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KNOWLEDGE SERVICES IN THE INNOVATION SYSTEM

Osaamispalvelut innovaatiojärjestelmässä

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ABSTRACT: This study examines the nature and role of knowledge-intensive business services (KIBS) in the innovation system. KIBS have been found to be important users and disseminators of knowledge. This study assesses their role in *creating* new knowledge. In addition, issues related to management of knowledge in interfirm relationships are investigated. Particularly, governance of intellectual property through contractual mechanisms is studied.

The main results of the study are that KIBS firms can be highly innovative. Innovative service firms invest in standardizing services and underlying procedures. Service innovation is thus associated with *organizational* learning and knowledge, even though individual experts' skills are very important for competitive service provision. Radical service innovation requires combining diverse internal and external sources of knowledge, while incremental learning in client relationships facilitates less drastic innovation. KIBS firms' learning and innovation strategies are also reflected in their contractual techniques to protect and govern knowledge. Particularly relevant are the control rights to service output, because they affect the incentives to innovate. Organization form and innovation are thus closely related.

Advances in information and communication technologies improve efficiency of service production and delivery, but they cannot be the sole basis for international expansion. Personal interaction with clients and visible market presence continue to be necessary. Nevertheless, codification and standardization of service packages as opposed to providing purely expert skill-based services support the adoption of and benefiting from these new technologies.

KEY WORDS: Business services, innovation, knowledge management, organization

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TIIVISTELMÄ: Tutkimuksessa arvioidaan osaamis-perusteisten liike-elämän palveluiden (KIBS) luonnetta ja roolia innovaatiojärjestelmässä. KIBS-yritysten on havaittu käyttävän ja kierrättävän korkeaa osaamista. Tässä tutkimuksessa tarkastellaan niiden merkitystä uuden osaamisen luojina. Lisäksi tutkitaan yritys-

ten välisten suhteiden johtamista ja siihen liittyviä sopimuksia erityisesti osaamisen kehittämisen ja siirtymisen näkökulmasta.

Tulosten mukaan KIBS-yritykset voivat olla hyvinkin innovatiivisia, eivätkä siis tyydy muiden osaamisen kierrättämiseen. Innovatiiviset palveluyritykset tarjoavat useammin tuotteistettuja palvelupaketteja kuin pelkkiä asiantuntijapalveluita. Palveluinnovointi näyttääkin liittyvän *organisaation* yhteiseen oppimiseen, vaikka yksilöiden taidot ovat toki hyvin tärkeitä kilpailukykyisten palveluiden kannalta. Radikaalit palveluinnovaatiot edellyttävät lisäksi monenlaisten niin sisäisten kuin ulkoisten osaamislähteiden yhdistämistä. Vähittäinen oppiminen asiakasprojekteissa voi sen sijaan johtaa vähittäisiin innovaatioihin. KIBS-yritysten oppimis- ja innovaatiostrategiat vaikuttavat myös sopimuksiin, joilla suojataan ja hallitaan tietoa ja osaamista. Erityisen tärkeitä ovat palvelutuotoksen hallintaoikeudet, koska ne vaikuttavat innovaatiotoiminnan kannustimiin. Organisaatio ja innovaatiotoiminta ovat siten tärkeässä vuorovaikutussuhteessa.

Tieto- ja viestintätekniikan kehitys on tehostanut palveluiden tuottamista ja jakelua, mutta tekniikka voi harvoin olla osaamispalveluyrityksen kansainvälistymisen ainoa perusta. Henkilökohtaiset kontaktit asiakkaiden kanssa ja näkyvyys markkinoilla ovat edelleen tärkeitä kilpailuvaltteja. Tuotteistettuja palveluita tarjoavat yritykset löytävät kuitenkin helpommin viestintäteknologioihin perustuvia uusia liiketoimintamahdollisuuksia.

ASIASANAT: Liike-elämän palvelut, innovaatiot, osaamisen johtaminen, organisaatio

Foreword

This study was carried out as a part of the Research Programme on the Finnish Innovation System financed by Sitra, the Finnish National Fund for Research and Development. The national innovation system is defined as the system of organisations and actors whose interaction shapes the innovativeness of the national economy and society. The main goal of the research programme was to identify the future challenges of the Finnish innovation system. In a rapidly changing techno-economic environment, the Finnish innovation system cannot be expected to repeat its recent successes without continuous and effective development effort.

The research programme included 12 research projects that represented several scientific disciplines: sociology, economics, innovation research, psychology, jurisprudence, etc. The cross-disciplinary approach was chosen to gain many different, but complementary, perspectives on the structure and functioning of the innovation system. The close cooperation of scholars from different disciplines was aimed at creating an innovative research environment for the programme. A particular emphasis was laid on understanding the micro-level innovation processes and innovation networks. The research projects went beyond the traditional organisation- and institution-oriented studies of innovation systems in order to better understand the drivers and context of modern innovation processes. In the changed environment, innovation policies cannot be effective without a deep understanding of these processes and their environment. The results of the whole research programme were synthesized in the programme's final report *Transformation of the Finnish Innovation System: A Network Approach* (Gerd Schienstock and Timo Hämäläinen).

Sitra wants to thank all the researchers, policy makers and distinguished foreign experts that contributed to the success of the research programme. The results of the research programme provide plenty of challenges for further research and future innovation policies.

Helsinki October 2001

Finnish National Fund for Research and Development Sitra

Foreword

Growth of the service sector and the overall focus on knowledge in the economic policy debate have attracted new research and political interest in the "high technology" area within service industries: knowledge-intensive business services. This study contributes to the debate by collecting new data of Finnish business service firms in the areas of engineering and design, management, advertising, and R&D services. Broad-based survey data of a set of different business service industries enable drawing some more generalizable conclusions of the phenomena of interest. A novelty of the approach is also that firms' innovation activities are assessed together with their informal and formal mechanisms of governance. Previous work has not examined the relationship between organization and innovation rigorously with reference to empirical evidence.

The results provide new insights into the processes of learning and innovation in the economy. In particular, results can be leveraged in managing knowledge flows and cooperation in collaborative innovation arrangements between firms. Strategies to learn and create new knowledge are identified, and their relationships with firm performance in terms of innovation and growth are demonstrated. Management practices such as sourcing of knowledge and standardization of service procedures are shown to impact, among other things, firms' capabilities to make use of new information and communication technologies and exploit associated business opportunities. The study hence brings together previously unrelated areas of investigation and brings forth evidence of their interaction.

The study is part of the ongoing research on technology, competencies, and competitiveness at ETLA. We would like to thank Sitra, the Finnish National Fund for Research and Development for financial support.

Helsinki, October 2001

Pentti Vartia

Author's preface

This study is part of the research program on Finnish innovation networks funded and lead by Sitra, the Finnish National Fund for Research and Development. I would like to thank Sitra, particularly Professor Gerd Schienstock and Dr. Timo Hämäläinen for both funding and new ideas to further develop my thinking around the themes of innovation, networks, and knowledge-intensive business services. Scholars participating in the Innovation Networks research program convened several times over the period of study, January 2000-May 2001. Seminars, presentations and discussions with other participants in the program were stimulating. In particular I enjoyed and benefitted from exchanging ideas with Christopher Palmberg, Ilkka Tuomi, Peter McGrory, and Sirpa Kolehmainen. Professor Keith Pavitt from Science Policy Research Unit in the University of Brighton (UK) and Professor J.-C. Spender from Fashion Institute of Technology (USA) participated in the workshops of the research program and shared their insightful views on my research topic.

During this research project I spent six months in University of California at Berkeley as a visiting post-doctoral research fellow. My host at the Institute of Industrial Relations was Professor James Lincoln, whom I would like to thank for this wonderful opportunity. The Institute is an inspiring research environment. Friends and colleagues at the Walter A. Haas School of Business also provided useful feedback on my work. Chapter 4 of the report has also benefited from the comments of the participants in the Innovation Workshop of the Royal Technical Institute in Stockholm, Sweden, particularly Professor Bronwyn Hall from UC Berkeley (USA).

The study is mainly based on a new Finnish survey dataset on business service firms. Developing the survey questionnaire was greatly facilitated by the comments of Ari Leppälahti and Olavi Lehtoranta at Statistics Finland. I am also grateful for the diligent work of Antton Lounasheimo, Kirsti Jalaistus and Hannele Immonen at ETLA. They helped me immensely in various, and for the most part, tedious stages of the survey. Pekka Ylä-Anttila, Rita Asplund and Steven Wolf have provided useful comments on the manuscript, but are of course not responsible for any of the content. Finally, I want to express my gratitude to all the people in firms and industry associations who graciously accepted my requests for interview or responded to the survey. Inter-

acting with these people has been fascinating to me, and naturally these inputs were critical for the successful completion of the study.

Aija Leiponen

Contents

Summary

Liike-elämän osaamispalvelut innovaatiojärjestelmässä

1. Miten osaamista kehitetään ja siirretään innovaatiojärjestelmässä?

Tässä tutkimuksessa tarkastellaan uuteen empiiriseen aineistoon perustuen osaamisperusteisten liike-elämän palveluiden merkitystä kansallisessa innovaatiojärjestelmässä. Näihin palveluihin kohdistuu huomattavia taloudellisia ja poliittisiakin odotuksia uutena talouden ja innovoinnin kansallisena moottorina. On siis paikallaan kartoittaa suomalaisia liike-elämän osaamispalveluyrityksiä ja niiden roolia kansallisessa innovaatiojärjestelmässä. Tutkimuksessa kysytään, miten palveluyritykset luovat uutta osaamista ja kehittävät palveluitaan yhdessä asiakkaittensa kanssa, ja toiseksi, miten nämä yritykset vaikuttavat asiakkaidensa menestymiseen.

Liike-elämän osaamispalvelut ovat kiinnostava tutkimuskohde myös siksi, että niiden ”tuotteita” ovat osaaminen ja tieto, joihin perustuu yhä suurempi osa talouden toiminnasta. Osaamispalveluita voidaan siksi tarkastella nykykehityksen ääripäänä. Tieto ja osaaminen ovat aineettomia hyödykkeitä, joiden kirjaaminen esimerkiksi paperille tai tietokoneohjelmaksi ei usein onnistu. Osaamisen siirtäminen asiakkaalle voi kestää pitkään ja vaatia tiivistä yhteistyötä. Tällaisten liiketoimien tutkimus on vasta alussa, mutta se voi auttaa ymmärtämään innovaatiotoimintaa yleisemmin. Innovoinnissakin on yhä useammin kyseessä erilaisten osaajien yhteistyö.

Osaamispalveluyritykset sekä luovat uutta tietoa että oppivat asiakkailtaan ja ympäristöstään yhdistellen olemassa olevaa tietämystä omissa palveluissaan. Tieto liikkuu siten molempiin suuntiin palveluyrityksen ja asiakkaan välillä. Tästä syystä tiedon siirtoon ja hallintaan liittyvät strategiset ja oikeudelliset kysymykset ovat keskeisiä. Tässä tutkimuksessa selvitetään palveluyritysten oman innovaatiotoiminnan lisäksi niiden asiakkaiden kanssa tapahtuvan, usein uutta luovan vuorovaikutuksen luonnetta ja organisointia.

2. Osaamispalveluiden dynamiikka ja vuorovaikutukset

Tutkimus kohdistuu palvelutoiminnan ilmiöihin kolmella tasolla: palveluyrityksen sisäiset toiminnot ja strategia; palvelu- ja asiakasyrityksen välinen vuorovaikutus ja sopimukset; sekä asiakasyritysten näkemykset yhteistyön luonteesta ja palveluiden kehittämisestä. Näin saavutetaan monipuolinen näkemys palveluiden luonteesta ja merkityksestä taloudessa.

2.1 Palveluyritysten kilpailustrategiat

Palveluyritysten sisäisiä toimintoja lähestyttiin kolmesta, toisiinsa läheisesti liittyvästä näkökulmasta. *Palvelustrategiaa* kuvattiin yritysten suuntautumisella joko puhtaiden asiantuntijapalveluiden tai tuotteistettujen palvelupakettien tuottamiseen. Palvelun tuotteistaminen eli jonkinasteinen vakiointi helpottaa osaamisen levittämistä ja organisointia yrityksessä. *Kilpailukykystrategian* luonnehtimiseksi kehitettiin muuttujia, joilla voidaan arvioida, perustuuko yrityksen toiminta pääasiassa organisaation osaamiseen ja yhteisiin voimavaroihin vai yksilöiden taitoihin ja oppimiseen. Asiantuntijoiden rooli palveluyrityksessä vaikuttaa paitsi yrityk-

Taulukko 1. Palveluyritysten strategiset valinnat

Palvelustrategia	*Asiantuntijapalvelut*	• Ulkopuolisena eksperttinä asiakkaan projekteissa
	Palveluratkaisut	• Palvelujen tuotteistaminen • Palvelupaketit
Kilpailukyky-strategia	*Yksilöiden taidot*	• Korkeakoulutus • Työpaikkakoulutus • Työssä oppiminen
	Organisaation voimavarat	• Innovointi • Palvelujen kehittäminen • Markkinointi • Tiimien osaaminen
Osaamisstrategia	*Vähittäinen oppiminen*	• Työpaikkakoulutus • Työssä oppiminen
	Osaamislähteiden yhdistäminen	• Tiimit • Sisäinen yhteistyö • Ulkoinen innovaatioyhteistyö

sen sisäiseen organisaatioon myös sen kasvumahdollisuuksiin. Kolmantena strategisena ulottuvuutena tarkasteltiin yritysten *osaamisen* kehittämistapoja. Niissä polaariset strategiat ovat yhtäältä sisäisten ja ulkoisten osaamislähteiden yhdistäminen ja toisaalta vähittäinen tekemäl-lä oppiminen. Monipuolisten tietolähteiden yhdistäminen mahdollistaa radikaalimpien innovaatioiden syntymisen kuin vähittäinen, kumulatii-vinen oppiminen. Strategioiden yhteenveto on taulukossa 1. Strategian onnistumista arvioitiin kolmella mittarilla: yrityksen kasvu, innovaatiotoiminta ja vienti. Tulosten mukaan strategiset valinnat palveluiden, kilpailukyvyn ja osaamisen kehittämisen suhteen vaikuttavat yrityksen kehittymissuuntaan ja -nopeuteen. Tulosten yhteenveto seuraa jäljempänä.

2.2 Asiakassuhteiden hallinta

Palveluyritysten ja niiden asiakkaiden välistä vuorovaikutusta arvioitiin erilaisilla laadullisilla mittareilla sekä käytetyillä sopimuksilla. Yhteistyön luonnetta kuvaavat esimerkiksi palveluyrityksen rooli asiakassuhteessa – kuinka varhaisessa vaiheessa palvelutoimittaja liittyy asiakkaan projektiin, kuinka aktiivisesti se osallistuu projektin suunnitteluun ja kuinka tiiviisti projektissa tehdään yhteistyötä. Sopimuksellisista ulottuvuuksista tärkeimpiä ovat osaamisen ja palvelutuotoksen hallinta. Nämä hallintaoikeudet vaikuttavat esimerkiksi palveluyrityksen motivaatioon nähdä vaivaa projektissa ja kehittää palveluitaan.

