey (n=166) and the survey data is used to reflect and generalize the descriptive and in-depth qualitative data. In addition to this survey, we accomplished an online survey concerning the use of knowledge-intensive services in connection with the different business models and value networks (n=48).

The project was divided into two phases. The first phase of KISA-SWC project (research question I) was conducted through literature review and interviews. The literature review of the current state of the software cluster drew mainly on earlier studies, OECD KISA documents, and information gathered from various statistic sources. The current state of the knowledge-intensive services was studied using interviews. Interviewees were selected from the following type of organizations providing knowledge-intensive services:

- business consulting providers
- human resource development consultants
- legal service providers
- T&E centers,
- centers of expertise,
- the Finnish software business industry association, and
- one software company (a representative of service buyers).

The interviews conducted with the above mentioned organizations functioned also as a pre study for the second phase of the research project

In the second phase of the project (research questions II and III), we focus on innovation processes, business models, and value networks in software industry. Data was mainly collected by carrying out semi-structured interviews and adopting a case study approach. In addition, literature reviews will be done in studying the innovation processes in software companies and networks.

Table 2. Research methods and data

Research questions	Method	Data
First phase:		
I) What is the current state of knowledge-intensive services in the SW services cluster? What are the characteristics of the SW cluster?	Individual interviews Literature review	7 Interviewees
Second Phase:		
II) What are the innovation processes in the software business sector? What is the role of KISA in innovation processes? Why they are used or not?	<ul style="list-style-type: none"> •Case studies •Individual and group interviews •Literature review •Survey 	<ul style="list-style-type: none"> •4 case companies, 2-3 interviewees in each •Earlier studies
III) What aspects of innovation processes and knowledge intensive services are carried out in connection to business models using strategic partnerships and value networks in the software industry?	<ul style="list-style-type: none"> •Case studies •Interviews •Literature review •Survey 	<ul style="list-style-type: none"> •3 joint case •3 additional case •Earlier studies

Reasoning behind the case study approach

In general, case studies are the preferred strategy when “how” and “why” questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context [Yin, 1994] comparing to survey study, where the form of research questions are who, what, where, and how much. In addition, case studies can be used to accomplish various aims: to provide description (e.g. to describe innovation processes), to test theory or to generate theory (see: [Eisenhardt, 1989]).

In this research the focus was to study on examination contemporary events within the software companies, the use of KISA in innovation processes; what KISA used and in which phase, and why they are used and why not. The concept KISA do not have an established holistic interpretation and definition. Therefore one of the aims is to define the concept and role of KISA in the software industry in more detail, which also support innovation among the above mentioned standpoints to use case study as the strategy in this research project.

However, in this kind of research, both survey and case study have relevance and they are not mutually exclusive. In the study, the dominant approach is qualitative case study research with a minor component of the study based on a quantitative approach. This is done according to the concept of triangulation, i.e. the combination of different methodologies in the study of the same phenomenon (Creswell, 1994; Miles and Huberman, 1994). Therefore, we have used surveys as a secondary data to compare our qualitative result with a sample from the same population.

Criteria for selecting case companies for the study

The main guideline for the selection of case companies was to obtain a broad view of KISA in software businesses. Case companies for the research question II were selected according to the following criteria: the main market; the type of business; the size of the company; the phase of the company life cycle; and the use of KISA (Cases A, C, D and G). Case companies for the research question III were selected according to the following criteria: the market focus; size of the company (number of personnel); business model; position in the value network; and the use of KISA (Table

3). The selected cases were A-F. Three of the cases (A, C, and D) were joint cases for the research questions II and III.

The reason for choosing case companies of different size and business models was to provide a solid base for cross-case analysis to find out whether (and what kinds of) differences exist in using KISA between the companies. When considering the validity of the research, the case companies were selected on the basis of their relevance from the research phenomenon point of view. The interest was to find the most representative companies from each category to provide an overall view of the whole segment.

The other selection criterion emphasized the variety of innovation processes (product, process and organizational innovation). The four selected innovation processes were: product and organizational innovation (Case G); process innovation (Case D); Organization innovation (Case C); process and organization innovation (Case A). These cases provide a solid base for studying the role and use of KISA in the different innovation processes.

The selection of the case companies accommodated also the idea to compare the use of KISA between companies incorporating various types of business models, and representing different position in value network. The companies represented each type of business models according to our previously constructed classification. Similarly, they represented the various positions in the earlier forged value network illustration in the framework of the study.

Table 3. The Case Selection Criteria in Research questions II and III.

Selection criteria	Case A	Case B	Case C	Case D	Case E	Case F	Case G
Market Focus							
Domestic	x		x	x	x		x
International	x	x	x	x		x	
Size (Personnel)							
< 50			x			x	
50-100				x			
> 100	x	x		x	x		x
Phase of company life cycle							
Start-up						x	
Entrepreneurial			x				
Professional Entrepreneur		x			x		x
Expansion	x			x			
Business Model							
Software project business				x			
System solution business				x	x		x
Software/system services business			x	x			
Standard product/service business	x	x	x	x		x	
State of Value Net							
Stable, well-defined value system				x	x		
Established value system with incremental impro	x	x					x
Emerging value system with radical changes		x	x			x	
Use of Knowledge-intensive Services							
Commercial/KIBS	x	x	x	x	x	x	
Public/RTO	x	x		x		x	x
Internal/In-house	x	x		x	x		x
Innovation process research	x		x	x			x
Business model & value network research	x	x	x	x	x	x	

As the focus of the research is to find how KISA contribute to innovation processes and business models, the case companies were chosen to represent an average company in the segment from KISA usage point of view. The selection was based on findings in the first phase of

the research as well as researchers' previous knowledge about the segments and the companies within them.

Contents of the Report

Section 1 consists of the introduction of the KISA-SWC research project including the scope of the project and the objectives of this report. In addition, the chapter includes the description of the research methods and data as well as definitions of the key terms and frameworks used in this report.

In the following two sections 2 we present the results; First quantitative and then qualitative results. The quantitative results include summaries of the Online Survey of KISA and The Finnish National Software Survey 2003. The qualitative results include the usage of KISA from perspectives of business models, value networks and life-cycles. In addition, the chapter consists the discussion of use KISA provided by KIBS, RTO, In-house and Networks, as well as the use of KISA in different innovation processes.

The last section consists of conclusions and recommendations of the KISA-SWC project. Additionally, the section includes the evaluation of research design and results and the discussion of future research.

Key definitions

Knowledge-intensive service activities (KISA) are defined as "the production and integration of service activities undertaken by firm, in manufacturing or service sectors, in combination with manufactured outputs or as stand-alone services". KISA can be provided by private enterprises and public sector organizations. Typical examples of KISA include: R&D services, management consulting, IT services, human resource management services, legal services, accounting and financing services, and marketing services.

Figure 2 shows the mapping of detailed KISA-KIBS terminology used in our report. The activity is separated from its provider (actor). This taxonomy will be used throughout the Finnish KISA project. The essential of the taxonomy is to understand the difference of between the actor and the activity.

Knowledge-intensive service providers can be categorized basically into two groups: (1) specialized providers which offer the service as their core business, and (2) non-specialized providers which run their service provisioning apart from their core business. The group of specialized providers consists of KIBS, knowledge-intensive business service providers and RTOs, research and technology organizations. In this categorization, the RTOs refer to public and semi-public organizations and KIBSs to private organizations. In additions to these two basic groups we can find service providers inside the companies own organization. These so-called internal, or in-house, service providers, often organized as separate departments or units, provide services to the company's different business units.

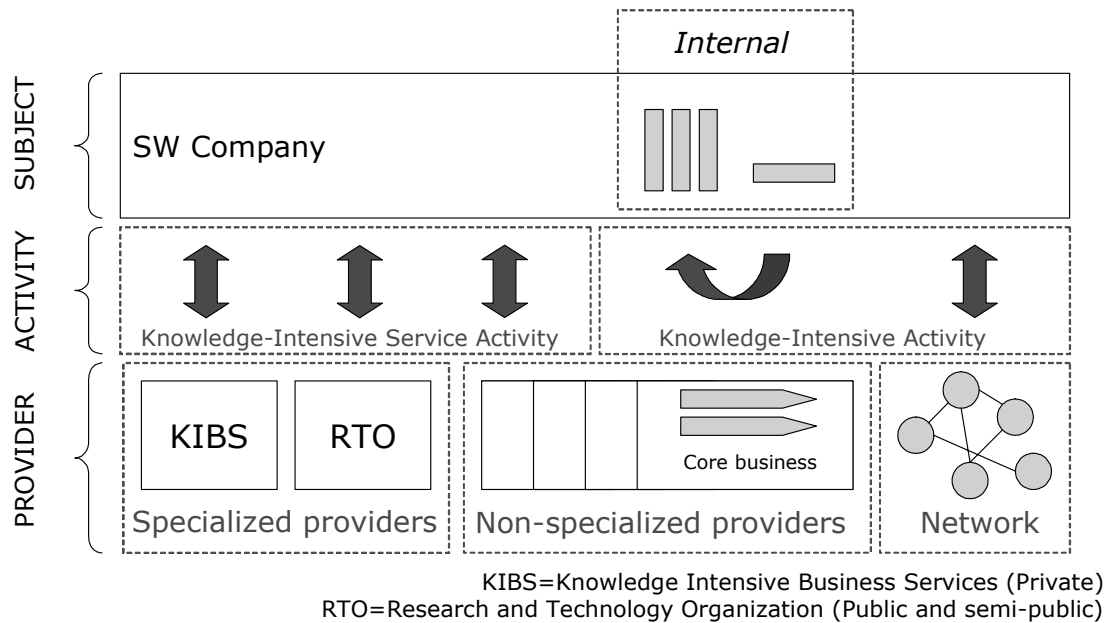


Figure 2. Mapping of terminology

Innovation is a rather broad concept that can be defined and understood in many different ways. Very often the term “innovation” is related with technological novelty and even the words “technology” and “innovation” have been defined as synonyms. In this report, an innovation in general is defined more broadly as an idea that has been implemented into a new product or service, process or organizational elements (e.g. communication, reward and authority structure) guiding it to technological, organizational or market change in a value-adding way [Zaltman *et al.*, 1984; Urabe, 1988; Smeds, 1994; Tidd *et al.*, 2001]. This definition captures the crucial importance of implementation: new knowledge has to be successfully implemented before it can be called an innovation. Thus, the implementation of ideas for reorganization, cutting costs, putting in a new reward system, improving communication, or assembling products in teams are also innovations [Kanter, 1983].