2.3 Miksi ulkoistaa palvelutoimintoja?

Asiakkaiden strategisista kysymyksistä tärkeimpänä tarkasteltiin päätöstä siitä, hankitaanko palvelu ulkopuoliselta toimittajalta vai kehitetäänkö tarvittava osaaminen itse yrityksen sisäisin voimavaroin. Päätökseen vaikuttavat ennen kaikkea osaamisen kehittämiseen ja hyödyntämiseen liittyvät pitkän aikavälin näkökohdat. Periaatteessa asiakkaat haluavat ulkoistaa mahdollisimman suuren osan palveluista, koska silloin hyödytään monipuolisesta osaamisesta ja voidaan kilpailuttamalla tehostaa toimintaa. Strategisesti arat ja korvaamattomat palvelut kuitenkin pidetään yrityksen sisällä. Suurin osa asiakkaista siis toteuttaa ns. ydinosaamisstrategiaa. Sen sijaan monelta puuttuu palveluhankintastrategia – miten parhaiten hyötyä palvelutoimittajien osaamisesta ja levittää sitä yrityksen sisällä. Suuren yrityksen eri divisioonat eivät esimerkiksi yleensä tunne toistensa palvelutoimittajia, vaikka palveluostoissakin skaalasta saattaisi olla etua esimerkiksi sopimusten kirjoittamisen ja luottamuksen kehittämisen suhteen.

2.4 Tutkimuksen laajuus ja kulku

Tutkittuihin palvelualoihin kuuluvat teollinen muotoilu, mainos- ja markkinointipalvelut, kone- ja prosessisuunnittelu, sähkö- ja automaatiosuunnittelu, liikkeenjohdon konsultointi sekä tutkimus- ja kehityspalvelut. Toimialojen välillä on selviäkin eroja, mutta tutkimusaineiston analyysin mukaan yritysten käyttäytymistä selittävät paremmin niiden strategiset erityispiirteet kuin toimialaerot. Empiiristä tutkimusaineistoa kerättiin projektissa kolmessa vaiheessa. Ensin haastateltiin 16 palveluyrityksen toimitusjohtajaa. Suuremmissa yrityksissä haastateltavana oli yleensä osaamisen ja palveluiden kehittämisestä vastaava johtaja. Tämän tapausmateriaalin perusteella suunniteltiin kyselykaavake, joka postitettiin lähes 400 palveluyritykselle. Vastauksia kyselyyn tuli 168, eli 42 prosenttia otoksesta. Lopuksi haastateltiin muutamien suurten teollisten yritysten osaamispalveluita ostavia ja käyttäviä johtajia.

3. Asiakkailta oppiminen ja osaamisen hallinta

Asiakkaat ovat osaamispalveluiden toimittajien tärkein tietolähde. Asiakasprojekteissa tapahtuva oppiminen on siksi tärkeä tallentaa ja hyödyntää muissa projekteissa. Strategiatutkimuksessa tätä on kutsuttu osaamisen johtamiseksi (*knowledge management*). Käsitteellä tarkoitetaan organisaation toimintatapoja, jotka mahdollistavat kumulatiivisen oppimisen ja opitun kierrättämisen. Projektikokemuksen tietoinen kerääminen, pohtiminen ja hyödyntäminen kiihdyttää organisaation oppimista. Osaamisen tehokas hallinta edellyttää myös tietämyksen, työtapojen ja hyvien ratkaisujen jakamista yrityksessä. Osaamisen johtamisessa on siten ennen kaikkea kyse yksilöiden taitojen ja kokemuksen muuntamisesta organisaation yhteisiksi voimavaroiksi. Strategisesti tämä edellyttää keskittymistä asiakkaisiin ja projekteihin, jotka tukevat halutun osaamisen kertymistä. Asiantuntijayrityksenkin kannattaa erikoistua rajattuun osaamisalueeseen, jossa sillä on mahdollisuus saavuttaa vahva markkina-asema.

Liike-elämän palveluissa työskentelee korkeasti koulutettuja asiantuntijoita, joiden taidoille on runsaasti kysyntää työmarkkinoilla. Palveluyritysten yhtenä osaamishaasteena on saada nämä ekspertit viihtymään yrityksessä motivoimalla heitä mielenkiintoisilla toimeksiannoilla ja erilaisilla kannustimilla. Rahallisten ja laadullisten kannustinjärjestelmien lisäksi sitoutumista voidaan edistää työsopimuksilla sekä varsinkin osakkuudella tai sen mahdollisuudella tulevaisuudessa. Monet palveluyritysten johtajat kuitenkin korostavat ilmapiirin merkitystä.

Kannustinjärjestelmän suunnittelussa on päätettävä, pyritäänkö motivoimaan pääasiassa yksittäisiä työntekijöitä vai ryhmiä ja tiimejä. Tämän pohjalta määritellään, miten tavoitteiden saavuttamista mitataan. Yksilöiden toiminnan onnistumisen mittaaminen luo voimakkaat kannustimet, mutta saattaa haitata yhteistyöilmapiirin syntymistä. Tiimi- tai yritystason mittarit tuottavat hieman laimeammat kannustimet, mutta vaikutukset työilmapiiriin saattavat olla myönteisempiä, varsinkin jos yrityksen kilpailukyky perustuu tiimien yhteiseen osaamiseen eikä niinkään yksilöiden taitoihin.

Asiantuntijayrityksen johtamishaasteisiin kuuluu myös tasapainotella vahvojen ja itsenäisten yksilöiden sekä toisaalta organisaation tarpeiden välillä. Yksilöiden ja organisaation tavoitteet eivät välttämättä aina ole kannustimista huolimatta täysin yhteneväisiä. Pienissä osaamispalveluyrityksissä tyypillinen tilanne on, että yrityksen perustaja on voimakas persoonallisuus ja alallaan poikkeuksellisen lahjakas suunnittelija tai ajattelija. Yrityksen alkutaipaleella tästä on korvaamatonta apua, kun yritys kaipaa kipeästi hyvää mainetta, asiakasreferenssejä sekä yhteistyökumppaneita. Riippuvuus tällaisesta ”tähtisuunnittelijasta” on kuitenkin samalla riski organisaatiolle. Tähden jättäessä yrityksen organisaatio saattaa jäädä tyhjän päälle, kun osaaminen, johtaminen ja maine ovat olleet yhden henkilön varassa. Kasvuun pyrkivälle nuorelle palveluyritykselle on tärkeää jakaa osaamista ja johtamisvastuuta yrityksen sisällä, kannustaa kaikkien työntekijöiden yritteliäisyyttä ja ideointia sekä kehittää organisaatiota ja yhteisiä toimintatapoja.

Palveluyritysten asiakassuhteita vaivaa varsinkin alkuvaiheessa ns. epäsymmetrisen informaation ongelma. Asiakas ei voi etukäteen tietää kovin täsmällisesti kuinka taitava ja huolellinen palveluyritys on toiminnassaan. Vaikka yritettäisiin kirjoittaa täsmällisiä projektisopimuksia, varsinkin innovaatioprojekteissa syntyy aina odottamattomia tilanteita. Yhteistyön täytyy siis olla joustavaa ja perustua molemminpuoliseen luottamukseen. Luottamuksellisten asiakassuhteiden ja niitä tukevan maineen kehittäminen voi viedä yllättävän paljon aikaa.

Nuoret palveluyritykset voivat pyrkiä vauhdittamaan asiakassuhteiden syntymistä solmimalla sopimuksia, joihin liittyy onnistumistakuita tai -bonuksia. Silloin asiakas maksaa palvelusta vähemmän, jos laatu tai tuottavuus on heikkoa, tai vastaavasti enemmän jos tavoitteet ylitetään. Tällaiset sopimukset siirtävät projektiriskiä palvelutoimittajalle ja edellyttävät onnistumisen mittaamista, mutta hyötynä on että palvelutoimittajan uskottavuus kasvaa. Onnistumismittareita ja -bonuksia käytetään kuitenkin palveluhankinnassa melko harvoin johtuen mm. siitä, että asiakkaan vaikutus palveluprojektin onnistumiseen saattaa olla jopa suurempi kuin palveluyrityksen, jolloin palveluyrityksen kannustimet

eivät juuri vaikuta lopputulokseen. Tässä tapauksessa projektista voitaisiin muodostaa väliaikainen tulosyksikkö yhdistäen palvelu- ja asiakastiimit, jolloin kaikki yksikön työntekijät saisivat tavoitteiden ylittämisestä ylimääräistä palkkiota. Tämäkään ratkaisu ei toimi, jos projektin onnistumista on hyvin vaikea mitata. Silloin voidaan pyrkiä parantamaan laadunvalvontaa erilaisilla laatujärjestelmillä ja palveluprosessien ja -tuotoksen vakioinnilla. Riskiä ja tehokkuuskannustimia voidaan siirtää palveluyritykselle myös määrittämällä projektille kiinteä hinta.

Kyselyaineiston mukaan pienet osaamispalveluyritykset käyttävät onnistumisbonuksia yleisemmin kuin suuret palvelutoimittajat. Kyseessä saattaa olla juuri edellä mainittu laadun ”signalointi”. Bonusten käyttö on yleisempää myös yrityksissä, joissa asiakastyytyväisyyttä mitataan säännöllisesti sekä kehitetään projektien johtamista ja standardeja. Tällainen onnistumisen ”kirjaaminen” tai ”koodaaminen” parantaa mahdollisuuksia hyödyntää onnistumismittareita asiakassopimuksissa. Bonushinnoittelu itsessään voi olla keino ilmaista palveluprojektin onnistumisen arvo asiakkaalle. Ilman näitä hallintamekanismeja palvelun arvoa saattaa olla vaikea kuvata. Onnistumisstandardit, -mittarit ja -hinnoittelu voivat siten olla hyödyllisiä markkinoinnin työkaluja kasvuun pyrkiville osaamispalveluyrityksille.

Palveluyritysten sisäinen rakenne vaikuttaa niiden innovaatiotoimintaan. Sekä palvelutoimittajien itsensä että niiden asiakkaiden mukaan erityisesti kansainvälisen konsernin tai verkoston tuomat hyödyt ovat merkittäviä. Palveluyrityksen oman osaamisen kehittämistä helpottavat palvelukonsernin kansainväliset koulutusohjelmat, keskitetty tutkimustoiminta, tietokannat ja palvelukonseptit. Kansainväliset yritysverkostot tarjoavat myös asiakkaille mahdollisuuden hyötyä laajasta osaamisverkosta. Verkossa olevat eri alojen tai eri maiden asiantuntijat voidaan kutsua erityisosaamista vaativiin projekteihin. Mainonnassa ja liikkeenjohdon konsultoinnissa tällainen yritysrakenne on hyvin yleinen, ja sillä on huomattava positiivinen vaikutus esimerkiksi palveluiden kehittämiseen. Teknisissäkin palveluissa voitaisiin todennäköisesti hyötyä paikallisesta läsnäolosta ja osaamisen vaihdosta kansainvälisen verkoston kautta, mutta toistaiseksi kansainväliset verkostot ja konsernit ovat tällä toimialalla harvinaisempia.

4. Innovaatioita suomalaisista osaamispalveluyrityksistä

Tutkitut suomalaiset osaamispalveluyritykset panostavat merkittävästi palveluidensa kehittämiseen. Osaamista luodaan koulutus- ja T&K-

toiminnalla sekä yhteisillä innovaatioprojekteilla asiakkaiden tai muiden palveluyritysten kanssa. Myös laite- ja palvelutoimittajat ovat joillekin yrityksille tärkeitä innovaatiokumppaneita. Yliopistot ovat keskeinen yhteistyötaho erityisesti T&K-palveluita toimittaville yrityksille. Erilaisten innovaatioinvestointien tuloksena yli 40% yrityksistä on tuonut markkinoille täysin uudenlaisia palveluita viimeisten kolmen vuoden aikana, ja yli puolet yrityksistä ilmoittaa parantaneensa palveluitaan olennaisesti. Innovatiivisten yritysten osuudet eivät juuri poikkea teollisuusyrityksistä kootuista vastaavanlaisista tilastoista. Tutkituista toimialoista erityisesti liikkeenjohdon konsultointi ja T&K-palvelut panostavat osaamisen ja palveluiden kehittämiseen. Mainonnan ja teknisen palvelun yritykset perustavat toimintansa useammin vähittäiseen projekteissa oppimiseen, jolloin radikaalien palveluinnovaatioiden syntymisen todennäköisyys on vähäinen.

Tutkimuksen tulosten mukaan edellämainitut yritysten palvelu- ja osaamisstrategiat vaikuttavat asiakkaiden kanssa tapahtuvan vuorovaikutuksen organisointiin. Esimerkiksi hallinta- ja omistusoikeuksien määrittely riippuu palveluyrityksen oppimisprosessin luonteesta. Vähittäisen oppimisstrategian yritykset antavat tyypillisesti hallintaoikeudet asiakkaalle, kun taas yritykset, jotka oppivat ja innovoivat yhdistämällä monenlaisia sisäisiä ja ulkoisia osaamislähteitä, tapaavat pitää oikeudet palvelun tuotokseen ja siihen liittyvään osaamiseen itsellään. Palveluyritysten asiakkaiden kannattaakin pitää mielessä, että tämän hetken hallintaoikeudet vaikuttavat palvelutoimittajan innovatiivisuuteen tulevaisuudessa. Toimittajan liiallinen kahlehtiminen saattaa heikentää yhteistyösuhteen menestymistä pitkällä tähtäyksellä.

Yritysten oppimisstrategiat vaikuttavat myös innovaatiotoiminnan tuloksellisuuteen. Vähittäisen oppimisen yritykset eivät juuri tuo markkinoille radikaaleja palveluinnovaatioita. Monenlaisen osaamisen yhdistäminen sisäisellä ja ulkoisella yhteistyöllä sen sijaan tukee innovointia voimakkaasti. Oppimisen luonteella on siten pitkän aikavälin vaikutuksia yrityksen ja sen palveluiden kehityssuuntiin.

Myös palvelustrategia vaikuttaa innovaatiotoiminnan suuntaamiseen. Tuotteistettuja palveluratkaisuja korostava strategia tuottaa vähittäisiä innovaatioita enemmän kuin yksilöiden taitoja korostava asiantuntijastrategia. Asiantuntijastrategiaan toimintansa perustavat yritykset eivät myöskään todennäköisesti tee radikaaleja palveluinnovaatioita. Syynä voivat olla strategisen suuntautumisen synnyttämät kannustimet. Innovaatiot ovat koko organisaation investoinnin ja oppimisen tulos, kun taas vähittäinen oppiminen perustuu usein yksittäisten asiantuntijoiden oppimiseen. Yritys hyötyy enemmän tehdyistä innovaatioista kun osaaminen saadaan muunnettua palveluratkaisuiksi tai -paketeiksi, joita voi-

daan kehittää kumulatiivisesti. Siksi innovaatiotoiminnan tuotot saattavat olla suuremmat palveluita tuotteistamaan kykenevälle yritykselle. Asiantuntijoiden henkilökohtainen oppiminen ja innovatiivisuus taas voivat hyödyttää enemmän kyseistä henkilöä kuin yritystä, koska asiantuntija voi vahvan neuvotteluasemansa turvin usein siirtää innovoinnin tuotot omaan palkkaansa.

Kerätyn suomalaisen kyselyaineiston mukaan palvelustrategia vaikuttaa lisäksi yrityksen kykyyn käyttää uusia teknologioita. Palveluratkaisujen tarjoajat näyttävät hyötyvän enemmän tieto- ja viestintätekniikan tarjoamista uusista liiketoimintamahdollisuuksista kuin asiantuntijapalvelujen toimittajat. Tuotteistamiseen liittyvä palveluprosessien vakiointi sekä laadun mittaaminen ja kuvaaminen helpottavat sähköisen viestinnän hyödyntämistä uusien asiakkaiden hankinnassa.