Product innovation refers to new, or enhanced innovative products or services.

Process innovation refers to new information and material flows within and between units and organizations as well as innovative principles of working, working methods, roles and the tools used in the business process.

Organizational innovation refers to innovations about administrative, social and organizational elements, e.g. organization structure, management system and leadership issues, reward system, the work environment e.g., technological layout, and well-being of employees. An organizational innovation has typically high complexity because it requires fundamental organizational (e.g. culture) and managerial (e.g. more leadership type of management) changes.

Process and organizational innovations differ from product innovations in terms of the implementation of ideas. Process and organizational innovations have an internal focus, i.e., are most often implemented within the company with the same organizational members who have been involved in creativity processes. On the other hand, product innovations are embedded into products and launched into external markets by different individuals and departments [Damapour *et al.*, 2001; Tidd *et al.*, 2001].

Business Model refers to value creation model and the way the business is capturing opportunities in the market into revenue through sets of actors, activities, processes and collaboration with customers and other stakeholders. We understand the business model as a practical appearance or manifestation of the business derived from strategy and designed to fit into a specific market situation in order to execute strategic plans. We share this view with other

business model researchers, e.g. Osterwalder and Pigneur (2002), who have appreciated business models as the missing link between strategy and business processes. Also, business model spells out how a company makes money by specifying its earning logic and the position in its value network.

Value network refers to an interconnecting web of value-creating and value-adding processes that are held together by a unified design and shared values. [DeRose, 1994] A value network is a usually a set of relationships between firms, where companies engage in multiple two-way relationships to bring increasingly complex products and services to the market. [Aldrich, 1998] Value networks are often loosely structured in regard to the number and role of actors, and it makes sense to discuss about intentionally formed groups of companies that have some specific purpose or goal in order to gain competitive advantage.

Frameworks: KISA from the perspectives of business models, value networks and life-cycles

Three different perspectives were selected to interpret the data:

- (1) the business model perspective was selected to better understand the role and emphasis of KISA in accordance to different business contexts, i.e. to understand *why* firms choose to use particular different KISA,
- (2) the value network perspective was selected to analyze the systemic context of KISA, i.e. to understand *how* firms interact with each other and with external service providers, and
- (3) the life-cycle perspective was selected to identify and analyze *when* firms use different KISA, i.e. to better understand the use of particular KISA at different phases of the company life cycle.

The intention to study knowledge-intensive services from a business model perspective is to review the prevalence of KISA in a different types business contexts. Our exploratory case study indicates that the use and need of KISA vary significantly according to the business model a company applies. Thus, we believe that understanding the role and nature of knowledge-intensive services is improved by considering the business model context, in which the services are produced and used.

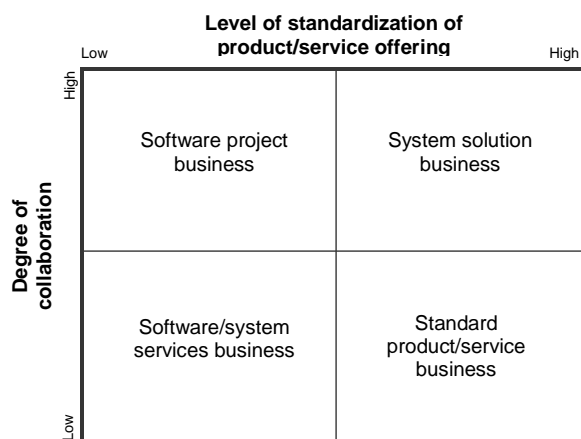


Figure 3. A classification scheme for types of software business models (Adapted from Rajala et al. 2001)

The characteristics of services, including aspects such as intangibility, inseparability, variability, and perishability [Rust *et al.*, 1996], presume interaction between service producers and users. Furthermore, in the case of knowledge-intensive services, the vendors and buyers need to collaborate in the production and use of these types of services. This is a breeding ground for

value networks. In this study, we apply the concept of value network to describe the characteristics and structure of this collaboration in association to innovation activity.

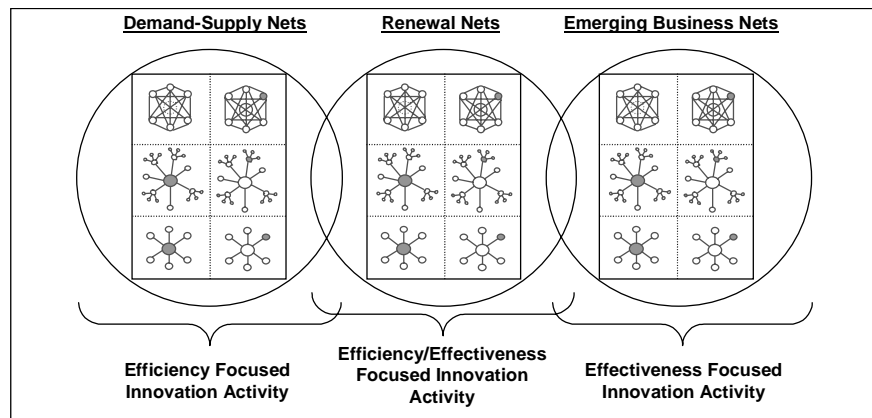


Figure 4. Network configuration (Modified from Doz 2001 and Möller et al. 2002)

As the industrial network approach suggests, companies in a network are economic actors, which are inter-related through a web of resources and activities (see Figure 5). Value is created in a network by actors who perform and control activities that are based on control over critical resources, and include social content by developing relationships with each other through exchange processes (Håkansson and Johansson, 1992; Axelsson and Easton 1992). Critical resources can be physical, but especially, in software business they are mainly knowledge-intensive intangibles.

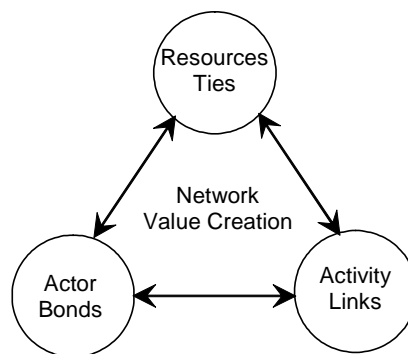
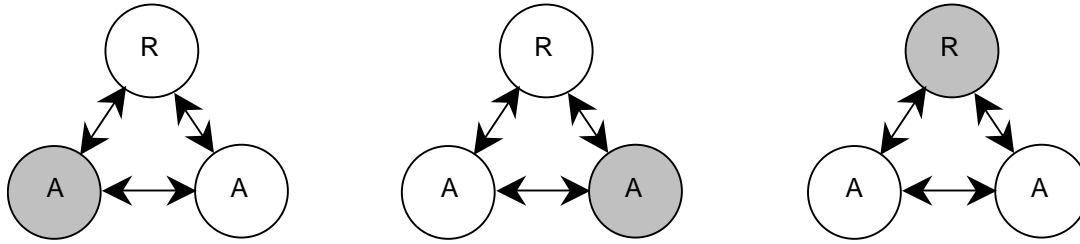


Figure 5. Actors, Resources, and Activities (ARA-model) (Håkansson and Snehota, 1995)

Resource ties between the companies are essential in order to innovate in using resources and to develop new ones (Ford et al. 1998; Ford et al. 2002). Actors also have differential knowledge about activities, resources and other actors in the network, and act as information sources providing new opportunities and alternatives, thus enhancing the potential for innovation activity of the focal network. Furthermore, actors are goal-oriented and continuously have efforts to increase their control and to achieve better position in a network. Increasing the control over the network leads ultimately to the position presented by Jarillo (1988) where a company becomes the firm that sets up the network and takes pro-active attitude in the care of it. In the context of value nets, this is called the hub company. However, Möller et al. (2002) claim that full control of another actor's resources and activities cannot be acquired in value networks, but opportunities and challenges of control and coordination vary considerably in terms of novelty and complexity as expressed along the value-system continuum.

Service Partners	Type of Service	Role of Service
<i>Providers, users, facilitators, etc.</i>	<i>Communication service, business service, other</i>	<i>Informative, Diagnostic, Advisory, Facilitative, Turnkey, Managerial</i>



In this study, we use the above-mentioned theoretical concepts to depict the variety of business models and value networks and services related to them. We use the ARA-model to address the knowledge-intensive service partners and types and roles of services within the innovation systems of identified business models and value nets in the software industry.