Palveluyritysten strategisilla eroilla on innovaatiotoiminnan kautta merkitystä myös laajemman innovaatiojärjestelmän kannalta. Tuotteistetut palveluratkaisut johtavat todennäköisemmin kasvaviin tuottoihin ja synnyttävät siksi enemmän kasvu- ja kansainvälistymismahdollisuuksia. Tällainen kehitys vahvistaa suomalaista palvelusektoria ja tuottaa sitä kautta myönteisiä ulkoisvaikutuksia palveluita käyttäville aloille, kun osaamispalveluiden tarjonta kasvaa, monipuolistuu ja nousee kansainvälisesti kilpailukykyiselle tasolle. Asiantuntijapalvelut puolestaan ovat tärkeä tieto- ja taitovaranto varsinkin teollisuudelle. Ne muodostavat ennen kaikkea koulutettujen ja taitavien ihmisten reservin, joka kierrättää olemassa olevaa tietämystä taloudessa ja tuottaa uusia näkemyksiä omaan oppimiseensa nojautuen. Nämä asiantuntijat saattavat olla hyvinkin tärkeitä kumppaneita asiakkaidensa innovaatiotoiminnassa.

5. Osaamispalveluiden politiikka

Euroopan yhteisön ja OECD:n piirissä liike-elämän osaamispalvelut ovat kiivaan poliittisen keskustelun ja tutkimuksen kohteena. Koko palvelusektorin osuus kansantuotteesta on teollistuneissa maissa kasvanut jatkuvasti, ja kaikkein ”korkeinta teknologiaa” palveluiden alueella edustavat juuri osaamispalvelut ja tietokoneohjelmointi. Nämä alueet myös kasvavat hyvin nopeasti. Viimeisten 10 vuoden aikana liike-elämän palvelut ovat kasvaneet OECD:ssä noin 10 prosentin vuosivauhdilla, vaikkakin niiden osuus kokonaistyöllisyydestä on edelleen vain vajaan viiden prosentin luokkaa. Nopean kehityksen arvellaan jatkuvan, etenkin kun tieto- ja viestintätekniikan odotetaan mullistavan koko palvelusektorin. Esimerkiksi Valtion tiede- ja teknologianeuvosto on äskettäin nostanut juuri tietotekniikan omaksumisen liike-elämän

palveluissa koko innovaatiojärjestelmän erityishaasteeksi.[1] Kaiken kaikkiaan vaikuttaa siltä, että liike-elämän osaamispalveluista odotetaan jonkinlaista uutta talouden moottoria.

5.1 Tietotekniikka osaamispalveluissa

Tässä tutkimuksessa käytetyn empiirisen aineiston perusteella eräät näistä odotuksista saattavat olla ylimitoitettuja. Tulosten mukaan tieto- ja viestintätekniikka tehostaa palvelujen tuottamista ja viestintää asiakkaan kanssa merkittävästi, mutta tekniikka voi harvoin olla osaamispalvelun ainoa perusta. Haastatellut asiakkaat korostivat henkilökohtaisen yhteydenpidon merkitystä palveluprojekteissa. Mitä monimutkaisempi ja pitkäkestoisempi palveluprojekti, sitä tärkeämpää esimerkiksi on tavata henkilökohtaisesti, varsinkin projektin alussa. Tämä helpottaa huomattavasti ensiarvoisen tärkeiden luottamuksen ja henkilökohtaisten suhteiden syntymistä. Lisäksi monet suunnitteluprojektit edellyttävät toistuvaa keskustelua asiakkaan ja palveluyrityksen välillä projektin aikana. Keskustelua ja yhteistä ideointia voidaan käydä viestintätekniikan välityksellä vain osittain.

Tietotekniikan odotetaan myös lisäävän palveluvientiä olennaisesti. Vienti ei kuitenkaan ole välttämättä tärkein kansainvälistymisen muoto liike-elämän osaamispalveluille. Kansainvälisten tilastojen mukaan[2] suo-rat sijoitukset ovat palveluissa volyymiltään selvästi vientiä tärkeämpiä. Useimmissa palveluissa on nimittäin edelleen tärkeää olla jatkuvasti ja näkyvästi lähellä käyttäjää. Tämä korostuu liike-elämän palveluissa, jotka perustuvat osaamisen siirtämiseen ja maineen ylläpitoon.

5.2 Kilpailun sääntely: viranomaiset ja toimialajärjestöt

OECD:n vertailujen mukaan[3] Suomessa on hyvin vähän kilpailun esteitä liike-elämän palvelujen alalla. Kilpailuvirasto sai purettua alan järjestöjen hintasuositukset vuonna 1988. Yritysten ja asiantuntijoiden jäsenyys järjestöissä on vapaaehtoista eivätkä järjestöt muutenkaan hallitse alojen kehitystä liikaa auktoriteetillaan. Markkinoille pääsy riippuukin enemmän yrityksen omasta kyvystä rakentaa osaamista ja asiakaskontakteja kuin toimialajärjestöjen hyväksynnästä.

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1 VTTN: Katsaus 2000. Tiedon ja osaamisen haasteet, Helsinki 2000.

2 OECD: Science, Technology, and Industry Scoreboard 1999. Benchmarking Knowledge-Based Economies.

3 OECD: Competition in Professional Services, 2000.

Suomessa liike-elämän palveluiden laadun valvonta ja sääntely tapahtuu epäsuorasti alan järjestöjen toimintatapasuositusten pohjalta. Suomen Konsulttien Liitto SKOL esimerkiksi tukee laadun kehittämis-tä jäsenyrityksissään konsulttitoiminnan eettisten ohjeiden ja laatukäsikirjan avulla. Konsulttitoiminnan ohjeissa suositellaan muun muassa, miten välttää konfliktit palveluyrityksen eri asiakkaiden tarpeiden välillä, säilyttää asiakkaan luottamukselliset tiedot sekä ylläpitää asiantuntemusta. Palveluiden asiakkaiden mukaan nämä normit toimivat Suomessa hyvin. Pienillä ja hyvin toimivilla markkinoilla maineen menetys on palveluyritykselle kohtalokasta. Suomen toimintaympäristö perustuu siten vahvaan luottamukseen, kun tieto liikkuu osapuolten välillä suhteellisen tehokkaasti. Jatkotutkimuksessa voitaisiin selvittää miten käyttäytymisnormit eroavat eri maissa, koska siitä riippuu miten suomalaiset palveluyritykset menestyvät ulkomaisilla markkinoilla ja toisaalta miten Suomeen sijoittuvat ulkomaiset palveluntarjoajat mahdollisesti muuttavat suomalaisia toimintatapoja. Suurilla ja nopeasti muuttuvilla markkinoilla maineen ja luottamuksen synnyttäminen vaatii yrityksiltä ehkä uudenlaisia toimenpiteitä.

5.3 Liiketoimintaosaaminen ja teknologiapolitiikka

Suomen teknologiapoliittiset päätöksentekijät ovat korostaneet toistuvasti markkinointi- ja liiketoimintaosaamisen puutteita varsinkin pienten ja keskisuurten yritysten toiminnassa.[4] Kaivataan myös lisää soveltavaa liikkeenjohdon, liiketoiminnan ja markkinoinnin tutkimusta. Tässä tutkimuksessa käytetyn aineiston mukaan yhteydet palveluyritysten ja kaupallisen alan akateemisten tutkijoiden välillä ovatkin lähes olemattomia. On hämmästyttävää, etteivät edes liikkeenjohdon konsultointi ja mainonta, jotka ovat kaupallisen alan tietämyksen intensiivisiä tuottajia ja käyttäjiä, löydä hyödyllisiä keskustelukumppaneita tutkijoiden joukosta. Jos kyse on vain yhteyksien syntymisestä, poliittisella ja rahallisella tuella voitaisiin melko helposti tuoda tahot yhteen. Voitaisiin esimerkiksi tukea palveluyritysten, niiden asiakkaiden sekä akateemisten tutkijoiden yhteisiä tutkimusprojekteja. Jos syy yhteyksien vähyydelle on syvemmällä, eli tilanne johtuu vaikkapa kaupallisen tutkimuksen heikosta sovellettavuudesta, pidemmän aikavälin tutkimuspanostus ja tutkimuksen uudelleensuuntaus ovat tarpeen.

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[4] Ks. esim. VTTN:n Katsaus 2000.

5.4 Palveluinnovaatiotoiminnan kannustimet ja tuki

Missä määrin osaamispalveluiden innovaatiotoimintaa tulisi tukea julkisin varoin? Yleisesti sovellettu ajattelutapa on, että innovaatioiden syntymistä on tuettava, koska tieto ja osaaminen vuotavat kilpailijoille, jolloin innovointiin investoidaan optimaalista vähemmän. Tällöin oletetaan, että kaikki innovaatiotoiminta on tuottavaa ja hyödyllistä. Ajattelu perustuu talouskasvun uusiin teorioihin: innovaatiot lisäävät tuotteiden arvoa tai vähentävät tuotantokustannuksia. Täyttävätkö palveluinnovaatiot nämä kriteerit?

Teollisuudenkaan innovoinnissa ei etukäteen tiedetä, syntyykö tuloksena hyödyllinen uusi tuote tai teknologia. Monet keksinnöistä eivät lopulta pärjääkään markkinoilla. Sama pätee palveluinnovaatioihin. Monet uudet palvelut voivat osoittautua hyödyttömiksi, mutta jos on myös olemassa realistinen mahdollisuus, että palveluinnovaatiot lisäävät asiakkaidensa tuottavuutta ja tehokkuutta, ne saattavat synnyttää positiivisia ulkoisvaikutuksia yritysten ja sektorien välille.

Innovaatiopolitiikan suhteen havaituilla palvelutyypeillä (palveluratkaisut vs. asiantuntijapalvelut) on erilaisia tarpeita. Asiantuntijoiden taitoja kehitetään paitsi työssä oppimalla myös kouluttamalla. Henkilökohtaisten taitojen ei kuitenkaan voi odottaa synnyttävän yhtä merkittäviä ulkoisvaikutuksia kuin koodatun ja tuotteistetun tiedon. On siis mahdollista että näihin taitoihin investoidaan yrityksissä ja asiantuntijoiden itsensä toimesta riittävästi. Perustaitojen kehitystä tuetaan myös julkisen koulutusjärjestelmän piirissä. Sen sijaan tuotteistetut palvelukonseptit leviävät helposti kilpaileville yrityksille, joten niiden kehittämiseen todennäköisesti investoidaan ”optimaalista” vähemmän. Tämän ajattelun mukaan innovaatiojärjestelmässä voitaisiin siis tukea tuotteistettavia palveluinnovaatioita samaan tapaan kuin fyysisten tuotteiden ja uusien teknologioiden kehittämistä tuetaan.

Joka neljäs otoksen yrityksistä osallistuu kansalliseen innovaatiojärjestelmään julkisen rahoituksen saajana. Liikkeenjohdon ja mainonnan yritykset saavat kuitenkin hyvin harvoin julkista rahoitusta innovaatiotoimintaansa. Ne kompensoivat tätä puutetta ehkä osittain liittymällä kansainvälisiin palveluketjuihin ja -verkostoihin. Innovaatiojärjestelmän kannalta saattaisi kuitenkin olla hyödyllistä ottaa näiden alojen innovatiivisimmat yritykset mukaan tukien ja palveluiden piiriin, jolloin järjestelmään saataisiin enemmän markkinointi- ja johtamisosaamista.

Teknologia- ja innovaatiopolitiikassa voitaisiin kokeiluluontoisesti tukea osaamispalveluiden innovointia, aluksi rajoitetuin tavoittein ja resurssein ja vähitellen laajentaen toimintaa teollisten innovaatioprojekti-

en tukipalvelujen kaltaiseksi, kun palveluinnovoinnista opitaan lisää. Useimmat palveluyritykset eivät todennäköisesti suoranaisesti osallistuisi tällaiseen innovaatio-ohjelmaan, mutta korkeatasoista osaamista omaavat yritykset, joilla on hyviä ideoita mutta ei aikaa ja voimavaroja toteuttaa niitä, hyötyisivät tuesta ja potentiaalisesti kehittäisivät laajemmin sovellettavia ja ulkoisvaikutuksia tuottavia uusia palveluita.

Liike-elämän palveluita koskevissa raporteissa on myös huomattu, että pienet ja keskisuuret asiakasyritykset käyttävät palveluita suuria yrityksiä harvemmin ja hyötyvät siten palvelusektorin osaamisesta vähemmän. Pienillä yrityksillä saattaa olla liian vähän taloudellisia varoja ostaa ulkoisia palveluita, tai niillä voi olla puutteita omassa osaamisessa, jolloin ne eivät pysty hyödyntämään ulkopuolista palveluosaamista tehokkaasti. Lisäksi monet palveluyritykset pyrkivät mieluummin saamaan asiakkaikseen suuria yrityksiä mittavine palvelubudjetteineen. Pienten yritysten palveluostot saattaisivatkin olla julkisen tuen kohde. Esimerkiksi nopeasti kasvavien teknologiayritysten liiketoimintaa voitaisiin kehittää ostettujen markkinointi-, johtamis- ja muotoilupalveluiden avulla. Ongelmaksi tässä voi kuitenkin muodostua, että strategisia markkinointipalveluita löytyy Suomen palveluyrityskentästä hyvin vähän. Suurin osa alan yrityksistä suunnittelee mainontaa, viestintää tai tekee markkinatutkimuksia. Sen sijaan markkinoinnin johtamisen konsultointia on vähän tarjolla. Olisikin aiheellista selvittää, onko kyseessä kysynnän vai tarjonnan puute. Jos strategisille markkinointipalveluille löytyy kysyntää mutta ei suomalaisia palvelutoimittajia, esimerkiksi julkisilla tutkimus- ja kehitysprojekteilla voitaisiin alueen osaamista kehittää.

1 Introduction

The rapid shift towards global markets in most goods and services as a result of technological change and deregulation has made businesses painfully aware of the need to innovate. Competition has intensified and knowledge is now viewed as the fundamental factor of competitiveness, for both firms and economies. The term Knowledge-Based Society has been invoked to describe the current emphasis on innovation and technological change more generally as seminal goals for societies, economies and organizations therein. This report examines the role of a relatively new but rapidly expanding area contributing to innovation and knowledge production more broadly: Knowledge-Intensive Business Services (KIBS).

The growth of KIBS can also be seen as a manifestation of another trend in the organization of economic activity, including innovation: increasing reliance on external suppliers of goods, services – and knowledge. Therefore, KIBS is a fascinating area of investigation, both because of the growing economic importance of the sector itself and because of the opportunity to observe the shift towards collaborative – or distributed – innovation.

Studies of innovation have long emphasized the need to combine knowledge and information from various sources. Kline and Rosenberg (1986) examined firms' internal sources of competence and particularly the links among them. Von Hippel (1988) and Lundvall (1985) focused on the critical interaction between users and producers of technology. Nelson (e.g. 1986; 1992; 1993), Mowery and Rosenberg (1989; see review in Mowery, 1995) among others, have emphasized public sources of knowledge, particularly education and basic research. All of these studies recognize the foundation laid by Polanyi (1966), who discussed the production of new ideas and pointed out that there is a large tacit component in technology, and even in scientific research. Therefore, close cooperation and interaction is often necessary between university scientists and firms' R&D personnel in order to transfer knowledge to the latter. In summary, innovation in an economy is to a large degree a question of creation and exchange of knowledge among relevant actors.