Use of KISAs according to surveys

Quantitative results of KISA surveys

Results of two surveys conducted along with this study identify the most prevalent KISA. Whereas the quantitative surveys serve the identification of KISA and is mainly based on existing knowledge on the phenomenon (i.e. on existing lists of KISA). The qualitative research approach deepen the analysis by analyzing the role of identified KISA and exploring new, uncharted KISA.

An Online Survey of KISA in the Software Industry

According to the online survey of knowledge-intensive service activities within software industry (n=48) conducted by LTT Research Ltd, most prevalent KISA in all software businesses are related to the following business functions:

- legal services related to marketing and sales,
- financial services,
- consulting related business strategy,
- business services related to internationalization and
- business services related to the development of customer relationships.

The survey was based on KISA identified in prior research (e.g. earlier reports of the KISA-SWC study). The results indicate that the KISA identified in the survey seem to support the existing business processes.

The relative importance of different KISA are illustrated in the **Error! Reference source not found.** (Source LTT survey on KISA in the Software Industry, June-July 2003; n=48; suggested scale 1 to 5; 1= not important, 5=very important.) The main finding of the survey indicates that the importance of the examined KISA was relatively low. This may be due to that the examined KISA included only those relatively non-core services that were identified in earlier studies.

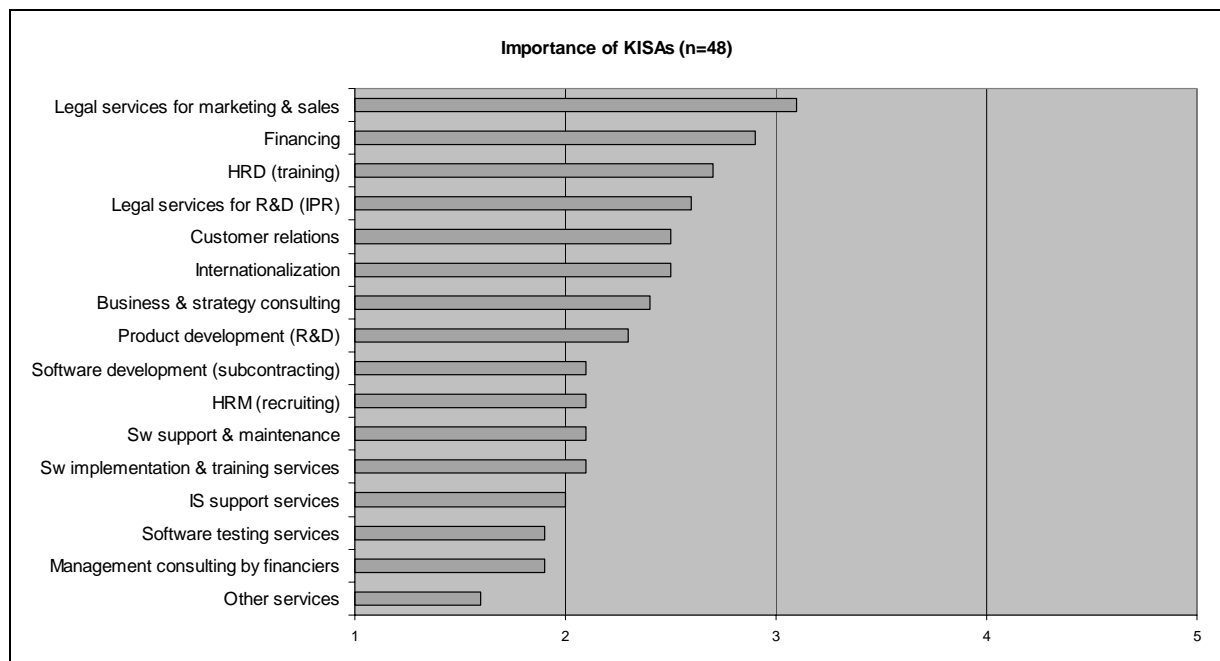


Figure 6. The relative importance of KISA related to specific business functions (scale from 1 to 5; 1=not important, 5=very important; n=48)

The KISA identified in the survey do not, however, represent the potential demand for new and unidentified KISA, because respondents were guided to rate only the relative importance of suggested KISA.

Finnish National Software Survey 2003

In the Finnish National Software survey 2003 conducted by HUT, companies (n= 166) were asked the companies about their usage of external knowledge-intensive business services (KIBS). Many factors affect the companies need and the amount of usage of these services, i.e. size, age, strategy, processes etc. In general the usage of these services is not very common, as on average companies spent 11 % of their total revenues (median 3 %) on KIBS s (**Error! Reference source not found.**). Even the largest companies seem to use KIBS s quite rarely. This could indicate that either larger companies have the knowledge in-house or companies and service providers do not find each other or the quality of the services is not good enough to add value to the company [Hietala *et al.*, 2003].

According to Finnish Software product survey, usage of KIBS between companies differ/vary according to several factors e.g.

- Software product business turnover
- Age of software product business
- Software exporting and domestic revenues
- Maturity of companies own processes,
- Thorough understanding of the markets vs. gathering requirements merely from the key customers,
- The version releasing approach (time-paced or feature-paced).

The results about use of KISA is more discussed in Appendix 2 which includes the chapter from the Survey report “ Subcontracting and distributed software development”

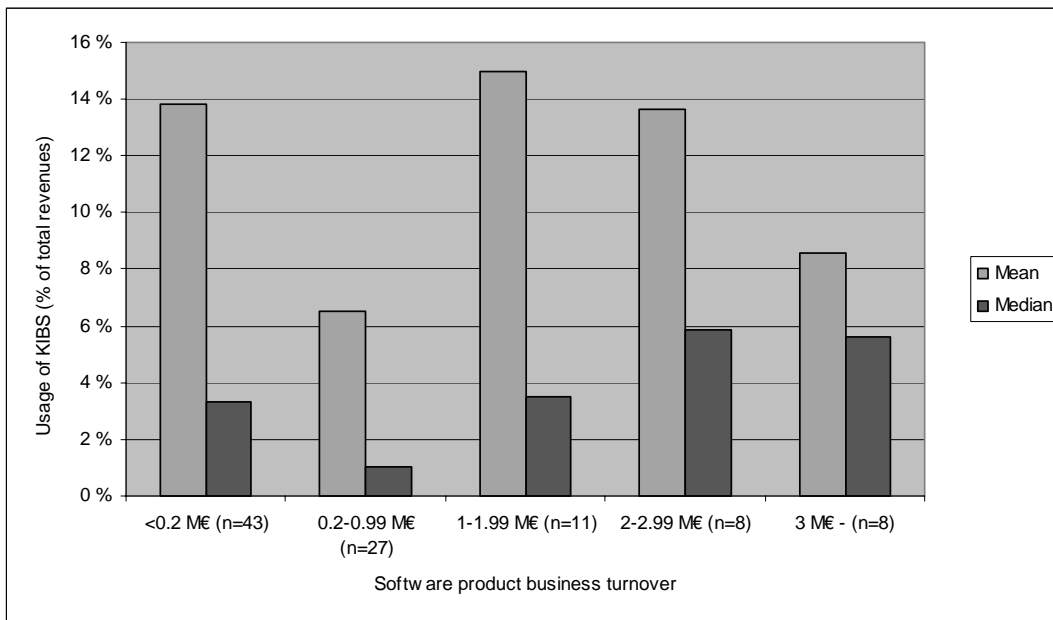


Figure 7. The use of knowledge-intensive business services as a percentage of the total turnover in 2002 (Source: [Hietala *et al.*, 2003]).

In addition, companies were asked to indicate to what degree they use different forms of subcontracting in their software development. Figure shows the importance of seven central forms of subcontracting for the studied companies. The most important form of subcontracting was programming, followed by program and architecture planning and testing. Subcontracting of programming was of moderate to extreme importance to 30 % of the respondents, and 51 % did at least some subcontracting of programming. Subcontracting of program and architecture planning was of moderate to extreme importance to 26 %, and subcontracting of testing was of moderate to extreme importance to 20 %. However, when looking at the other forms of subcontracting, at least 80 % of the respondents reported that they do not use other forms of subcontracting at all or only in small volume. (Hietala et al., 2003)

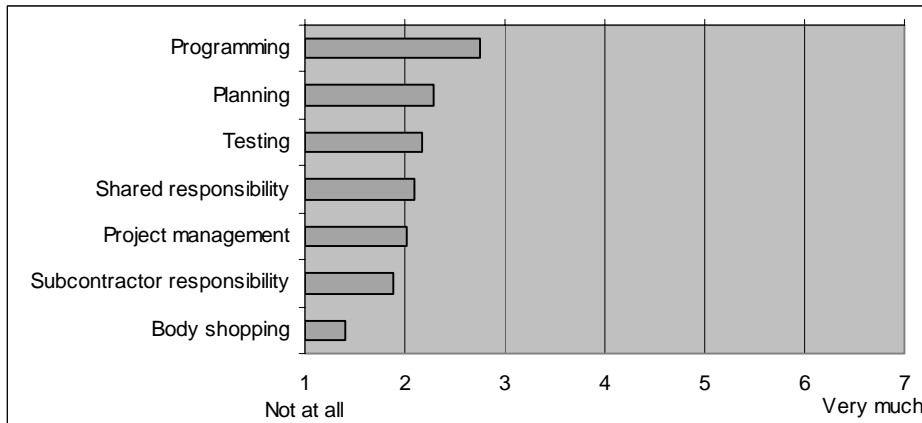


Figure Importance of the Central Forms of Subcontracting (n=133)

Our cases presented in the **Error! Reference source not found.** illustrate different software businesses selected to analyze the prevalence and emphasis of KISA in connection with different business models.

As discussed earlier, the business model perspective was selected for the study analysis in order to improve understanding about *why* firms use particular KISA. Our framework divides software businesses into four generic categories on the basis of their business models. These categories are: software project business, system solution business, software and system services business, and standard product and service business.

KISA in software project business

Our analysis indicates that KISA in software project businesses are mainly related to development of technological competences. External services related to marketing (especially in international markets) are used to a lesser extent.

The identified KISA in software project businesses include:

- management consulting to develop competences on solution domain and total offering
- market sensing and business intelligence monitoring
- improve understanding on customer's needs and processes

KISA in system solution business

KISA in connection with system solution businesses were mainly used as means to improve technological knowledge as well as application of technology in new solution domains. New application areas are sometimes suggested by the customers. The identified KISA in system solution businesses include:

- development of total business offering
- improvement of understanding on customer's processes
- development of technological competences
- research collaboration with technology partners

KISA in software/system services business

KISA in software and system services businesses were used especially to improve internal efficiency of operation. The identified KISA in software and system services businesses include:

- services related the development of new technological competences (through technology partnerships)
- operating and usability services
- development of new business infrastructures
- development of management processes
- human resource development
- outsourcing of support functions

KISA in standard product/service business

KISA in business models embodying standardized offerings aimed at large number of customers are mainly related to marketing and distribution activities. External KISA related to the development of technological competences (excl. product development funding) are used to a lesser extent in connection with these business models.

The identified KISA in standard product and service businesses include:

- legal services related to contracts and agreements
- market analysis (surveys, sensing, etc.) related to internationalization

- establishment and mobilization of distribution networks (partner identification and evaluation, development of delivery networks, management of customer relationships)
- localization services
- management consulting
- product development funding
- customer satisfaction analysis

This analysis indicates that KISA varies remarkably in accordance with different business models. In addition to exploring the reasons for using KISA, we also analyze the ways *how* KISA is utilized and what actors are involved. This is analyzed next through the value network analysis according to our framework.

Value Network Perspective

Networks have attained a lot of interest both in academic journals and business magazines (Möller and Svahn, 2003). Reason for this is that the way in which economic value is created in a society is fundamentally changing. Increased importance of knowledge, technological complexity, global competition and the availability of digital information technology are driving this change [Castells, 1996]. To cope with these challenges companies are establishing networks consisting of both knowledge and technological bonds. Networks adapt especially well to knowledge-rich environments because of their superior information-processing capacity and flexible governance structures compared to markets and hierarchical organizations [Achrol *et al.*, 1999; Snow *et al.*, 1992].

The ways networks operate shift the mindset from streamlining internal processes of value chains into connecting networked processes across organizational boundaries. This shift incorporates the challenges of both managing the networked processes and capturing new opportunities of networking externalities in various value networks.

The establishment and management of value networks and strategic navigation in the network environment form a major challenge to Finnish software providers. According to recent studies, software companies are extensively using networks, or other collaborative forms, in their business operations. The role of networks and other collaborative forms are claimed to be especially fruitful in innovation context [Tidd *et al.*, 2001; Miettinen *et al.*, 1999].

However, the establishment and development of value networks cause often both managerial and system-related challenges. Managers may have difficulties in identifying what kinds of organizational arrangements, managerial capabilities and systems are needed to improve innovation activities and processes in a software company (Möller and Svahn, 2003).

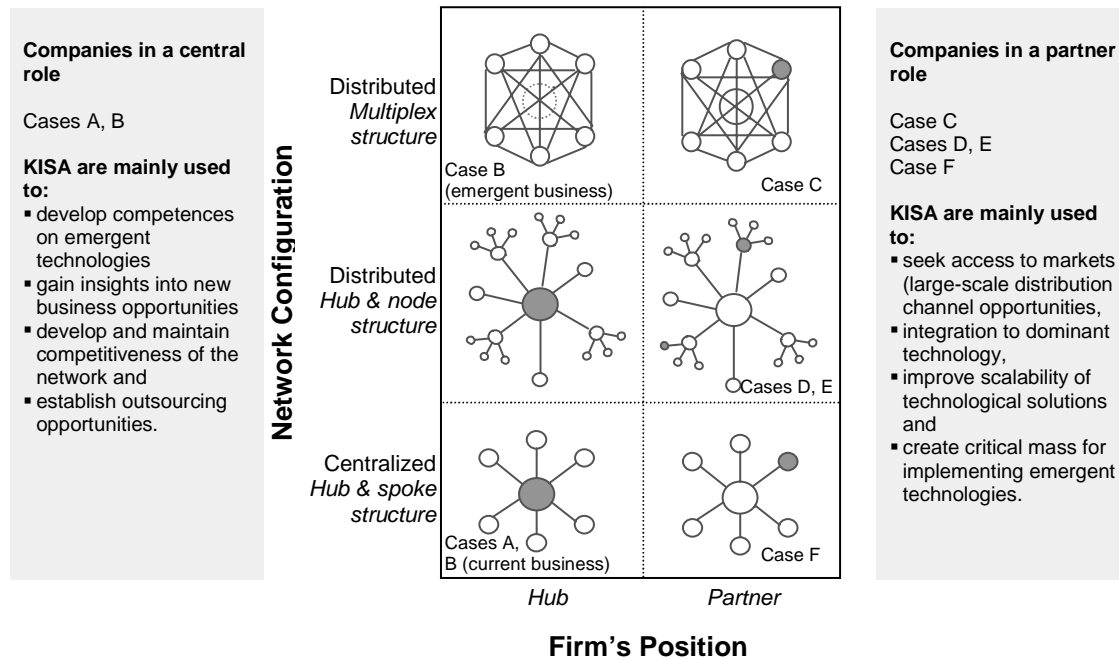


Figure 9. Value network structure (Rajala et al. 2003, modified from: [Doz, 2001])

Our value network analysis focused on identifying the network structure and a firm's position in it as described in the **Error! Reference source not found.** Figure 9. The theoretical framework presented in the figure has been discussed more comprehensively in the earlier report of the KISA-SWC project by LTT Research Ltd (Rajala et al. 2003). It incorporates both the network configuration as either centralized or distributed structure of the value network where our case companies participate, and, the company's position as either a hub or a partner within it.

This theoretical perspective was selected to improve understanding about *how* software companies use different KISA. Our framework distinguishes different value network settings on the basis of network structures and a firm's role and position within them. In addition to this, we analyzed the existence of KISA according to the purpose of identified networks.

In our analysis, different business model-related networks were classified on the basis of the intention of networks into distribution networks and product development networks.

KISA in distribution networks

The analyzed distribution networks included mainly standardized KISA related to marketing, partner seeking and business development. These KISA include in particular:

- partner identification and evaluation
- development of delivery networks
- management of customer relationships

KISA in product development networks

The identified product development networks included joint efforts intended to create new knowledge to support especially the future business of the network participants. These KISA include especially:

- development of technological competences
- deployment of total offerings
- improvement of technological integration

The network structure and firm's position in it affect the use of particular type of KISA. The identified examples of KISA in companies possessing central positions in their value networks

include development of competences on emerging technologies, insights into new business opportunities, development and maintenance of competitiveness of their network, and outsourcing opportunities.

Companies in a partner role in the in value network use KISA in order to seek access to markets (large-scale distribution channel opportunities), integration to dominant technology, scalability of technological solutions and critical mass for implementation of emerging technologies.

To extend the analysis by describing *when* software companies use particular KISA, we utilize the third perspective, i.e. the different life cycle perspectives on KISA.

Life cycle perspective

The Life cycle perspective was selected for the study analysis in order to improve understanding about *why* firms use particular KISA. In the beginning of this study, we developed a framework for analyzing innovation processes and the associated services.

Company Life-Cycle

Our company life cycle framework divides software businesses into four generic categories on the basis of their number of their employees and the maturity of the company. Once the company grows the enterprise and its subsystems increase and change. Enterprises subsystems consists e.g. processes; procedures and practises; people and their needs and knowledge; information systems; cultures; as well as organizational and job structures (Salminen, 2000). Thereby, the needs for organizational development and available services change while companies grows. In the context of this research, a software business company's life-cycle is divided into four phases: 1) Start-up, 2) Entrepreneurial, 3) Professional management and 4) Expansion. The model indicates the maturity of a company. There are no unambiguous measures for maturity. In the context of this research, the number of employees is used as a proxy guideline.

Case companies of the study are classified according to their company life cycle: Case F was in start-up phase, Case C in entrepreneur phase, Cases B, E and G in professional management phase and Cases A and D in the expansion phase.