However, innovation literature has not rigorously examined the organization of knowledge exchange. Harrigan (1988), Kogut (1988) and others have observed that interfirm cooperation is not easy: many joint ventures and strategic alliances fail to generate the expected benefits.

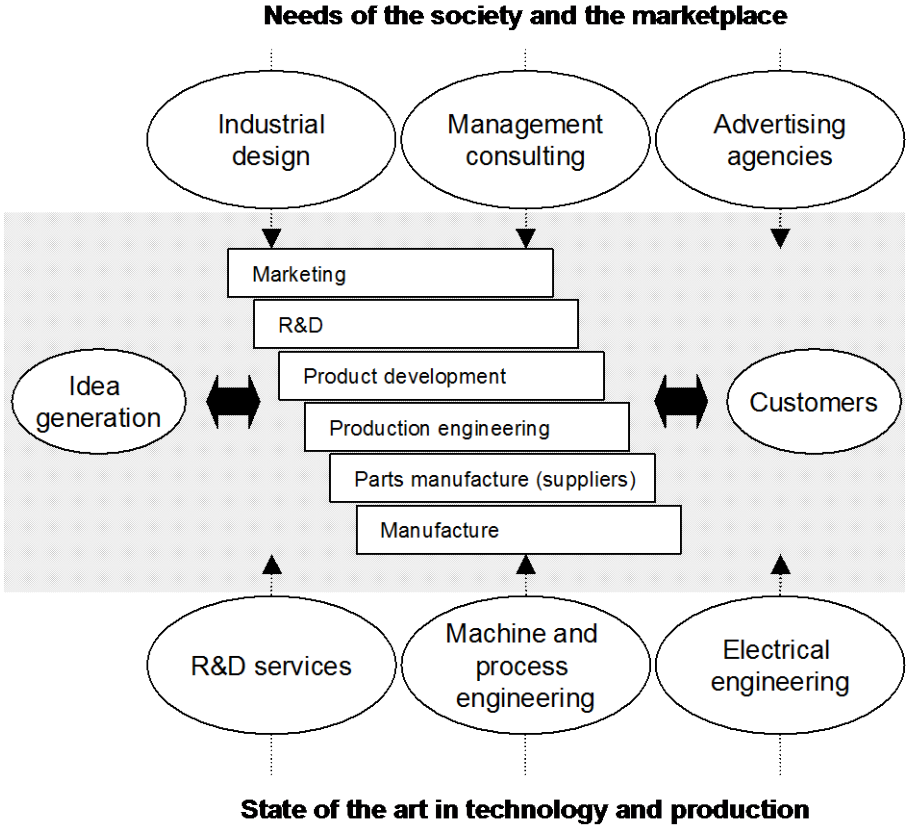
Previous experience in collaboration, and complementarity of the knowledge assets of collaboration partners have been found to support productive relationships (Kogut, 1989; Dyer and Singh, 1998; Balakrishnan and Koza, 1993). A recent study of Finnish manufacturing firms highlighted the role of firms' internal competencies, or "absorptive capacity" (Leiponen, 2000a). Results showed that firms with high levels of skills and accumulated competencies profit more from collaborative arrangements than do firms lacking these assets. Apart from these studies toward understanding the determinants of successful cooperation in R&D, the organizational question as to how to structure collaborative work and delimit each party's responsibilities is not well understood. In particular, empirical work has not been forthcoming.

There is some evidence that the choice of how to organize innovation depends on the operating environment of the firm. It is well-known that patterns of technological change vary considerably among industries (Pavitt, 1984; Pavitt et al., 1989). This has ramifications for the innovation process. First, the locus of opportunities to innovate varies, and therefore the sources of knowledge and partners for R&D are different for firms in different environments (Leiponen, 2001). Second, technological uncertainty and cumulativeness of underlying knowledge implicate organization of innovation. Under high uncertainty or low cumulativeness it is relatively more efficient in the dynamic sense to organize innovation externally (through collaboration or outsourcing) than under conditions of highly cumulative knowledge and predictable patterns of technological change (cf. Freeman, 1991; Leiponen, 2000b). Third, Pisano et al. (1988; 1989) and Oxley (1997) have examined the effects of appropriability of innovation returns. Their argument is that low appropriability aggravates transaction costs of externally organized innovation, thus supporting internal organization.

The empirical context to study the organization of collaborative innovation here is Knowledge-Intensive Business Service (KIBS) firms' cooperation with their clients. KIBS providers are agents of knowledge exchange by definition: they are in the business of supplying specialized expertise and knowledge. Given this role, they can be expected to be important actors within innovation networks. Indeed, KIBS inputs have been found to contribute significantly to industrial productivity (Tomlinson, 1999; Luukkainen and Niininen, 2000). This positive effect is generally attributed to business services contributing to the efficiency of *accessing and using* knowledge in industrial networks. But within this explanation, the role of KIBS in *creating* knowledge remains unclear. One goal of this study is to examine the KIBS firms' innovation by focusing on how KIBS create new knowledge.

Business service firms from six industries are studied here. In each industry, service firms are differently positioned in the innovation processes of their clients. *Machine and process engineering, electrical engineering,* and *R&D services* help their clients in product and process development, and contribute to technology development directly. *Industrial design* services also participate in the product development process by sharing their knowledge of ergonomic, aesthetic, and functionality aspects of new products. *Advertising* agencies assist in introducing new products in the markets by generating marketing and communication strategies and campaigns. Finally, *management consulting* services may facilitate organizational change that the successful adoption of new technologies, among other things, might require. Management consultants plan and bring about changes in internal cooperation and communication of the client firm, thus improving its "internal innovation network" by enabling relevant knowledge flows within the organization. Figure 1 illustrates the relationships between the firm's parallel internal

Figure 1. Knowledge-Intensive Business Services and client's parallel innovation process



innovation processes and various business services' contributions. The figure emphasizes the role of business services as interpreters and distributors of societal and economic needs as well as advances in science and technology.

These KIBS industries are all in the business of transfering knowledge. In most cases knowledge has a considerable tacit component, and the success of transfer depends on the communication capabilities of the consultant and the client organization. For instance, it is usually not possible to sell, deliver, or apply a new organizational method in a codified form. Organizational tools such as "total quality management" or "self-managing teams" can be outlined in a management bestseller, but to implement them effectively requires that the firm learn and fine-tune internally. Consultants can usefully support such adaptive processes. This leads to a high degree of customization of consulting services. The consultant needs broad professional skills and a diverse "toolkit" to be able to adapt his or her knowledge to the particular needs, capabilities, and organizational configuration of the customer. However, we do observe one-size-fits-all type consulting services in those settings where the problem is more standardized. Even then, however, the consultant must participate in the client's learning process because of the organizational (systemic) nature of this process. A change in one element of the firm often requires a broader adaptive effort.

As specialists these business service providers have the potential to contribute to their client firms' performance by bringing in some of the complementary assets that Teece (1986) has proposed are requisite for profitable innovation. However, without carefully designed contractual strategies, these services cannot become a *strategic* asset to their client in the sense of improving the client's competitive advantage sustainably: the client's rivals might have access to the same knowledge and competence. Therefore, in order to maintain their advantaged learning position – business service providers learn in part by experimenting in several companies simultaneously and comparing results – *and* be perceived as providing strategic services to clients, they must be extremely efficient in crafting contractual and organizational arrangements.

There has recently been a surge of research on KIBS (Löwendahl, 1997; Hauknes, 1998, Miles et al., 1995 and Miles and Boden, 1999, Antonelli, 1998), but several interesting issues need to be further examined. The nature of learning processes within KIBS firms, their organizational structures, and the role of KIBS firms in the larger innovation

system are in the focus of this study. This chapter identifies and discusses the research questions in more detail.

1.1 Specialization vs. flexibility

How do service firms grow?

Growth in KIBS firms is not well understood. The largest industrial design firm in the Nordic countries employs less than 30 people. In contrast, global strategic management consulting firms have thousands of employees. What accounts for this difference?

According to a classical economic argument, growth is related to the "minimum efficient scale" of operations, i.e. the technological dimension determines the size of production units. Other modes of explanation such as the transaction cost theory focus on the determination of firm boundaries (Williamson, 1985, 1996). The theory submits that transaction costs define which operations are carried out internally and which are carried out externally. Penrose (1959) suggested a knowledge-based explanation: growth of firms depends on the generation of "excess" resources, such as managerial capacity, that can be more efficiently exploited within the firm than by selling the resources to outsiders. This is in fact a combination of the technological and transaction arguments. Excess capacity which is characterized by high transaction costs, for example knowledge resources, is more efficiently utilized internally. These ideas are variants of the more general argument that firm growth is based on firm-specific increasing returns to scale that render larger firms more efficient. One way to achieve positive returns to scale in services is to increase the degree of standardization of the service to lower the cost of delivery.

Firms can grow either through specializing and generating increasing returns on learning in a limited number of "core" activities, or through diversifying, whereby they deploy their competencies in a number of different, albeit usually somehow related activities. It can be argued that the specialization strategy enables more efficient *cumulative learning*, and can therefore lead to better performance in the long term. However, as most business services tend to be domestically oriented, and since the Finnish market is limited in size, growth through diversification may often be more feasible for Finnish service firms.

The advantages of growth include higher internal task specialization and division of labor. Larger firm size makes it more profitable to employ specialists. Business service providers usually need to work with people from very diverse backgrounds and across functional bounda-

ries. This requires a capacity to communicate with a variety of people and to understand the conceptual frameworks and the relevant problems of organizational subgroups. However, the understanding developed by consultants is usually superficial. In the words of one of the respondents in this study, the consultant needs to be bold enough to draw conclusions based on rather limited and impressionistic understanding of the situation.

Nonetheless, in addition to the client's productive activities, its organizational setup and culture must be addressed in the service process. This creates a need for diverse competencies within the service provider. For instance, industrial designers are usually educated in design institutes, but in the workplace, artistic vision needs to be complemented by skills in psychology, business strategy, industrial economics, and even philosophy. Internal specialization of employees of service firms would enable construction of consulting teams matched with the customers' knowledge needs. However, more extensive division of work may reduce firms' flexibility as jobs become more rigidly defined and special education and skills are required. Thus there is a tradeoff between the breadth and depth of consulting knowledge. The choices of both individual employees' skills and aggregate competencies within the firm, and as a result, the size of the firm, are likely to depend to a great extent on the (in)stability of the environment in which their customers compete (see Aoki, 1990). The faster and more radical the changes, the less useful it is to build rigid knowledge structures. More generally, this study explores the linkages between nature and organization of capabilities within service providers and their growth performance in Chapter 6.

1.2 Incentives governing client-consultant interaction

What are the implications of performance-based compensation schemes and under what conditions are these useful?

Literature on asymmetric information (see Holmström, 1979, for an early contribution) suggests that agency costs are likely to arise in a situation where the agent possesses more information about the job to be carried out and about his own effort than the principal. In the case of KIBS provision, the agent is the KIBS firm and the principal is the client firm. Agency costs can in theory be mitigated by using contracts that link compensation to performance.

In reality, project compensation is most commonly based on hours worked rather than on more complex profit sharing schemes. Partly this can be explained as an issue of learning: clients are often relatively unfamiliar with incentive based payments and therefore prefer to avoid the associated uncertainty. Clearly there are instances where project outcomes could be productively coupled with the compensation of service providers. For example, if an organizational change facilitated by a management consulting firm is expected to improve the productivity of a business unit, the service firm's pay could be conditioned on productivity change over a specified period of time.

However, in projects where the output depends to a large extent on the effort by the client itself it may be difficult or even counterproductive to tie the service firm's compensation to performance. Another fundamental problem with profit sharing schemes is that it is often difficult or even impossible to identify the change in performance caused by the consulting effort. As a consequence, business service relationships frequently rely on dynamic incentives created by the possibility of future interactions. The relative importance of various incentive mechanisms and the contexts in which they are used are assessed in this study.

1.3 Incentives for internal collaboration

How to structure incentives within service firms?

Service employees work very independently and often spend more time with clients than in the office, which means that it is difficult to monitor their activities. Employees' motivation can be enhanced with more or less formal systems of incentive compensation. The idea is to make the employee internalize the goals of the organization at least to some extent.

Service providers can apply internal incentive schemes such as performance bonuses either at the level of individuals, departments, or the firm. Economic theory of incentives supports individual level bonuses, but in practice, group, department, and firm-level mechanisms appear to be used more frequently. Arguably, agency theory fails to acknowledge, one, how important teamwork is in business organizations, and two, how cooperation is sustained in the long-term. For instance, strong support for individual employees' effort may destroy the atmosphere for cooperation among project groups. Holmström and Milgrom (1994) recognize this tradeoff: compensation based on the per-

formance of the individual employee creates competition among employees thus discouraging cooperation. Another stream of the theory of the firm examines decentralized processing of information under the heading of theory of teams (Marschak and Radner, 1972; see Radner, 1992 for a review of the literature). This theory approaches firms as hierarchies consisting of subunits, or teams, without reference to incentive considerations nor organization of work within teams. Agency and team approaches to the economic theory of the firm have yet to be reconciled, particularly as regards the incentives for cooperation within and across teams.

Promoting the creation of social relationships may be one way to overcome the detrimental effects of individual level incentives on the willingness to help colleagues. Building this kind of social capital requires that the employees spend considerable time together to create common language and understandings, and to form personal relationships. One forum for this informal activity is in-house training. Through frequent and extensive communication and joint learning in competence and cooperation development events, employees form the requisite social relationships for open knowledge exchange. The study seeks to identify and evaluate the ways firms motivate their personnel, as well as balance the needs for individual employees' effort and cooperation within and among teams.

1.4 Knowledge creation and innovation in KIBS firms

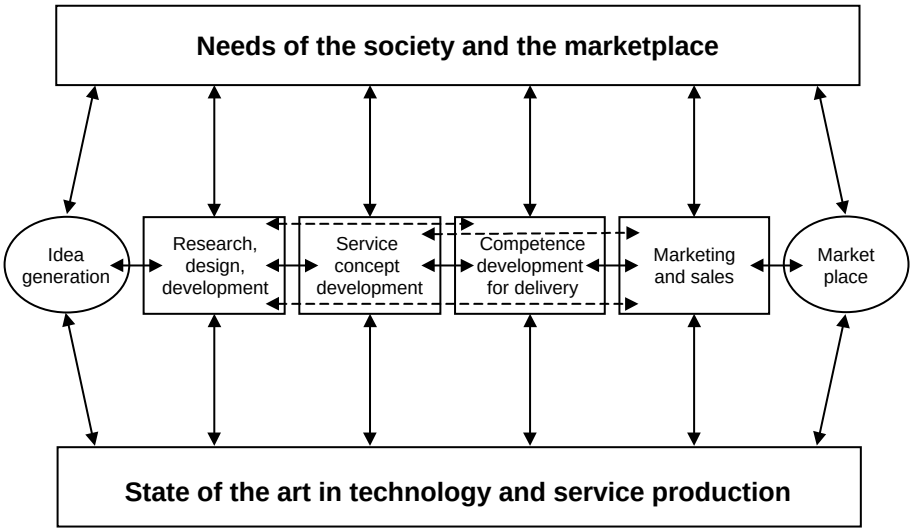
How does learning and innovation occur in KIBS firms?

Traditionally, service firms are thought to not be very actively engaged in innovation. More recently, however, particularly in the aftermath of the new Community Innovation Survey data for Europe, this sector has received more attention. Barras (1986) was among the first to conceptualize service innovation. In his model of service innovation, technology adoption induces product innovation. In essence, the model posits that product innovation follows process innovation, a notion opposite to that describing innovation in manufacturing firms (e.g. Abernathy and Utterback, 1978). This conceptualization has been criticized for applying mainly to financial services at the expense of the rest of the diverse service sector.