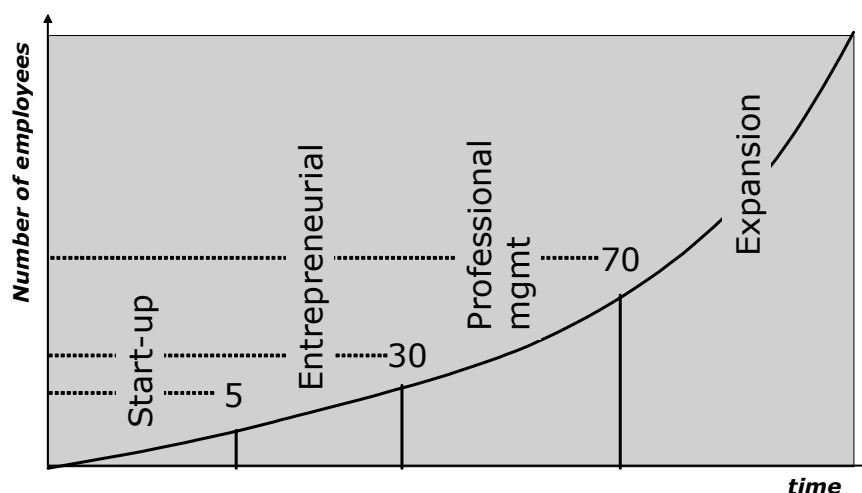


Figure 10. Number of Employees in Different Phases of the Company Life-Cycle

According to the case studies, the mostly used KISAs in the start-up, professional management and expansion phases were

- business consulting and

- research services.

The latter was used in entrepreneur phase as well. In addition, the start-ups used in particular financial services and companies in expansion phase, used software development. Services that were used in all phases of the life cycle, were as follows:

- Research services
- Marketing and communication services
- Software Development services
- Legal services
- HRD
- Financing services

Product Release Life-Cycle

Based on the interviews and research group’s knowledge and experience, a framework has been constructed to associate KISA with different phases of a product release. The framework is based on product release life-cycle which is presented in Figure 11 **Error! Reference source not found..**

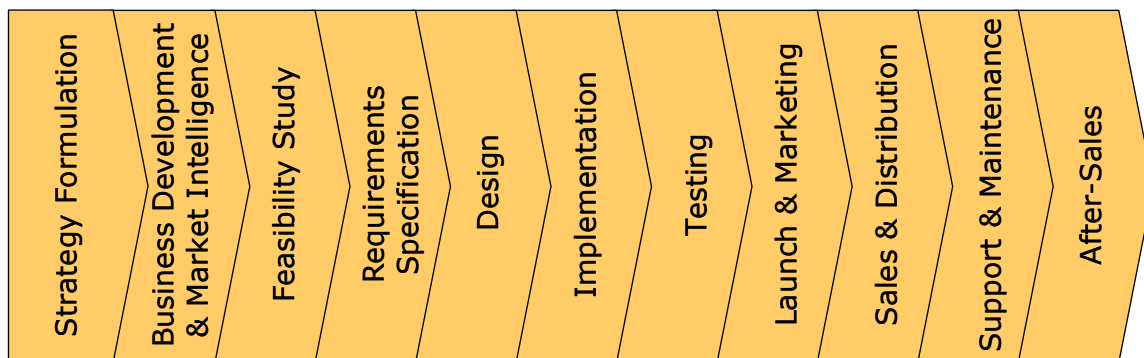


Figure 11. Software Product Release Life-Cycle

In the first phase, a strategy for product development, marketing, sales and distribution as well as after-sales is developed. The next phase is business development and market intelligence. This means organizing a team or a business unit for product development and gathering all the required data about market and its behavior as well as potential clients. The next phase is to construct and evaluate different prototypes and concepts against their feasibility in a specific market. Requirements specification specifies the features and functionalities to be included or excluded in current release of a software product. Design phase refers to product, architecture and module design of a specific software product. Implementation phase includes actual physical software development work, e.g. coding and integration. Testing of the individual modules as well as the whole product is done before launching. At the same time with launch and commercialization, marketing effort is carried out to create demand for the product. Sales & distribution refers to all the effort related to building and maintaining sales and distribution channels. Support functions serve clients in aspects related to installing and using the software as well as training. Maintenance means providing updates and patches for software. After-sales refers to activities related to client engagement and selling more products and services for current clients.

In the interviews of the first phase of this research project, interviewees were asked to map KISAs with the phases of Product Release Life-Cycle. Table 4 shows the mapping between the software product release life-cycle and KISAs offered to software business sector. A colored box indicates that KISA offering is relevant and applicable in that certain part of the life-cycle.

“A traditional problem in software business is the challenge of commercialization in technology based environment.”

Table 4. KISAs mapped with Product Release Life-Cycle according to First interviews

	Strategy Formulation	Business Development & Market Intelligence	Feasibility Study	Requirements Specification	Design	Implementation	Testing	Launch & Marketing	Sales & Distribution	Support & Maintenance	After Sales
Strategic Consulting	■	■							■		
Business Consulting		■							■		■
IT Consulting				■			■			■	
Research Services		■						■	■		
Marketing & Communication Services		■						■	■		■
Software Development Services				■	■	■	■				
Sales & Distribution Services								■	■		■
After-Sales & Support Services					■					■	
Legal Services		■						■		■	■
Human Resource Development Services								■		■	■
Financing services	■	■									
IT Support Services		■									■

Noticeable in the table above is that software business companies tend to do the requirements specification-design-implementation-phase with their own resources. Strategy formulation is the first phase of the life-cycle. Interviews show that currently only strategic consulting and financing services contribute to this phase. Legal services would be the next to come along, but this is not yet the current situation. Services related to phases after testing seem to be more popular. This indicates a possible development that software business companies' businesses and success depends more and more on networks of companies rather than the company itself.

In the case studies, the framework was used to analyze product innovation process in Case G. The case analysis summarized the phases and the innovation process consisted of seven phases described in Figure 12.

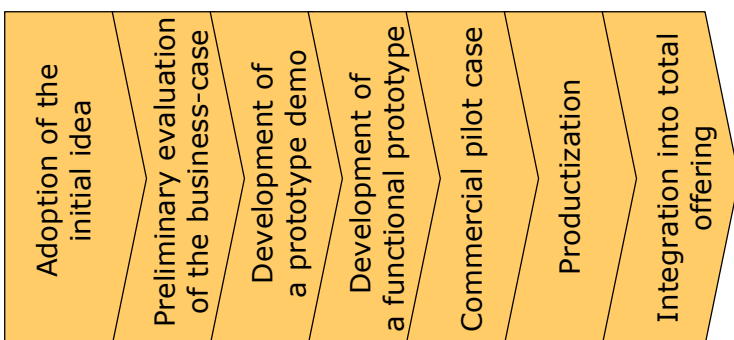


Figure 12. Phases of innovation process of Case G

However, the results showed that the use of KISAs in the innovation process is very marginal. Instead, the key success factors were:

- Company culture: The culture supported the idea of being in the front-end of technological development

- Management commitment and support: Specific sub-project were widely supported by the management
- Identification of a pilot customer project: The customer had a stated need for the product

Use KISAs provided by KIBS, RTO, In-house Service and Network

KISAs are provided by KIBS, RTOs or as a in-house service. In addition, we have found the use of “network KISA” as a remarkable activity. Table 5 summarizes the twenty most common KISA listed according to their occurrence in the case studies. In addition, the most common type of KISA providers are shown in regard to the activity. The final column lists most mentioned specific actors providing each KISA. The reasons to use these KISAs provided be different service provided is discussed in the following chapters.

Table 5. The 20 most used KISA (RTO=Research and technology organizations, NW=network KISA, KIBS=commercial knowledge-intensive business services providers, IH=In-house KISA)

Activity	Type of actor	Most used specific actor
Market research	RTO	FinPro
Total offering development	NW	Business partner
Product development	RTO	VTT Technical Research Center
Business development	KIBS	Strategy consultant
Product development funding	RTO	Tekes (National Technology Agency)
Technology development	NW	Technology partner
Training services	KIBS	HRM service provider
Establishment of new standard	NW	Standardization organization
Internationalisation services	RTO, KIBS	FinPro (RTO), Business consultant (KIBS)
Contract and agreement services	KIBS	Lawyer's office
Marketing communications services	KIBS	Media company
Auditing of the accounts	KIBS	Financial auditing agency
Recruitment services	KIBS	HRM service provider
Requirements engineering	NW	-
Financial management services	KIBS	Accounting agency
Market sensing	NW	-
Operating services	KIBS	Business partner
Personnel training	-	-
Quality assessment	-	-
“Wise money” providing strategy and business knowledge	IH	Board of Directors

Identified reasons to use KISA provided by KIBS

The primary reason for using external knowledge-intensive services is companies' tight focus on their core businesses. As companies recognize their core business and build their competitive advantage around it, they are able to outsource functions and activities external to the core. The further away the activities are from the core, the more appealing they become to be outsourced or supported by KISA. The outsourcing decisions are made as part of strategy and business development work.

Another point-of-view is to relieve the managerial resources from activities not providing significant added value to businesses. The optimization criterion is the allocation of managerial resources, not the optimization of costs of running specific business activities.

Companies need to invest on state-of-the-art knowledge (e.g. legal, financial and human resource development activities) to remain competitive and to lower their business risks. When using external services company also ensure they get objective knowledge and objective view to support their business. External facilitators also provide acceptable approach to reach consensus and to unify procedures and process descriptions.

In the areas of strategy and business development external services are used to gain unbiased view on the business. In marketing management, an external view is seen essential to develop company's total offering from the customer perspective.

Time to market and ability to maintain growth are also seen as decision criterion to use KISA. The external facilitators provide market research activities in competitor analysis, market analysis and seeking business partners especially in foreign markets. External services also provide knowledge and insight otherwise unavailable to companies.

Services related to support processes (operations management, competence development, process control & methods development) are facilitated through partners and subcontractors.

In some cases, the companies see that the quality of the outside-core activities is better when acquiring them from external parties.

Identified reasons to use KISA provided by RTOs

Knowledge-intensive activities provided by public or semi-public organizations are related to financing product development. The reasoning is to complete projects which are too risky or too large for the company's own financial resources. The resources and services provided by Tekes are seen as important contributors for companies' technology development.

Reasoning to participate in research and development activities with universities and technology organization is to gain access to the state-of-the art technology and methods.

As the activities relate to market research and business development, the reasoning to use KISA provided by RTOs is the objectivity and good price for the value gained by using the services.

Identified reasons to use KISA provided through networks

The conjoint business model and value network analysis of our cases indicates that the network activity in business models that include standardized product and service offerings embody mainly KISA related to marketing and distribution. Furthermore, our cases indicate that the network KISA in these cases include the development of comprehensive total business offerings for mutual benefit of the participants in the value network.

On the other hand, network KISA related to business models featuring customized business offerings, and especially those that are delivered in close collaboration with customers, are mostly aimed at developing technological competencies through business partnerships.

In addition, the existence and importance of network KISA were identified in the intentionally established networks aiming to reach a specific purpose, e.g. standardization, market sensing, etc. These networks facilitate innovation and are sometimes related directly to the development and emergence of new technology. They usually involve heterogeneous group of actors representing various activities in the value network, including e.g. technology partners, industry associations, standardization organizations, industry-related media companies, and customers. Some of the actors in these networks are even not necessarily related to the current revenue generation and business models of the companies. A distinctive feature of these intentional value networks is that they are more investment-type of structures which are more future revenue-oriented than current revenue-oriented, i.e. their purpose is not to gain instant profit directly from the operation of the

network. Instead, the operation and activity of these networks is firmly aimed at gaining indirect revenues and competitive advantage over competing value networks in the long run. This invokes a plausible assumption that some, or all, of the current actors in this network compound the essential actors of the future business models.

Challenges and bottlenecks in using KISA

According to the results from the first phase of the research, the main ***bottlenecks in using services*** were: 1) lack of replicable, best practices, 2) lack of business knowledge, 3) difficulty of finding service providers, and 4) comparing service various service providers. National software survey and SPIN evaluation (2003) by LTT supported these findings, too. Also, the companies in the software sector do not have experience and a business culture for using such services.

Especially, companies in the entrepreneur and expansion phases seem to have a strong belief in their internal capabilities. This seems to limit their interest of using KISA in their innovation processes. On the other hand, large companies are a subject for outsourcing activities not belonging in their core business.

A fundamental challenge in using KISA seems to be the service providers' ability to understand the company's business. Especially, entrepreneurial companies have hard time spending their resources to familiarize suitable service providers in the business. When considering organizational innovations, companies felt usage of external services as a possible risk if they participate in the core innovation itself. This may be due to sensitivity of implementing change within organization.

Identified needs for new KISA

Standardization and commercialization of product propositions was identified as an area for developing new KISA. It seems to be that companies use external service providers to find information about markets and customers, but they lack the service of consolidating this information with product development efforts.

Complementary solution providers were identified important actors to provide total business offerings to customers. Sophisticated market intelligence generation and partner seeking was also of great interest.

Insourcing of knowledge related to core competencies was mentioned to be done in order to avoid dependency of external service providers in strategic business areas. Hence, there is need to develop knowledge in-house.

Use of KISA in different innovation processes

Innovations can be grouped into three categories: product, process and organizational innovations. Product innovations are the implementation of the idea for a partly or totally new product, or a service. Process innovation is a new ways of organizing the work, tasks, or information and material flows in the main or sub business processes and networks. An organizational innovation has typically high complexity because it requires fundamental organizational (e.g. culture) and managerial (e.g. TQM) changes (Boer and Doring, 2001) or improvements in the work environment e.g., participative or consultative decision making with employees and management.

Four different innovation processes in this study were identified in the case companies: product (Case F: a new software product, however, Case included also organizational innovation): process organizational (Case A: process innovations to extent the company's international markets; Case D: a new software production process), and organizational innovation processes (Case C: an innovative cooperative practices) (see in detail Appendix 1).

The use of KISA in different innovation processes according to case studies is as follows: (**Error! Reference source not found.**).

Table 6. Use of KISA in innovation processes

Innovation process	KISA	KIBS	RTO	In-house
Product innovation	Product development funding		X	
	Market research	X	X	X
	Requirements engineering		X	
Process innovation	Process development consulting	X		
	Legal services	X		X
	Training	X		X
Organizational innovation	Product development services		X	
	Requirements engineering	X		
	Legal services	X		
	Human resource development	X		X

The use of KISA varies mainly between innovation processes, except legal services, which were used quite similarly in connection with both process and organizational innovations. According to interviewees, the role of RTOs seem to be most important in product innovation. All three service providers, KIBS, RTOs and In-house, were used for market research.

The need of training and HRD seem to be larger in process and organization innovations than in product innovations as shown in the results. According to earlier studies, process and organizational innovations have an internal focus, i.e., are most often implemented within the company with the same organizational members who have been involved in creativity processes i.e., process and organizational innovations differ from product innovations in terms of the implementation. Meanwhile product innovations are manufactured into products and launched into external markets by different individuals and departments. In addition the adoption of process and organization innovations is more disruptive than product innovations because they involve a larger number of tools, people and a social system. (Damanpour and Gopalakrishnen, 2001; Tidd et al., 2001).

The KISAs in different innovation processes above were not prioritized. However, the interviewees mentioned the most important key players in the innovation processes. There were found three types of players: internal company members, external people cooperating profitless, and KIBS as KISA providers. The key players of different innovation processes were:

Internal company members

- Company CEO, (Both Organizational innovation cases)
- Board of directors (Both Organization innovation case, Product innovation case)
- Process owner (Process innovation case)
- The development team (Process innovation and organizational cases)
- Sales representative (Product and organization innovation case)

External people

- Partners (Product innovation and organizational innovation cases)
- Board of directors (Both Organization innovation case, Product innovation case)
- People in networks (Process and Organizational innovation case)
- Customer point of view representative and pilot customers (Product and organization innovation case)

KIBS

- Process consult KIBS (Process innovation case)

In addition to KISAs, other knowledge-intensive activities, which takes place in individual networks seemed to have a very important impact to all types of innovation. These network knowledge-intensive activities is not purchased in a traditional meaning. In addition, networking with partners, authorities, etc. has been build up systematically in order to become creativity and innovative.

In the Case G, the innovation consisted of both product and organizational innovations. The timing and interaction of the product and organizational innovations is presented in Figure 13.

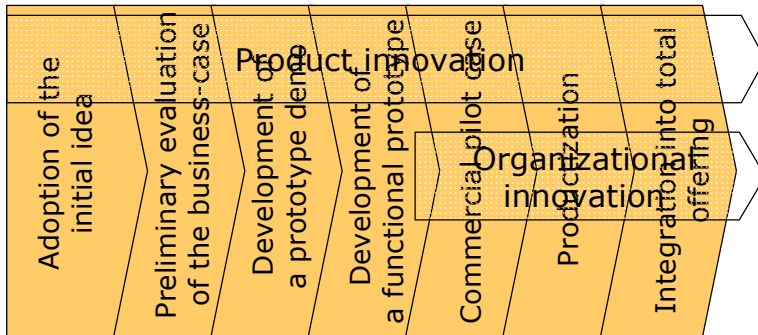


Figure 13. Timing and interaction of the product and organizational innovations

The innovation was initiated as a product innovation. As the case developed, there was an apparent need for restructuring the organization. This was not only due to the initial product innovation but also due to challenges in selling ERP-solutions in general. Anyhow, the organizational innovation, including changes also in processes, was a pre-requisite to success with the actual product innovation. The organizational innovation was carried out to respond to the business growth targets set by the company management, to facilitate a new business development and to respond to challenges in the customer relationship management and sales.

According to earlier studies organizational, process, and product innovations should be seen as representing a continuum rather than a dichotomy, as they are typically interrelated (Palmgren et al., 1999). The synchronous implementation of product and process innovations has positive implications for organizational performance (Damanpour and Gopalakrishnen, 2001).

It has to be noticed that case companies were selected to represent different types of organizations. Therefore, organizational differences may affect more the use of KISA and the choice of service providers than the variation of the innovation process itself. In addition, in several interviews, innovativeness is dependent on the organizational culture that allows to express individual opinions and ideas, which is supported in earlier studies. Earlier studies have been come to the conclusion that innovativeness needs an underlying supportive culture and innovation climate (Forssén, 2002; Tidd et al., 2001; Bessant et al., 1994).