One can argue that there is no need for a special model of service innovation; that the "integrated innovation" model in which internal and external sources of knowledge are combined through multiple

feedbacks between the stages of the innovation process (Kline and Rosenberg, 1986; Rothwell, 1994) applies to all sectors of the economy. This conceptualization is represented in Figure 2, modified to the stages of new service development. Based on an analysis of the Finnish inno-

Figure 2. Kline and Rosenberg's (1986) chain-linked model of innovation as applied to service innovation



vation survey data for manufacturing and services, Leiponen (2000c) demonstrated that innovating service firms' investments in training and R&D, and their collaboration with R&D partners were relatively similar to those of manufacturing firms. Interesting differences between the sectors were identified as well, but these do not undermine the conception of innovation as a process of integrating relevant sources of knowledge both within and outside the firm.

Literature on innovation in service industries has emphasized the informal nature and organization of the service innovation process. Service firms do not necessarily invest in formal R&D, and even highly innovative firms may not have an R&D department (Sundbo, 1997). Extensive in-house training programs are a common model of knowledge creation, but the development of more systematic processes and organizational structures for developing new services and enhancing organizational capabilities is only beginning in many Finnish service firms. It remains to be seen how these strategies take shape in the near future.

As regards product development, KIBS have generally provided highly customized services. Their professional expertise and capabilities are deployed to solve the particular problems of the client, rather than supplying narrowly defined and standardized services. While complete standardization may not be desirable, it is nevertheless useful to define clearly both the service products, and even more importantly, the competencies and organizational capabilities on which the services are based. In order to enhance capabilities cumulatively and exploit potential complementarities, the firm needs to define its "core" services, how these can be improved, and how the supporting competencies are to be built. It would seem that focusing, rather than engaging in dispersed, non-cumulative learning within unrelated activities, is an important strategic challenge.

Even if a standardized service must be modified to fit the needs of each client, a clear conceptualization of service "products" can guide decisions about possible development trajectories of the firm. Further, well defined services or methods (processes) can sometimes be standardized and even licensed to other service providers. Perhaps surprisingly, such licensing arrangements are common in management consulting despite the rather amorphous nature of the consulting process itself. Significant returns to scale in knowledge creation can be realized only through some degree of standardization and concentration of efforts.

Thus one can argue that the process of service innovation and product development does not necessarily differ quite as dramatically from that in manufacturing industries as has been claimed in the literature. Even though formal scientific research plays a less important role, it is not unheard of for firms in service industries to collaborate with university researchers. Service firms also collaborate frequently with specialized technology firms in order to develop tools and processes to participate in the information technology revolution. In addition to evaluating the investments and activities that business service firms engage in to improve their services, this study attempts to highlight different strategies related to service development trajectories and how the organization of collaboration with clients affects them.

1.5 Appropriability of knowledge in services

How is knowledge safeguarded in KIBS?

How do KIBS firms and their clients manage knowledge flows between them?

Appropriability of the returns to knowledge creation is found to be a fundamental factor in determining the incentives to invest in innovation. In the context of business services, this has implications for both knowledge creation in service firms themselves and the willingness of their clients to outsource knowledge services. Moreover, the whole service transaction is about knowledge transfer both from the service firm to the client and vice versa, so there is an acute need to strategically manage these knowledge flows. Unsuccessful transfer or unintended leakage of strategic knowledge would result in market inefficiencies, thus reducing the demand for knowledge services.

Appropriability of knowledge has been suggested to be relatively low in services (e.g. Miles et al., 1995). This generally reduces the incentives to invest in innovation. In services, however, low appropriability of innovation returns was found in an earlier study to be associated with *higher* probability of successful innovation (Leiponen, 2000c). This finding merits further examination as it concerns the incentives to invest in innovation by service firms. Cohen and Levinthal (1989) argued that appropriability of innovation returns has two opposed effects. On the one hand, high appropriability increases the returns to innovation, encouraging investment in innovation. On the other hand, *low* appropriability enables high spillovers, i.e., high incoming knowledge flows, providing an incentive for investment in R&D to build *absorptive capacity*. In the second case, the knowledge base of a firm is enhanced by other firms' learning and innovation, provided that the firm possesses sufficient absorptive capacity to benefit from these knowledge flows. It is possible that the relative importance of innovation and imitation explain the observed anomaly related to the appropriability regime in service industries.

Appropriability issues have an effect not only on the incentives to invest in R&D, but also on the organizational choices made by firms. Teece (1986) has discussed how appropriability affects the "make or buy" decision. His proposition is that under low appropriability "make" has advantages over "buy". In line with this theoretical observation, joint R&D among rival service firms is not common according to the Finnish survey data. Apparently, the benefits from collaboration are not perceived to outweigh costs associated with leaking strategic information to rival firms. However, low appropriability does not seem to prevent service firms from collaborating with organizations in other industries. Moreover, the possibilities to appropriate the knowledge created in a joint project may have an effect on the organizational form of cooperation between a KIBS firm and its client. This is due to the strategic considerations of both the client and the service provider. The

partly conflicting objectives of these parties include ensuring a smooth and efficient knowledge transfer, controlling the spillovers of own knowledge assets, and learning as much from the partner as possible.

This study assesses the role of the appropriability environment of KIBS firms. Particularly, intellectual property rights to service concepts and output are hypothesized to affect both KIBS' incentives to innovate and their contracts with clients (see Chapters 4 and 5). In those cases where service products and processes are sufficiently well defined, it is possible to contract and trade in "service designs" or methods. As mentioned earlier, firms do exchange licenses for particular service concepts. In general, however, intellectual property rights protecting service products are difficult to define and enforce. For instance, while trade secrets protect process drawings in engineering, this protection is incomplete. It is not completely unheard of for clients to request proposals from one engineering firm and then pass the designs on to a second firm who will take on the project at lower cost. This is possible because rights associated with trade secrets are difficult to enforce. Therefore, even in cases where firms learn that their secrets have been infringed upon, prosecution is generally not pursued. While there are gaps in legal protection, some informal codes of conduct or norms of "proper" behavior have emerged. For example, in engineering services it is not considered to be ethically correct to use the same drawings for two different clients. However, legal treatment of property rights to service concepts may be changing due to the pressure from internet services to patent business models. Particularly, to the extent the service concept can be embedded in an information technology solution, such as the "one-click-shopping" concept of Amazon, patents may become a more feasible option.

1.6 Changing boundaries of KIBS' client firms

How do manufacturing firms decide which service projects to carry out internally and which to outsource?

How boundaries of firms are determined is a classical question in organizational economics. Transaction cost economics has shed some light on it through analysis of asset specificity and moral hazard (Williamson, 1985). However, the transaction cost approach does not sufficiently address the technological environment. The characteristics of the underlying knowledge and the patterns of technological change can have significant effects on the governance choice. In particular, cumu-

lativeness of knowledge (whether innovation is radical or incremental) and appropriability of returns to innovation may influence the choice of internal versus external procurement (Leiponen, 2000b). Therefore, innovation and knowledge accumulation within firms and within collaborative structures need to be studied in detail in order to better understand the dynamics of organizational choice.

Over the past 10-15 years there has been a trend to outsourcing of business service functions by manufacturing firms. There appear to be many reasons for this development. Demand for services has increased in general, expanding service markets. Increasingly competitive supply by independent service firms enables more manufacturing firms to begin to outsource. Manufacturing firms' service departments may previously have been underemployed or employed in an erratic and discontinuous fashion. Therefore externalization of service provision has been attractive.

While the trend to outsourcing has attained the status of stylized fact in both academic and popular literatures, empirical evidence is more mixed (O'Farrell, 1995). It appears that the initial externalization of business services by manufacturing firms has been followed by a reverse swing. Certain services have been re-internalized. Some firms have realized that it order to develop and maintain absorptive capacity and to collaborate effectively with service suppliers, internal competencies are helpful. Additionally, firms have recognized the value in reintegrating service functions closely related to the "core" activities of the firm. The new task is thus to balance the goals related to learning and knowledge exchange with service suppliers and the efficiency benefits from competition in the markets. The strategies governing KIBS' client firms' boundary decisions are explored here through an analysis of interview data in Chapter 8. The focus there is on the characteristics of knowledge underlying KIBS' relative to their client firms' capabilities.

1.7 Information and communication technologies (ICT)

How do new communication technologies affect the interaction between service providers and their clients?

What is the role of face-to-face interaction in the circulation of tacit knowledge (socialization)?

Scholars have examined how tacit knowledge is created and exchanged within organizations. Nonaka (1994), as well as the innovation systems

literature (e.g. Johnson, 1992) emphasize the role of personal communication, frequent and sustained interaction, extended planning horizons, and appropriate governance structures. Nonaka's concept of "socialization," i.e., transmission of tacit knowledge between individuals is viewed as a central aspect of knowledge production. Thus, it appears that face-to-face interaction is important for effective learning. At the same time, the ICT revolution is widely expected to accelerate exchange of knowledge at a distance and expand the potential geographic range of operation of KIBS firms. It is not clear how these differing perspectives on the geography of service provision can be reconciled. It seems that personal relationships, preferably face-to-face contact, are necessary to create the codes and dedicated communication channels through which tacit knowledge is exchanged.

Finnish business services are currently making significant investments in information and communication technologies. These investments are made in the expectation that virtual interfaces can substitute for face to face interaction. But, based on the discussion above, the validity of these expectations can be questioned. Intranets, extranets and virtual "workdesks" which allow several people to simultaneously participate in projects such as process engineering will surely change the service process and improve productivity. However, it is not clear whether these communication media are sufficiently powerful to overcome barriers to transmission and incorporation of sticky tacit and collective knowledge. Rather, new technologies may be complementary with personal contact as means of communication. Chapter 7 analyzes and discusses the new empirical findings of this study with respect to the role of information and communication technologies in service innovation and evolution of service firms.

1.8 Concluding remarks

This chapter has described the broad research questions to be examined through an interrogation of the extant literature and a new dataset of Finnish business service firms. The objective of this study is to contribute to our understanding of how innovation occurs in KIBS firms, and how KIBS firms participate in the larger system of innovation. More generally, the goal is to elucidate the relationships between firms' organizational choices and learning processes.

The next chapter discusses the organization of learning and innovation in business services in the light of 16 interviews with KIBS executives. Chapter 3 presents a new survey dataset of 168 Finnish KIBS

firms. There the focus is on the patterns of knowledge creation emerging from the collected data. Organizational aspects of KIBS' interaction with their clients are examined in Chapter 4. In particular, several hypotheses concerning the relationships among knowledge creation, service strategies, and formal contracts governing the service projects are tested. Chapter 5 analyses the determinants of successful KIBS innovation. Again, strategic orientation and knowledge creation practices are the focus of attention. Analysis of KIBS performance continues in Chapter 6 where factors behind KIBS firms' growth and export orientation are investigated. A special aspect is the role of ICT in the evolution of KIBS, discussed in Chapter 7. Additional case studies, this time of KIBS users, were carried out and analyzed in Chapter 8. Here, results from earlier data sources are evaluated against the clients' perceptions of service relationships. Finally, Chapter 9 summarizes the empirical results and discusses policy implications.

2 Information and knowledge in business service relationships: Evidence from 16 case studies

2.1 Introduction

Information economics deals with problems arising from asymmetric information among economic actors. For example, in the case of legal services, a new client does not know how competent the lawyers with a law firm are and how much effort they put into the client's case. In addition to these two "unknowns," the client is often unaware even of the level of difficulty of his or her problem. Thus the client, or the "principal," possesses incomplete information about the quality and actions of the law firm, that is the "agent" (see Holmström, 1985) These issues are likely to be aggravated in many areas of business services, because it is difficult to know the quality of the service even after it has been delivered. In services such as advertising or design, perhaps only after a few rounds of service procurement the client has an understanding of the quality and competencies of the service provider.

At the same time, there are problems related to sharing and protecting strategic knowledge between the service provider and client firm. For instance, Mowery and Rosenberg (1989) have argued that external provision of R&D service is problematic because of the incomplete utilization of cumulative knowledge. They contend that the American innovation system performed better than the British one in the first half of the 20th century partly because American corporations internalized the research functions by establishing R&D laboratories. British companies, instead, under the lax antitrust regulation, supported joint industry-wide research associations thus sharing the R&D facilities among firms in an industry. According to Mowery and Rosen-berg, interactions between R&D and business functions were less intensive there, therefore firms were not able to internalize and contribute to the knowledge created by research associations.

Thus, in addition to the problems related to asymmetric information, interaction between a service firm and a client firm may involve difficulties of exchanging and sharing knowledge even if they were both willing to do so. It is very hard to communicate strategic knowledge, a

considerable part of which is organizational and tacit, across organizational boundaries. Sharing *tacit* knowledge involves socialization, that is, intensive informal interaction (Nonaka, 1994; Nonaka and Takeuchi, 1995). This can be a challenge between two organizations. Moreover, sharing *organizational* knowledge is generally not possible without intensive and frequent cooperation and communication.

But intensive cooperation among business organizations creates another kind of a hazard: involuntary knowledge spillovers. The client would like to communicate efficiently the knowledge needed in the current project, but at the same time, it would prefer to protect other components of its core knowledge assets from leaking to the service provider, who might in the future cooperate with the client's competitors.

There are thus two major questions related to the management of information and knowledge flows in business services. First, how do business services deal with asymmetric information? Second, how do they manage the knowledge flows between themselves and their clients? The solutions to these problems have implications for the demand for business services, and for the strategic level on which external knowledge services operate with their clients. Unresolved moral hazard and adverse selection due to asymmetric information lead to inefficiencies in service production, and consequently reduce the demand for services. Poorly managed knowledge flows result in spillover hazards and inefficient communication between the service and client firms, thus amplifying transaction costs between the organizations.

The reason for studying the questions of information and knowledge together is the following: organizational or contractual solutions to the first problem may have ramifications for the second problem, and vice versa. For example, the characteristics of the service contract, including pricing of the product and specifying the responsibilities of the two parties, create a set of incentives thus providing some solution to the moral hazard issue. However, what kind of a service contract is possible in the first place depends on the characteristics of the service. Moreover, the contract may affect the knowledge flows between the firms. Service quality, and in the long run, service innovation, hinge on learning and knowledge flows between the organizations.

The interactions among contracts, service characteristics, and learning can be illustrated as follows. Performance-based pricing of the service is not feasible unless performance can be defined and measured and the service firm is willing to assume risk. But if the service provider takes the risk and carries out most of the work in the project, then

there may arise an issue of transferring the project results back to the client firm. A case in point is a large production plant investment project where the engineering contractor may need to train the users of the facility.

Time-based pricing, on the other hand, creates lower-powered service incentives and leaves the project leadership and risk to the client. This traditional arrangement enables cooperation in less than perfectly defined service problems, but it also requires open communication between the organizations. From the asymmetric information perspective, openness supports monitoring the service agents' effort, whereas from the learning perspective, open communication supports knowledge exchange, which is critical when tasks are *a priori* undefined. For example, a product design project cannot succeed unless the client's project team informs the design service providers early on about the materials and technologies to be used and about the expected user characteristics. In a dynamic view, these user-service provider communication patterns contribute to further improvement of the service and potentially even generate ideas for completely new services. As a consequence, inter-firm communication, contracts, and services co-evolve. Hence, information- and knowledge-related issues in the organization of business service provision and innovation are fundamentally linked.