Conclusions and recommendations

In this study we have described and analyzed the role and use of knowledge-intensive service activities in the Finnish software industry. Although software is still a rather small industry sector in Finland with revenues around €3.5 billion [Seppänen *et al.*, 2003], it has grown rapidly during the last ten years. One of the critical factors for the industry development is companies' ability to keep up the pace of new product development. As most of the software companies are SMEs, the lack of resources may weaken their innovation capacity. However, by focusing on the company's own core competencies and increasing the use professional, knowledge-intensive services companies can enhance their innovation effectiveness.

The main reason for carrying out the present study was that we know very little about the role and use of knowledge-intensive service activities in the software business context. As for this reason, we collected both quantitative and qualitative data. On the other hand, the results from the qualitative case studies improved our understanding of the use of KISA. The conjoint analysis of these studies indicate that both the demand and supply of KISA in innovation is not extensive in the software industry. However, the study suggests a clear potential for knowledge-intensive services in various software businesses, and, that there is a need for KISA in the following areas:

- market analysis (surveys, sensing, business intelligence) especially related to internationalization
- market realization; development of delivery channels, management of customer relationships, and analysis of customer satisfaction
- partner identification and evaluation
- network establishment and mobilization
- analyzing possibilities for outsourcing and insourcing.

Implications from the framework analysis

Role of KISA in innovation processes

In the context of this report, innovation processes related to product, process and organizational innovations are considered. The main finding of the project is that companies use quite rarely external services to support their innovation processes. On the other hand, when the services are used, they support software businesses significantly to focus on their core activities.

KISA seem to enhance innovation, but a high level of innovativeness is associated to 'not purchased' factors such as cooperation in networks, cooperation with customers and partners, the type of business model, organization culture, and a high level of communication.

The study suggests that the most important KISA are related to business competencies, including management consulting, financial management consulting, legal services. It should be pointed out that only a small amount of existing KISA were identified in the study. It is subject of further study to identify the reasons why KISA do not exist, or are used, to a greater extent in the software industry. However, our views suggest that in innovation processes:

- the supply of KISA is not extensive in the software industry.
- KISA are not purchased in traditional meaning but they are embedded in "not-purchased forms" in networks and partnerships,
- software companies are used to carry out most of the knowledge-intensive activities in-house

Cross-case analysis of KISA from business model and value network perspective

In our qualitative part of the study, we divided our case companies into four categories according to selected dimensions describing their business models. These selected dimensions were (1) the level of collaboration in customer relationships and (2) the level of standardization of product/service offering. In the cross-case analysis we found out that software businesses featuring standardized product/service offerings emphasize KISA related to

- legal services bound up with contracts and agreements
- market analysis (surveys, sensing, etc.) especially in connection with internationalization process
- distribution network establishment and mobilization (including partner identification and evaluation, development of delivery networks, management of customer relationships)
- product development funding
- management consulting
- analysis of customer satisfaction

The qualitative study indicates that businesses embodying standardized product or service offerings emphasize KISA related to marketing and distribution. These services include legal services and consultation in the establishment and mobilization of distribution networks. In these cases, external KISA related to technology development are used to a lesser extent. As an exception to this, the standard product or service businesses use KISA related to product development funding.

On the other hand, our multiple case analysis illustrates that business models embodying customized product/service offerings emphasize KISA related to:

- the development of new technological competencies (through of technology partnerships)
- development of management processes
- human resource management and development (HRM and HRD)
- analyzing possibilities for outsourcing vs. insourcing.

Thus, we see that business models embodying customized product/service offerings and, especially, those that operate in close collaboration with customers use KISA related to the development of technological competencies and operational efficiency. External services related to marketing issues (especially to internalization) are used to a lesser extent.

Cross-case analysis of KISA from life cycle perspective

According to the case studies, the following KISA s were used in every phase of the life cycle (Table 7).

Table 7. Use of KISA in various phases of company life-cycle

	Start-up	Entrepreneurial	Professional mgmt	Expansion
Strategic Consulting				
Business Consulting				
IT Consulting				
Research Services				
Marketing & Communication Services				
Software Development Services				
Sales & Distribution Services				
After-Sales & Support Services				
Legal Services				
Human Resource Development Services				
Financing services				
IT Support Services				

According to the interviews in the first phase of the project, there are two major parameters affecting the form of company life-cycle: financing and experience. In the context of this research, it is assumed that these two parameters will affect the time each phase in the company life-cycle takes to complete. The majority of software entrepreneurs are on their first round of entrepreneurship. It is not too common to have entrepreneurs with experience of 2-3 established businesses in Finland as mentioned in interviews. According to interviews It is to be noted that in the current economic situation, the combination of venture capital and entrepreneurs with no experience seem to be irrelevant.

The improved company life cycle model presented in **Error! Reference source not found.** shows the difference between income financed start-up with low experience (beginner-income), income financed start-up with experienced management (advanced-income) and venture capital financed start-up with experienced management (advanced-VC). These aspects should be taken into account when analyzing the role and importance of KISA from Company life cycle perspective.

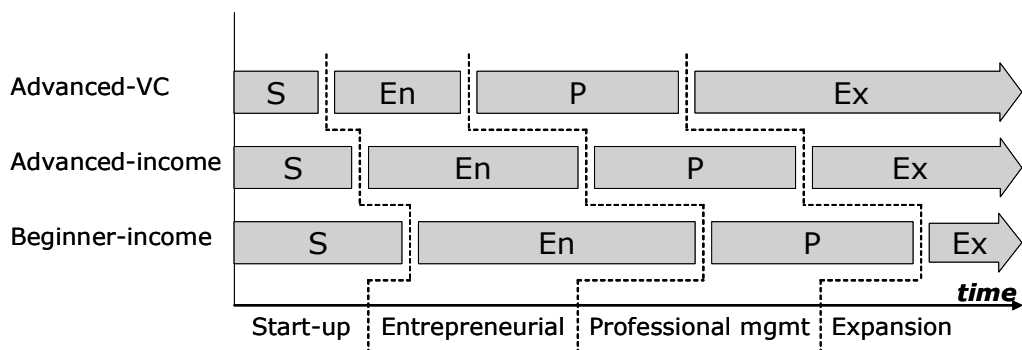


Figure 14. Company Life-Cycle

Why establishing the concept of network KISA was found necessary

We found it challenging to identify and classify all the KISA which were found in our exploratory case study, according the traditional definition of KISA (including commercial KIBS and public

services provided by RTO's). This may be due to the initial definitions of KISA which may not be appropriate for software industry.

Indeed, this challenge was emphasized when interviewees in our case companies were asked directly, what (knowledge-intensive) services are used in their business. The mentioned KISA included almost solely commercial services purchased for different purposes to conduct business in areas where internal resources and competences of the organization were insufficient to accomplish desired business objectives. Interviewees regularly ignored services related to the development of the business offering and development of technological competencies, e.g., in connection with activities related to entering into new markets. These services were not purchased in the traditional meaning but intertwined in the cooperation of the value network. The embedded services were identified by the researchers in the qualitative case analysis. Along with our multiple case studies, we found the value network perspective useful to identify KISA that are embedded in value networks and business partnerships.

“Value high the competence of networking when choosing your board of directors and advisory board members.”

Recommendations

SW business and KISAs

High-quality services for *start-ups* may have substantial potential in improving the business success rates. Figure 15 illustrates four different kinds of group of start-ups. Two of the groups are interesting in terms of using KISAs. The first group of companies has high, qualified business concept, but low skill of entrepreneur, i.e., “survives through successful recruitments”. The second interesting group of companies has a business concept with low quality, but people are highly skilled in entrepreneurship, i.e. “likely to survive with lots of work”. Both groups of companies seem to be the most potential KISA users. The challenge is, first, to find and identify those SW companies, secondly, define the crucial knowledge-intensive services they need, and, finally, support them.

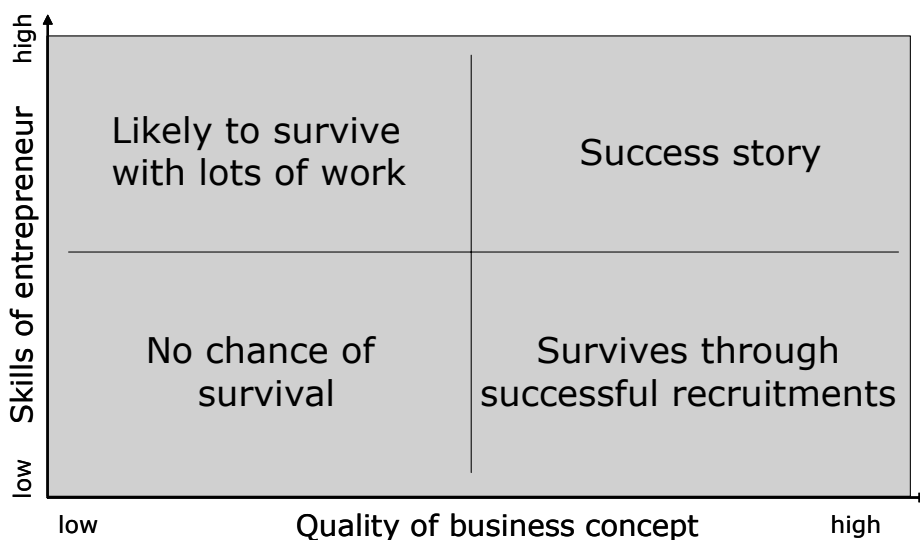


Figure 15. Categorization for start-up companies

Although, the finance issues were not addressed in this research project, the results emphasized the role of financing organizations in terms of development and innovativeness. Result shows, that the financing role is moving towards "smart money" types of investments

Results suggest that the role and impact of research institutions could be improved to support the development of the sector. The strong *collaboration between universities and companies* has proven to be one key success factor in successful SW business (e.g. Heeks and Nicholson, 2002).