2.2 Data

16 firms in the fields of industrial design (4 firms), advertising/market communication (3 firms), engineering (5 firms), and management consulting (4 firms) participated in the interviews (see attachment 1 for a list of interviewees). CEOs or business development managers were interviewed in a semi-structured way. In addition, company materials such as annual reports, brochures, and other publications were collected and utilized. The firms approached were among the industry leaders (largest and most successful firms), and therefore the results here should not necessarily be interpreted to reflect the industry as a whole. The goal is to characterize management and organization of knowledge at the Finnish cutting edge.

Basic descriptive statistics of these firms are presented in Table 1. Size of firms in terms of employees varies between 8 and 421. Four of the firms are subsidiaries in a business group, domestic or international, and others are independent service providers. Economic performance in terms of sales per employee varies between 320,000 and 800,000 FIM. This measure does not seem to vary so much by the size

Table 2.1 Means of some basic control variables(N=16)

Sales	66 MFIM
Employees	129
Sales/employee	528,000 FIM
Exports/sales	16%
Higher educated employees	58%

of the firm, as has been suggested in the literature (e.g. De Bandt 1996), but by industry. Management consulting and advertising appear to generally earn more per consultant than design and engineering services.

Firms report export shares between zero and 80 percent. The shares of employees with higher education degrees varies equally greatly: on average almost 60 percent of employees in these firms have higher degrees, but the figure ranges between 10 percent and 100 percent. Higher technical education tends to be most common in industrial design (tertiary level degree in design): about 60 percent, while in the engineering firms studied, the average share is around 20 percent. In engineering, secondary technical education is relatively more common.

2.3 Service development process

The basis for long-term competitiveness of service firms is the same as that of manufacturing firms: successful innovation and improvement. 13 of the 16 firms interviewed here had introduced completely new kinds of services within the previous three years. However, R&D activities are *continuous* only in a few firms. Engineering firms are more likely to recognize their development activities as R&D, perhaps in part due to their close ties with the culture in manufacturing that emphasizes R&D. Additionally, management consulting firms tend to invest rather systematically in development, even though there are no permanent R&D teams. Development teams may be temporary even if the search for new ideas is systematic and continuous.

Instead, a lot of service development is carried out in team or department level training and brainstorming, particularly in management consulting and industrial design. These may be complemented by searching relevant literature, exchanging ideas with academic researchers,

Table 2.2 Service innovation and competence development (N=16)

Newly introduced services	13 firms
R&D department/permanent team	None
Temporary development teams	11 firms
R&D investments > 0	3 firms
Training and development, avg.	18 days/year

and collaborating in development projects with clients. Indeed, it is not unusual that employees spend 30-40 days yearly in training and development. Considering that this directly reduces the time spent in revenue-creating client projects, it is a non-negligible investment.

The most frequently mentioned factor hampering innovation in the interviewed firms was lack of time. Thus the problem is not so much the scarcity of funding but that of time, although these are clearly related: by hiring more employees firms would have more man-hours to devote to innovation, but of course this strategy is costly. Some firms reported having experimented with more permanent quality teams or development teams, but they had given them up due to the inability of the members of such teams to remain up-to-date on developments related to customers and markets. The information linkage to clients is argued to be so critical that if service developers are not constantly engaged in client projects they risk focusing on irrelevant service features. At least partly this problem can be solved by rotating the service development responsibility yearly or even more frequently.

The time allocation problem is also related to the "indivisibility" of human resources in small service firms. In case the existing consultants are engaged full time in client projects, hiring new people to do R&D is not a viable option due to the reasons discussed above. However, often it is not viable to hire more consultants and share the client work evenly among the employees, either, even though this would create time for research and product development by experienced employees. Hiring a new employee is a large investment for small firms, requiring months or even years of training and on the job learning in addition to the new client project prospects to create sufficient sales revenue to cover the new employee's salary. These kinds of resource constraints, rigidities, and risks may represent significant barriers to undertaking more challenging development projects.

Some service providers source innovation ideas directly from clients and require that a client finances the development project at least partially. Otherwise the project is not even started. This ensures that the service firm only develops innovation ideas for which demand certainly exists among customers, thus minimizing R&D risks. However, the approach is somewhat backward looking in that ideas for future clients and markets are not pursued. A service firm following this strategy cannot *create* markets and win *new* clients with more radically innovative new services.

Training is an important way to improve individuals' and teams' skills and share them within the organization. After all, accumulation of knowledge, i.e., learning, is the *raison d'être* of knowledge-based business services, and service quality is directly based on employees' skills. Learning takes place mainly in the service relationships with customers, but most service firms also improve employees' skills through in-house training. In the firms studied here, training investments in money terms vary between one and six percent of sales, and in temporal terms between three and forty days per year.

As expected, customers are by far the most important *sources of innovation ideas*, as reported by 14 firms. Surprisingly, six firms cite universities as another important source, while equipment suppliers are brought up only three times. In the existing literature, services are often assumed to depend highly on equipment suppliers in their development activities. However, even if KIBS industries use computers intensively, design and engineering tools tend to be standard packages partly because they need to be shared with customers. Information and communication technologies (ICT) provide abundant opportunities for new service development, yet technology suppliers do not generally participate in the development process and provide new service ideas. This suggests that Barras' model of innovation rarely applies to knowledge-intensive business services. Finally, competitors are followed systematically for service ideas by five firms. These firms benchmark their own services in particular against international leaders in the field, and also innovative firms in other industries that make use of similar competencies, processes, or technologies.

More formal *collaborative arrangements* with clients are very common among the interviewed firms. Universities are the next frequently mentioned partner, while suppliers and firms in complementary industries were also mentioned a few times.

2.4 Internal systems of learning

Knowledge management within the organization receives surprisingly little attention in the interviewed firms. Even large engineering service groups may not have a system of knowledge creation and sharing. Typical knowledge creation and collection activities in other industrial settings include learning and training, search for innovation ideas, R&D, project performance evaluation and collection of lessons learned, systematic utilization of external knowledge: literature, research, competitors, other industries. Knowledge sharing depends on the processes and organizational settings for both formal and informal communication and interaction, and databases of project experiences that are maintained. In business service firms where client projects are organized as teams the composition of which varies from one project to another, the project organization may significantly support informal knowledge sharing among employees. Nevertheless, systematic collection of relevant information from outside sources and utilization of experiential knowledge by rendering the tacit knowledge accumulated in client projects more explicit and shareable would be beneficial in the longer term.

Within large international service companies, knowledge management is potentially immensely valuable (see e.g. Hansen et al., 1999). Decentralized learning and incremental improvements all over the world can be refined and brought to the attention of all employees in the corporation. Martiny (1998) provides an interesting account of the establishment of a knowledge management system at HP Consulting. This global firm is a Hewlett-Packard subsidiary with 5000 employees concentrating on IT related services. The aim of the knowledge management system was to make "the knowledge of the few the knowledge of the many." The system emphasized

1. taking time to reflect and learn from successes and mistakes
2. creating an environment that encourages sharing of knowledge
3. encouraging the sharing of best practices and reusable tools and solutions.

These elements could and should be incorporated in any service company's processes. There doesn't need to be a formal system, organizational structure, and tasks. Even in small and informally organized KIBS firms, cumulative learning requires a deliberate effort to learn from experience. And, the larger the firm is, the more attention needs to be paid on knowledge sharing within the organization.

Another important issue in businesses as greatly dependent on human competence as the various consulting services is how firms manage to retain their key employees, particularly after these have accumulated significant client-specific knowledge. In most of the interviewed firms, managers admitted that the competitiveness of the firm depends at least as much on individuals' skills as on organizational knowledge and process. The larger and more established the firm, the more likely it has accumulated sufficiently organizational process knowledge and reputation that clients seek the services of the firm and not the individual employees. This process of "institutionalizing" competencies can be accelerated by conscious efforts to convert tacit skills of individuals into explicit knowledge of the firm, and by developing ways to make use of the potential complementarities between individual consultants' competencies.

Additionally, there are two formal policies to mitigate the risk that core competencies walk out the door in the evening and never return. First, key employees can be tied to the company with partnerships or with the possibility of becoming a partner in the future. These strengthen employees' performance incentives and increase the opportunity cost of changing employer. Second, employment contracts can specify clauses that support commitment or tie employees to the company, such as quarantine periods or no-competition clauses. These kinds of sanctions can turn out to be two-edged swords, however, as the effects on internal working atmosphere can be detrimental. The interviewed firms' preferred in most cases to try to offer competitive salaries and interesting projects, in addition to providing an open and friendly atmosphere.

Sometimes high dependence on the founder can also be risky to the organization. These "star" designers or consultants are invaluable in the early stages of a firm in accelerating reputation building and attracting clients. However, at the time of their retirement it may be difficult for the firm to effect the change of leader generation smoothly and retain clients. Furthermore, "stars" often prefer to be heavily engaged in the actual client service, even though they are the CEO of the company as well. This may divert their attention from management, administration, and the general long-term development of the organization.

2.5 Organization of client interaction

Contracting with clients

Customer relationships in business services tend to be long-lasting. The relationship involves mutual learning and consequently relationship-specific assets build up increasing the cost of switching suppliers (Williamson, 1985). This learning both increases the quality of the service, as the service provider learns about the characteristics and preferences of the client, and reduces asymmetric information of the client, which enables building trust and reducing transaction costs. In the firms interviewed, the oldest client relationships go all the way back to the founding of the service firm, in other words, there has often been 10 - 30 years of periodically repeated collaboration. With these clients, the service firms are in some cases able to create a strategic partnership, a source of competitiveness for both firms, which serves to further tie the client to the service provider. Partnerships also give the service firm access to more strategic, in other words, secretive and valuable operations of the client. These relationships are governed by so called implicit contracts, where parties do not – cannot – explicitly agree on the specifications of each project and where time horizon is very long (Baker et al. 1997).

Several respondents emphasized the client's role in the service process and its implications for the success or failure of the project. In most of the studied service industries, service is co-produced, meaning that both service provider's and client's efforts are important. Then, a situation of "double moral hazard" arises, since each party's information about the other party's effort, skills and contingencies is incomplete. Therefore, in addition to the service team's competencies, experiences and incentives, those of the client's employees in the project have an important role to play in the process. For instance, the client's experience as a service buyer can sometimes determine the project's success. Also, agreeing on the information input by the client in each stage of the project, and the consequences of the failure to do so are critical. If the client provides incomplete specifications in the beginning, the service firm may need to have the right to renegotiate the project price and timetable. In part for the double moral hazard, the most common project pricing scheme is charging by the hours spent on the project. This allocates all risks and incentives to the client, and at the same time the moral hazard of the service provider is aggravated. This can be justified by the insight from the property rights theory of the firm (Grossman and Hart, 1986, Hart and Moore, 1990), which

suggests that the "ownership" to the project, or "residual claimancy"[5] which creates the strongest incentives, should be given to the party that is the most important in terms of the success of the project.

Another solution to the double moral hazard problem would be to provide team incentives for the whole project team comprising of both service provider's and client's employees. The project team would then be a kind of a "quasi-firm" (cf. Eccles, 1981), a temporary organization with its own structure and incentive system. Why we do not observe this arrangement in practice is not clear. There may be more negotiation and contracting costs involved than is immediately visible. Otherwise it would be an interesting organizational experiment.

Double moral hazard problem can partly be mitigated by agreeing on the procedures and responsibilities beforehand. This can be systematized across projects by establishing a quality system. Half of the service firms interviewed here employed some kind of a quality system, either a certified one (ISO) or their own. It seems that it does not matter much to clients whether the system is certified or not – one of the firms that has its own system for instance allows customers to audit the system, and this has been a sufficient guarantee to the clients – as long as there is one.

Popular beliefs notwithstanding, a quality system may thus actually create real value for the service firm itself. Even a small service provider benefits from specifying and standardizing its process stages, information exchange, and responsibilities of each party in each stage. Agreeing on these with the client in the project planning phase may save the parties from costly miscoordination and, in the worst case, haggling. A potentially truly valuable part of the system are the procedures to evaluate completed projects with the client and to learn and collect experiences from them. Hence, a systematic quality process may improve knowledge management through facilitating cumulative learning and knowledge sharing.

The following puzzle related to contracting between service and client firms arose in the course of the interviews: Why do service buyers (clients) not want to adopt pricing based on performance measures? According to the theory, stronger incentives to the service firm would induce more effort, thus the project is more likely to have a good outcome. In practice, several service firms indicated that they would gladly use such incentive measures in the service compensation wherever per-

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[5] Residual claimant is the party that at the end of the day collects the residual, in other words, the profits that remain after other parties claims have been paid off.

formance measures can be identified and agreed on, but it is clients who often refuse these.

One of the firms has observed that *new* clients like to use productivity-based incentives, but that they often remove these when they get to know the people and the process of the service firm. This suggests two, related, things. First, explicit performance incentives are an important signaling device, and as the client gets to know the service firm's competencies and work procedures better, signaling provides no more useful information. Second, the fact that in a more established customer relationship such schemes are not found to be useful suggests that the build-up of reputation and customer-specific assets reduces the moral hazard problem significantly. The contracting costs related to defining and measuring performance may eventually exceed the benefits from higher powered incentives. Moreover, incomplete performance measures can do more harm than good by diverting effort towards measurable activities from non-measurable ones. However, these considerations arise from a static view of the relationship. In subsequent chapters of this study, static hypotheses are contrasted with more dynamic effects of organizational choices and incentives on innovation.

Service firms that are able to standardize and conceptualize their services well can benefit from selling solutions rather than hours. This amounts to gaining the "property rights" to the project (Grossman and Hart, 1990). In addition, standardized services enable cumulative learning, and they are more easily communicated to potential customers. As a management consultant put it, it is quite impossible to market their specialty, which is basically a skill to propagate a certain organizational process in client firms. Services with intuitive names and clearly defined tools, processes, and outcomes, are easier to commercialize. By selling solutions to well-defined problems the service firm assumes most of the risk, but also has more control over the process and can potentially improve its profitability because of stronger market power arising from innovative service concepts.

Experience of case companies suggests that "solutions trade" is more easily realized in engineering and management consulting than in other service industries. Engineering firms may supply investment project design, management and implementation for a fixed price, with or without performance bonuses/guarantees. Similarly, management consultancies may charge a fixed price for a specific and standardized organization development process. In contrast, in industrial design it has so far proven difficult to standardize the design project to the extent that well-defined service processes could be offered at fixed prices. It

remains to be seen, whether the time-based pricing tradition in design is a result of the fundamental characteristics of the activity, or whether it is possible to develop more limited but equally useful "design solutions" that would enable different kinds of contracts. It is possible that the core creative services in design and advertising are inherently less conducive to any degree of standardization. Even then, however, the core service process could be complemented by standardized fixed price products based on ICT, for example.

Service contracts or pricing schemes used in client relationships are an interesting case of organizational innovation in that the type of contract used depends on the characteristics of the service offered. Organization (contractual arrangement) thus depends on the direction and success of innovation. This is one example of organization and innovation being fundamentally interrelated. Interestingly, one of the firms characterized project contracting as one of their key development areas.

Incentives for service employees

In small service firms, the dynamics, continuity, and the entrepreneurial character of the business is more tangible even to non-partner employees than in large firms. Even without explicit incentives, employees understand that getting the next project depends on quality and value supplied in the current project. Internalization of this kind of entrepreneurial behavior, and the long-term view of customer relationships it entails, can be facilitated also by partnership in the firm, or a prospect thereof. Indeed, nine firms had in place some ownership arrangement with key employees. In addition to this, all but two of the firms employed a bonus scheme, either at the level of the firm, department, project, or an individual.

Poorly designed incentive schemes can have detrimental effects on effort and atmosphere. If the basis for bonus pay calculation seems unfair to employees, an incentive scheme can discourage effort. Moreover, other organizational problems may arise. In two firms, incentive pay schemes based on financial performance of projects were dismantled, because they reduced the motivation of employees to participate in projects where profit prospects were less pronounced. In another firm, an incentive system degraded the overall atmosphere and aggravated confrontation between managers and employees.

In contrast, in a few firms, bonus pay based on more qualitative measures such as customer feedback, or team or department manager's subjective assessment were reported to work reasonably well. In yet

another interviewed firm consultants act as independent entrepreneurs. Even cooperation and support among the consultants are reimbursed in cash. This system reportedly works very well, and one of the reasons appears to be that these strong economic incentives are complemented by informal but mandatory joint training and knowledge sharing mechanisms. Finally, apart from economic incentives, employees' motivation can often be enhanced by such simple means as manager's attention, (non-monetary) encouragement, and public recognition. Overall, most firms recognized incentive systems as an important area still under experimentation and development.

Management of intellectual property

Perhaps contrary to expectations, there does exist trade in service tools and products, even though its monetary volume may be relatively small. Especially in management consulting, licensing service concepts from firms both within international chains and among independent firms is commonplace. In advertising the service concept trade takes place mainly within chains. Large international advertising and management consulting groups agglomerate resources for dedicated research and development centers. The output of these centers may include training packages and programs, service tools and processes, and they also collect information about industries, consumer behavior, and academic research. Firms in the sample clearly recognized the benefits, particularly from international training programs. Chain members thus delegate part of their competence and service development to group headquarters. Increasing returns may be realized from applying innovations globally. However, this represents a tension with what was emphasized by independent Finnish service firms, namely that participation in client projects is essential for employees carrying out service innovation. Unfortunately innovation processes of international service organizations cannot be analyzed here, they would merit a research project of their own.

Protecting intellectual property, that is, trade secrets and core competencies, from leaking to competitors did not seem to be a critical issue for the interviewees. Most managers submitted that their core knowledge is so tacit or procedural, and embedded in people or the service process, that it does not need to be protected. Remarkably, certain firms purposively advertise their competencies by revealing the process and skills. For example, one of the firms sells the service process description to customers, through which it surely leaks to competitors. The firm also publishes books and research reports about its technologies and processes regularly. The purpose of all this is to ad-

vertise the firm's competencies and signal quality, but also to receive feedback from customers, academic scholars, and other researchers, and engage in a fruitful debate about the development of technologies, markets, and production systems within the field. This is a strategy of active knowledge exchange with interest groups and the environment. Indeed, by debating about the future of the field with the key players, this small firm potentially contributes to *creating* the future.

To summarize, the interviewed firms were content to not bother too much with protecting their knowledge. They rather focus on staying ahead of competition by learning faster than protecting current position and competencies. Even if many of the firms interviewed are leaders in their specialized markets, this result probably reflects not only their leading position but also the nature of the underlying knowledge in many business services. Particularly in small businesses, relevant knowledge assets are so deeply embedded in individuals' skills and organizational processes, that even with a description of the process, competitors could not replicate it without having participated in it for some time. Moreover, selling this kind of an ambiguous "process" is hard, due to which revealing parts of it may be necessary in order to communicate it to potential customers. Thus it may be true that (external) intellectual property rights are relatively weak in business services, but the characteristics of the underlying knowledge make it very local thus reducing actual spillovers.

2.6 Information and Communication Technologies (ICT) and business service internationalization

Eight firms out of the total of 16 interviewed were currently engaged in projects that involved new product development based on information and communication technologies. Naturally, Computer Aided Design (CAD) and Computer Aided Engineering (CAE) programs and methods are crucial for all service firms in engineering, advertising and industrial design. In addition to these, ICT has already started to create real opportunities for innovative services and sales. Moreover, it is expected to revolutionize international communication patterns.

The simplest and most common applications that these firms were developing involved using extranets for communicating in real time, sharing databases, and exchanging drafts or designs with clients. Also, intranets and other electronic communications such as videoconferencing were used to support knowledge exchange and cooperation within an international network of companies or a business group. These improve

the speed of communication quite dramatically, but do not necessarily change fundamentally the nature of the service process.

More demanding applications of the new technologies include selling services over the internet, which requires service conceptualization and standardization, in order to be able to explain the service to the potential client, on the one hand, and to understand the client's problem without meeting, on the other. Simple simulations, design renderings, and such services that are currently parts of the total design service (engineering, industrial design, or advertising) could be offered as independent services over the internet. Also preliminary drafting and planning could be carried out through some electronic medium. Management consulting seems to have fewer opportunities in this area, so far.

Finally, digital media and *e*-commerce create demand particularly for media, advertising, and design services, and also management consulting. This demand is based on the presumption that service firms accumulate experience of the new phenomena faster than firms in other industries, through their continuous exposure to problem-solving in the area. The value of the service firms' accumulated knowledge stock that a client can utilize in the service process must exceed the value of the knowledge and revenue derived from the client itself. Thus, by contributing their own solution to the collection of solutions, clients get to benefit from all other firms' solutions to the same problem.

Some service firms expressed the intention of entering international markets and reducing the barrier of geographical distance by developing *e*-services. However, it is not obvious that internationalization in the case of traditional process-oriented business services can be based on electronic communication. It seems more likely that *existing* international networks, partnerships, and customer-relationships can be sustained and enhanced by new communication technologies, rather than new relationships being established in this way. Of course, it might be possible to sell completely new kinds of "*e*-services," which make use of the same underlying competencies already in place in service firms but in standardized form. However, at this stage these would require considerable service and technology development efforts. Moreover, it is not yet understood how international marketing of e-services takes place, and what is the role of local visibility and reputation. In the case of less than completely standardized services, extending national reputation to international or even global markets may not be a simple thing to achieve.

2.7 Conclusions

The key observations from 16 executive interviews are the following:

- Business services invest considerably in competence and service development, but the organization of these activities is, as observed by other scholars, less stable than in knowledge-intensive manufacturing firms.
- Competence and service development tend to be more strongly interdependent activities in business services than in most manufacturing firms. Related to this "human dimension" of innovation in services, the factor most frequently mentioned to hamper innovation is lack of time. This might also be due to the generally small firm size.
- Customers are the most important source of learning and innovation ideas for business services. However, too strong dependence on a limited set of customers may hamper the service firm's ability to draw from developments elsewhere in the society and combine these into more radical service innovations.
- Knowledge sharing within the organization rarely receives any systematic attention in the service firms interviewed. Many firms also do not systematically collect "lessons learned" and client evaluation from past projects. These deficiencies debilitate organizational and cumulative learning, which are critical in order to generate increasing returns to knowledge accumulation and to benefit from the organizational processes, in addition to individuals' skills.
- Client contracts are closely related to the nature of the service itself and the knowledge flows between the organizations. This chapter only characterized the main contract types and the contingencies they create. Subsequent chapters focus more on the innovation and performance implications. Two-sided asymmetric information, quality insurance, reputation, and customer-specific learning are some of the key concepts.
- Focusing on protecting intellectual assets from leaking to competitors is not critical to most firms in the limited interview sample. On the contrary, leading firms may choose to publicize their intellectual assets in order to advertise and solicit feedback on new technologies and competencies. Most firms interviewed also contend that learning faster than competitors is the best competitive strategy.

However, these strategies maybe more suitable for leading firms in an industry.

- ICT is at the heart of new service development and internationalization. However, thus far it seems that new communication technologies are most likely a tool and a medium for business services. Competitiveness is built on "real" competencies and relationships, which can at best be supplemented by "virtual" ones.

3 Survey Data of Finnish Knowledge-Intensive Business Services – Descriptive Analysis

This chapter presents the statistical material collected through a mail survey of Finnish business services. The questionnaire was mailed to 445 firms, 46 of which turned out to be invalid respondents (e.g., do not participate in the targeted industries, have merged, or have gone out of business). The firms were identified from the lists of 100 largest firms in each industry obtained from Statistics Finland. Focusing on the largest firms was necessary because of the small average size of firms in these industries and the emphasis on organizational aspects in this study. Service subsidiaries of manufacturing corporations were excluded. The CEO was the recipient of the questionnaire, although in some 10% of the cases he or she delegated responding to other managers. The questionnaire was designed to collect information about the organization of the customer relationships of service firms, their internal incentive systems, and their investments in learning and innovation. The response rate is 42%. Based on the information obtained from the Statistics Finland, firms responding to the survey were slightly larger on average than the average firm in the sampling frame (29 employees against 24 employees).[6] This difference is not surprising: larger firms are more likely to find the time and perceive industry surveys as useful. There may thus be a slight bias towards larger and perhaps generally more successful firms in the dataset. Other structural data of these industries is not currently available.

Some basic descriptive indicators of firms and industries are shown in Table 3.1. There is great variation across industries, both in terms of size, innovativeness, and export orientation. Firms are typically very small in industrial design[7] and quite small electrical engineering. Size appears to correlate with longevity: average age of firms in these industries is the lowest. Both automation and design services are relatively

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[6] The difference between these numbers and the ones obtained in the survey in Table 3.1 is because the Statistics Finland data is several years older.

[7] Industrial design refers here to services contributing to aesthetic, ergonomic, and functional aspects of new products. These services are to be distinguished from more technologically oriented engineering design and less product development oriented graphic design. However, overlapping areas of activity and expertise also exist.

Table 3.1 Descriptive statistics

	All firms	Industrial Design	Advertising	Machine and process engineering	Electrical engineering	Management consulting	R&D services
Sales MFIM (1999)	26.0	2.6	42.1	31.3	9.3	35.8	14.1
Employees (1999)	41	6	34	75	23	52	32
Export share (1999)	11.6%	1.6%	0.9%	21.3%	10.5%	7.4%	28.8%
Age (years)	17.2	13.5	17.1	17.0	15.0	20.0	20.9
Business group	38%	18%	51%	44%	24%	44%	24%
Service innovations	45%	55%	47%	46%	27%	61%	48%
Incremental innovations	54%	18%	64%	54%	40%	82%	50%
N	167	11	44	39	30	18	21

new industries. However, the industrial design group contains only 11 firms, and therefore the results may be rather unreliable.

Industry averages for exports vary between 1% and 29%. However, at the level of individual firms, there are a few technologically oriented firms in the sample that export all of their sales, while most firms export very little, reflecting the local nature of most business services. It seems that it is more feasible to export technical and R&D services than design, management and advertising services. In management and advertising industries, the dominating mode of internationalization is foreign direct investment through acquisitions, instead of exporting, as partly reflected in the variable business group.

As a crude measure of knowledge creation activities, the shares of firms within each industry introducing new services are reported. About 50% of firms have launched innovative or improved services. Management consulting firms report particularly high degrees of service innovation and improvement. In contrast, electrical engineering and industrial design firms appear less active in developing new services.

3.1 Knowledge creation in KIBS

KIBS firms' success in business operations almost entirely depend on the skills and competencies of their employees and teams. How do

knowledge-based service firms support learning and innovation to maintain their competitiveness?

As discussed in section 1.4, existing studies submit that service firms' innovation activities are *ad hoc* by nature (Sundbo, 1997) and often based on (information) technology adoption (Barras, 1986), and thus supported by equipment suppliers' knowledge. While these strategies are present in the industries examined here, they are by no means dominant. Many firms in these KIBS industries do engage in systematic training, research and development, and knowledge sourcing, even though the organization of R&D group may not be permanent. Information technologies, on the other hand, are perceived as improving internal processes, productivity, and facilitating service exports, but generally their use is not strongly linked with innovativeness. Partly this may be because knowledge that underlies KIBS activities is highly tacit and complex, for which reason it cannot be digitized to any significant degree. Finally, suppliers of service, software, and equipment play no particularly visible role in KIBS firms' innovation. In fact, universities, customers, as well other service firms are shown to be at least as important sources of knowledge as suppliers of technology or software.

Training

On the job training (OJT) is an important activity to improve skills and share knowledge in KIBS. While the survey questionnaire did not ask about firms' monetary training investments, firms were asked to assess the number of working days the firms' employees spend in various OJT events. In some firms, these can exceed 20 days per year, but the average is about nine days for all six industries. Assuming that sales are directly related to the time spent on projects, 9 annual training days represents an investment with an opportunity cost of 3.6% of sales revenue. This is excluding the direct costs of training (hiring consultants or teachers in specific fields, organizing the teaching materials and facilities).

Table 3.2 Training investments in KIBS

	All	Design	Adver-tising	Machine & process	Electrical	Man-agement	R&D
Training days	8.8	8.8	8.3	7.5	7.0	14.3	10.4
Technology adoption	2.2	2.3	2.4	2.2	2.1	1.8	2.1
Innovation	2.1	2.0	2.2	1.9	2.1	2.3	2.0
Service improvement	2.3	2.3	2.4	2.4	2.4	2.4	2.2
Motivation	2.5	2.4	2.7	2.5	2.6	2.2	2.5

Cooperation	2.2	1.4	2.4	2.2	2.1	2.3	2.3

On a scale of 0 to 3, the most important training goals among those inquired about in the survey include improving services, motivating the employees, and enhancing internal cooperation.

Management consulting is the most training intensive industry, with an average of 14 days spent in learning events. Also the purpose of training is slightly different in this industry, as innovation and support for internal cooperation are more important goals than technology adoption.

Service development

Service development activities ("R&D") by KIBS firms are unexpectedly common and entail significant investments (Table 3.3). Excluding firms for which development investments currently exceed sales (which arguably are in a temporary state and thus do not represent the sector very well), 54% of firms report having invested in service development, and 20% have a more permanent development team or department. On average these 161 firms invest 3.3% of sales in service development, but the median is only 0.8%, thus the distribution is rather skewed.

Table 3.3 Mean indicators of Finnish KIBS industries' R&D activities

	All firms	Design	Adver-tising	Machine & Process	Electri-cal	Man-agement	R&D
R&D investments > 0	54%	27%	48%	67%	43%	61%	65%
R&D department/team	20%	20%	12%	21%	24%	24%	20%
R&D investments/sales	3.3%	2.2%	1.3%	2.1%	2.3%	2.7%	12.7%
Funding from:							
CUSTOMERS	16%	11%	2%	28%	7%	12%	40%
PUBLIC	24%	20%	5%	31%	29%	6%	58%
OTHER PRIVATE	5%	0%	3%	0%	4%	0%	32%
Collaboration with:							
CUSTOMERS	74%	56%	74%	81%	74%	78%	60%
COMPETITORS	12%	0%	5%	5%	15%	22%	25%
Other SERVICE firms	47%	33%	54%	35%	52%	39%	55%
UNIVERSITIES	30%	22%	10%	35%	22%	22%	75%
SUPPLIERS	44%	22%	37%	57%	56%	28%	40%

External funding for R&D by KIBS is most commonly obtained from public sources such as the National Technology Agency (Tekes). 24% of firms participate in the National Innovation System in this way. Most of these firms operate in the technical service industries, particularly R&D services. Almost no advertising firms are funded by public agencies, while almost 60% of R&D service firms receive public funding. 28% of firms in machine and process engineering and 40% of firms in R&D services also share development costs with their customers. This can be important in terms of reducing the uncertainty related to demand for the new or improved service, as the customer either requests the new service or at least commits to buying. For R&D services, this type of contract R&D with clients is of course very common.