In human resource development services (HRD), the supply and demand seems to be in balance in large, stable companies. However, the *most potential growth area* in the sector is in dynamic and small companies, yet they are not using these services much. This may be a potential gap. There may be a need for the different types of HRD services according to the size of the company. For example, small companies need support to team working, as teams were mentioned as one success factor in interviews, and development discussions. Again, larger companies need, in addition to these mentioned above, for instance recruitment services.

The potential standardization of platforms (such as Nokia's series 60) can improve the potential for R&D outsourcing. Therefore, we believe that these kinds of technical *standardizations facilitate and enable also clustering*.

According to the first interviews, industry associations in the service sector should practice professional lobbying. They have an essential role in changing and enhancing the culture of outsourcing and using external services. Companies should find alternative ways to network more efficiently. The familiar and systematic way of working with clients is essential. Another important aspect in the way of working is productization of service offering and finding approved pricing strategies. Service providers should focus more on their marketing efforts and organize conferences and specialist events. There has to be additional way to make demand grow. Another way of supporting the growth of demand is to organize the supply to a more understandable form. There is a demand for more knowledge on internalization and conducting international business. Start-up companies should make a HRD assessment of their management and key personnel

Recommendation for KISA providers

According to the first interviews, the following issues were discussed. Service providers should understand software business better. They should also communicate more efficiently with potential buyers. One way to support the co-operation would be to develop process models that describe the interaction of the two co-operating parties. The problem seems to be that the current service models are quite narrow but the demand would be to acquire complete solutions. One solution to this challenge is to productize the offering better. For example, the best practices could be productized and replicated. This would benefit both sectors.

Pricing models of services are under developed and somewhat unrealistic according to an interviewee. Service companies should participate in risk sharing so that in the beginning the price margins are lower and after the mutual business has developed and the client is able to pay more, the premium is added and earned. Another pricing model would be success fee based pricing.

The lack of knowledge in acquiring services should be tackled with more clearly outlined training and course offering. Data security and confidentiality has to be considered also.

One interviewee from a smaller company argued the role of Incubator as follows "if you can not manage your core business and internationalization, you do not survive". However, external help (KIBS/RTOs) is important in some specific issues such as legal matters and banking in abroad. Some interviewees mentioned that according to their experience there has been knowledge sharing problems in TEKES projects, (i.e., no real knowledge sharing and creation). These companies have not really empowered or "forced to participate in the development projects", but just participated in annual workshops.

The following recommendations have been derived from our empirical analysis:

Actions for KIBS

Strategic Consulting

- Ensure replication when making consulting products

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- Provide best practices as solutions to business problems and replicate them
- Make tools for networking
- Make tools for the stage of founding a company.

“Software companies should fix the root causes of their problems instead of symptoms.”

Marketing & Communication Services

- Be advised that you hold the ball in changing the culture of using external services
- Acquire better knowledge on processes and organized way of working

Software Development Services

- Unify the processes of subcontracting and using external resources
- Develop better way of managing the resource pool

Human Resource Development Services

- Recognize the essential areas of training: management, leadership, product development and sales

Financing services

- Demand human resources due diligence
- Co-operate with HRD companies and recognize the HR as a success factor in financial decisions
- Make new ways to succeed in seed financing
- Move away from “passive money” towards more active role in developing the companies
- Find your role as a communication hub in networking, an adviser and a mentor

Actions for RTOs

Research Services

- Universities should recognize their role as influencers of the whole cluster
- Research deliverables and results should be distributed efficiently and taken into practice
- Research activities connection with common welfare should be recognized by the universities and research institutions

Financing services

- Demand human resources due diligence
- Be advised that every business relies on people]
- Support the interaction of different clienteles
- Increase the amount and efforts supporting seed financing
- Validate current service offering and do integration work as part of your service offering
- Develop you way of working towards a mentor like model

T&E Center

- Make sure that all the actions advance the whole to one direction

National Technology Agency of Finland

- Make a program for process development within software business sector
- Take a responsibility of gathering dispersed information and best practices together and distribute them
- Make tools for networking
- Make tools for founding a software business company
- Support actions that support networking across clienteles

Critical evaluation of research design and results

Research settings and design

This research project was set up to investigate the role and use of KISA in innovation at the firm level in the Finnish software industry. A case study approach was selected to better understand the particular patterns of innovation activity and the role and use of KISA in relation to it. Three different perspectives were selected to interpret the data and these frameworks were found useful for the purpose. These frameworks were:

- (1) the business model perspective was selected to better understand the role and emphasis of KISA in accordance to different business contexts, i.e. to understand *why* firms choose to use particular different KISA,
- (2) the value network perspective was selected to analyze the systemic context of KISA, i.e. to understand *how* firms interact with each other and with external service providers, and
- (3) the life-cycle perspective was selected to identify and analyze *when* firms use different KISA, i.e. to better understand the use of particular KISA at different stages of innovation project(s) and, the connection of KISA with specific processes.

In the beginning of this study, we developed a framework for analyzing innovation processes and the associated services. The framework consists of a set of three life-cycles and the definition of KISA. The life-cycles were used as an initial framework to map the landscape of knowledge-intensive services with software business. The three different life-cycles are: 1) Product release life-cycle, 2) Product market life-cycle and 3) Company life-cycle. All the life-cycles are applicable to software product companies as well as software project companies. These life-cycle phases are, however, methodologically difficult to identify explicitly. After the data analysis, we ended up to use Product release and Company life-cycles as the frameworks to map the landscape of knowledge-intensive services with software business.

In the case studies, Product Release life cycle was used to analyze product innovation process in Case G but it did not work as expected. In addition, there was only one case where the focus was on product innovation. Therefore, the frame could not be used for the initial purpose or validate in this study. Instead, Company Life cycle worked as a framework, and it was further developed for the use of future studies.

The research setting was found successful in order to set forth a rich view of the nature of innovation in the software industry. In addition, the use of the setting yielded the increased understanding both the context where KISA are used and the way software firms use different external services provided by either public or private service providers or in-house KISA. Furthermore, the study poses some initial implications why some firms select not to use external KISA in their particular business context.

In the study, the dominant approach is qualitative case study research with a minor component of the study based on a quantitative approach. This is done according to the concept of triangulation, i.e. the combination of different methodologies in the study of the same phenomenon (Creswell, 1994; Miles and Huberman, 1994). The purpose of a case study approach in this study was to obtain a rich and thorough view on the role and use of KISA in software businesses. This approach complements the quantitative analysis conducted through surveys by providing means to identify also the embedded KISA usually carried out through intentional collaboration in value networks.

Results

The methodological question related to the generalization of the results was considered essential, because the study embodies a small set of software firms totaling in seven selected case companies. Therefore, particular attention was paid on the case selection criteria. Also, the case study results were compared with two surveys accomplished during the project. One of the

surveys, an online survey focused on the importance of KISA related to specific business functions in Finnish software firms (n=48). Another survey, which collected data on the use of KIBS was carried out along with the Finnish national software survey (n=166).

The validity of results was further addressed by comparing case analyses between the two separate research groups focusing on different perspectives applied to interpret the data. One of the groups focused on the business model and value network perspectives, while the other concentrated on the life cycle and innovation process perspective. Therefore, three of the case companies were overlapping (i.e. carried out on shared case companies) between the two research groups, whereas four of the cases were carried out on distinct companies.

Despite of the initial research proposition, the main purpose of this project was not to build up a complete list of KISA in the software industry, but merely to understand the role and use of KISA in connection with the particular patterns of innovation activity. As a result, this study applied a set of dimensions to analyze KISA in order to better understand the need and use external services.

Future Research

When considering further research in this area, there are few areas to consider. The use of KISA is affected by many different factors, e.g. company's age and turnover, company's operations in domestic/international markets, maturity of company's own processes, competences of the personnel, product development approach and process, software product revenues, company's business model as well as role and position in value network.

The use of KISA should be studied reflecting to the company context, that set requirement for the usage of KISA. This is remarkably more than the innovation process itself.

As KISA as a term or a definition is not recognized in scientific research literature and publications, it is an appealing area for defining the taxonomy in the academic context. Various parties providing the services as well as the various modes of participating and contributing to the activity sets an appealing landscape for further research. As the networked economy develops, the earning logic and/or exchange of services is an area of interest. As for now, the term KISA is exposed to critique as it is incompatible in the network domain as the activity is not service, but purely exchange between companies.

Suggestions for research questions for further research include:

- What are the special KISA needs of the companies operating in different environment, with different competence, a business model, and a role in the value network?
- What kinds of competences are needed within different companies at the different stages of innovation processes? How those needed competences are build or achieved - through the usage of KISA or otherwise?
- How to differentiate support processes related to "business as usual" operations from innovation processes from KISA point of view?
- What is the difference in using different KISA-providers (KIBS, RTO, Network) in activities external to the pure activity?
- Can KISA be an initiator of innovation?
- How to define the difference of subcontractor and KIBS (as a KISA-provider)?
- If innovativeness needs an underlying supportive culture and innovation climate, how could KISAs enable the development of the supportive culture and climate in organizations?

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