Collaborative innovation with customers (excluding normal customized services) is very common: 74% of all firms engage in that. Other service firms (not direct competitors) and equipment or software suppliers are the second most common partners. In line with the survey data for a broader set of service industries of Statistics Finland (1998), universities and horizontal competitors are clearly less common partners for service firms. However, Chapter 5 will demonstrate that universities nevertheless tend to play an important role in the innovation activities of KIBS firms, while supplier collaboration features less prominently there.

Table 3.4 R&D activities in small and large KIBS firms

	EMP99≤20	EMP99>20
R&D investments > 0	47%	66%
R&D department/team	17%	23%
R&D investments/sales	3.2%	3.4%
Funding from:		
CUSTOMERS	15%	19%
PUBLIC	21%	29%
OTHER PRIVATE	5%	5%
Collaboration with:		
CUSTOMERS	73%	76%
COMPETITORS	14%	10%
Other SERVICE firms	46%	49%
UNIVERSITIES	22%	42%
SUPPLIERS	48%	38%
	104	64

Size affects KIBS firms' R&D activities surprisingly little. Table 3.4 splits the sample into two groups, small firms (employees in 1999 ≤ 20) and large firms (employees in 1999 > 20). Small firms are only slightly less likely to invest in R&D or have a permanent R&D team than large firms. Also their chances of attracting external funding are almost as high as for larger service firms. Furthermore, small firms collaborate with clients, competitors and other service firms about as often as larger firms. The interesting exception is collaboration with universities; universities are clearly less common partners for small firms. Additionally, large firms make use of suppliers' knowledge less frequently. This picture is not significantly changed if we split the sample at 10 employees instead of 20 employees. These statistics suggest that knowledge creation and service innovation in KIBS rarely exhibits significant scale effects, except when related to basic research, as suggested by the differences in collaboration with universities.

A useful way to compare collaboration patterns across industries is to carry out a principal component analysis (PCA) and look at the average scores in the six industries.[8] The PCA results are shown in Table 3.5. The first component loads all types of partners highly, suggesting that the general propensity to collaborate is a dividing characteristic: firms that collaborate tend to do so with several partners. The second component loads collaboration with competitors and universities, while the last one considered here emphasizes suppliers instead of universities. Figure 3.1 shows the average scores in each of the six industries.

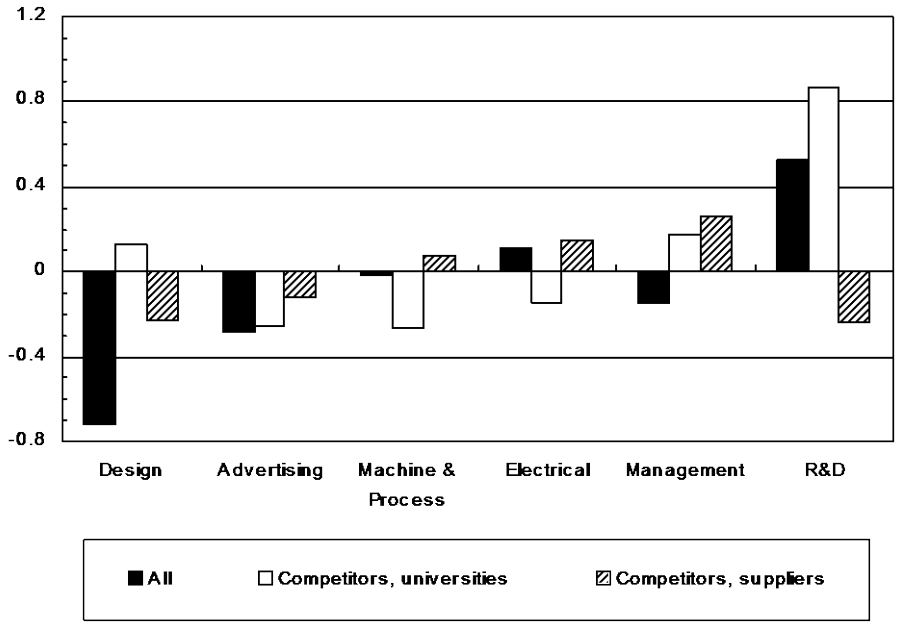
Table 3.5 Principal components of collaboration

	PrinComp 1 "All"	PrinComp 2 "Competitors & universities"	PrinComp 3 "Competitors & suppliers"
Customers	**0.43**	-0.52	0.06
Services	**0.53**	0.02	-0.53
Competitors	**0.37**	**0.52**	**0.70**
Suppliers	**0.43**	-0.47	**0.34**
Universities	**0.45**	**0.49**	-0.33
Cumulative	38%	60%	75%

[8] See e.g. Mardia, K. V., J. T. Kent and J. M. Bibby (1979). "*Multivariate Analysis*." London, Academic Press. for technical explanation of principal component analysis.

The broadest collaboration strategy is widely used in R&D services, while firms in industrial design and advertising are very unlikely to adopt this strategy. Collaboration strategy emphasizing competitors and suppliers is the most common in machine and process engineering, electrical engineering, and management consulting. Finally, strategy of collaboration with universities and competitors is most common in

Figure 3.1 Collaborative innovation partners by industry



R&D services, management consulting, and design. These patterns also reflect the industries' average investments in innovation. R&D and management services are the most active collaborators and have the highest R&D intensities, followed by electrical engineering firms, while advertising agencies are the least active in both collaboration and R&D.

Sources of knowledge for innovation

Higher education is a very important source of skills for KIBS industries. 33% of KIBS employees have higher education degrees, and 3% have licentiate or doctoral degrees. Medians for these characteristics are 25% and 0%, respectively. Thus an "average" firm in these industries tends to employ very highly educated people. Education levels are particularly high in industrial design and management consulting. Employees with postgraduate degrees are concentrated in R&D services, where they make almost 14% of the workforce.

Firms were asked in the survey questionnaire to evaluate, on a scale of 0 to 3, the following sources of knowledge in terms of their importance for the firm's innovation and service development activities: Internal sources, business group, customers, competitors, equipment, service and software suppliers, and universities. Table 3.6 shows the means for firms' responses.

Table 3.6 Sources of knowledge

Source	All firms	Design	Advertising	Machine & Process	Electrical	Management	R&D
Higher education (% of employees)	32.8	69.0	24.5	22.0	21.6	67.0	37.1
Internal	2.4	2.7	2.4	2.4	2.1	2.7	2.3
Group	1.1	0.1	1.3	1.3	0.7	1.4	1.1
Customers	2.3	2.2	2.3	2.4	2.2	2.3	2.0
Competitors	1.4	1.2	1.5	1.3	1.4	1.2	1.6
Suppliers	1.5	1.7	1.3	1.6	1.6	1.1	1.5
Universities	1.2	1.2	1.0	1.1	1.1	1.1	2.1

Customers are clearly the most important external source, in line with the results for manufacturing firms and also the broader service industry sample (SF, Leiponen 2000c). Competitors and suppliers are rated about equally important. Interestingly, competitors are a relatively important source of knowledge for KIBS firms, but the least common collaboration partner. This result reflects probably conditions of competition and appropriability in the sector. Firms do not want to risk the leakage of strategic processes and assets to their rivals through joint R&D. Universities are the least important external source, except in R&D services, where universities are even more important than clients.

Now the principal component analysis demonstrates that the most common strategy loads highly knowledge from customers, competitors, suppliers, and universities. Again, firms that value some external sources are likely to be able to make use of a lot of them. Second combination of knowledge sourcing emphasises formal education and internal competencies. The last component considered is the simplest one, emphasizing universities as sources of knowledge assets.

Table 3.7 Principal components for knowledge sources

	Customers, competitors, suppliers	Education, internal	Universities
Higher education	0.11	**0.66**	0.21

Internal	0.08	**0.61**	-0.46
Customers	**0.60**	0.09	-0.37
Competitors	**0.50**	-0.18	-0.13
Suppliers	**0.52**	-0.31	0.11
Universities	**0.32**	0.24	**0.76**
Cumulative	26%	46%	62%

Figure 3.2 Knowledge source principal components by industry

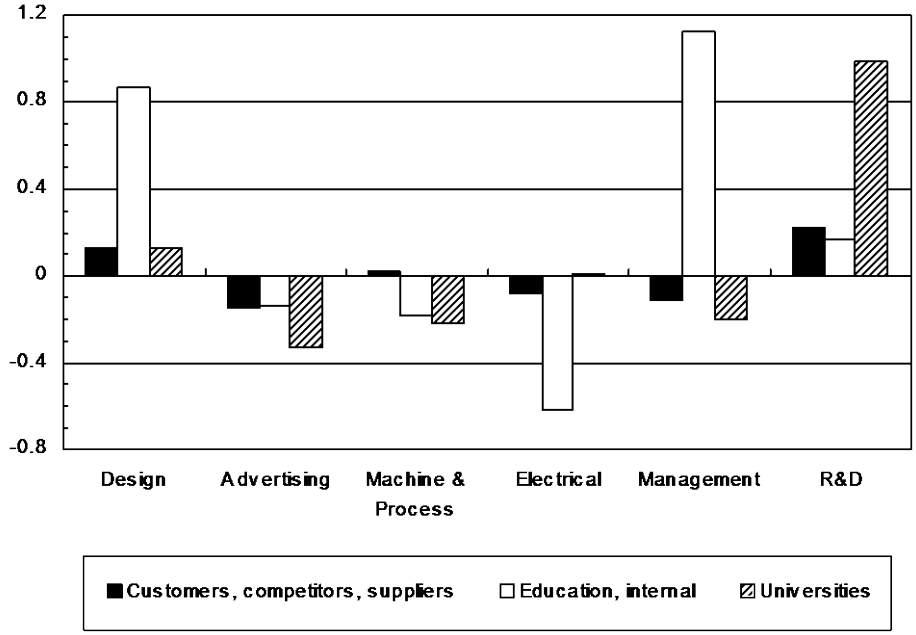


Figure 3.2 shows that internal knowledge accumulation and higher education are valued by industrial design and management consulting. R&D firms, as well as some design firms utilize multiple types of knowledge from customers, competitors, and suppliers. However, relatively speaking, the main knowledge sources for R&D services are universities.

Sources of competitiveness

To understand how KIBS firms value their internal learning activities themselves, they were asked to rate the importance of a set of knowledge creation activities for their long-term competitiveness and performance, again on a scale of 0 to 3. The results are in Table 3.8. These data can be seen as a kind of "industry recipes" (Spender, 1989), or shared perceptions of strategies to sustain competitive advantage, as

seen by the firms themselves. The most common strategies are not necessarily the most succesful ones, however.

In all KIBS industries, learning on the job is the most valued process of knowledge accumulation. All firms in the sample reported scores of 2 (important) or 3 (very important) on the scale of 0-3. The second most valued source of competitiveness is reputation, not a surprising result. On the job training, formal education and incremental service

Table 3.8 Sources of competitiveness in KIBS industries

Source	All firms	Design	Adver-tising	Machine & Process	Electri-cal	Man-agement	R&D
Learning on the job	2.8	2.8	2.8	2.8	2.9	2.9	2.7
Reputation	2.7	2.7	2.8	2.6	2.6	2.9	2.7
In-house training	2.4	2.0	2.4	2.3	2.5	2.6	2.3
Education	2.3	2.4	2.2	2.3	2.2	2.6	2.5
Improvements to services	2.3	2.3	2.5	2.2	2.2	2.5	2.3
Knowledge residing in teams	2.2	2.0	2.6	2.1	2.1	2.2	2.3
Marketing	2.1	1.8	2.2	2.1	2.0	2.0	2.1
Service innovations	2.0	2.1	2.0	1.8	1.9	2.2	2.2

development were the next most important activities. Marketing and more radical innovation were least frequently mentioned as critical activities. These data sketch well the common perception of KIBS firms (Lowendahl, 1997).

Advertising services differ from other industries by emphasizing teams as centers of competence. Management and R&D services appreciate formal education as a relatively more important factor than for other industries. These two fields also value service innovation slightly more highly than other industries.

Table 3.9 shows the PCA results for these competitiveness factors. First component loads service innovation and improvement, marketing, and teams the most. This approach was labeled "Organizational knowledge" because the aforementioned factors support building *col-*

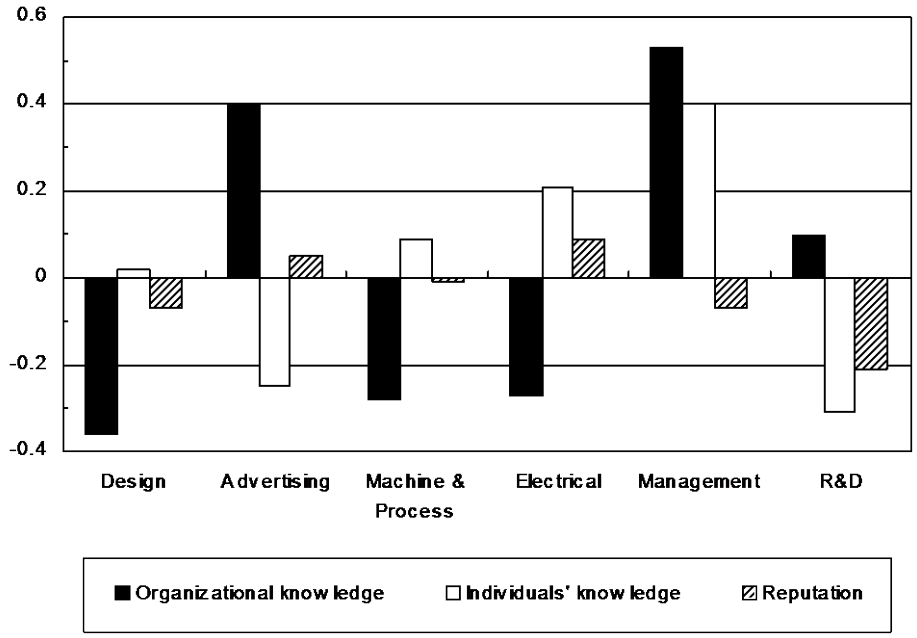
Table 3.9 Sources of competitiveness (PCA)

	"Organizational knowledge"	"Individuals' skills"	"Reputation"
Education	**0.30**	**0.34**	-0.51
In-house training	**0.33**	**0.37**	-0.20

Learning on the job	0.26	**0.59**	**0.32**
Improvements to services	**0.45**	0.04	-0.13
Service innovations	**0.41**	-0.34	-0.19
Marketing	**0.38**	-0.34	0.28
Reputation	0.29	0.08	**0.68**
Knowledge residing in teams	**0.37**	-0.40	-0.09
Cumulative	31%	46%	59%

Loadings higher than 0.30 are highlighted.

Figure 3.3 Principal components of competitiveness by industry



lective assets possessed by the firm as opposed to individuals' human capital. Individuals' skills are emphasized by the second component. The last component is labeled "Reputation" due to the high loading on this item.

Figure 3.3 shows interesting industry patterns of firm behavior in terms of seeking competitiveness. Advertising, management consulting, and R&D services rely most strongly on the component labeled "organizational knowledge." Advertising and R&D also emphasize individuals' skills the least. In contrast, some firms in management consulting focus strongly on employees' skill development. This is also the most prevalent strategy in engineering industries. Reputation-based approach shows up in advertising and electrical engineering.

Another way to see how the industries studied differ in terms of their "recipes" is to carry out the principal component analysis separately for each industry. The results do not differ very drastically from those for all industries. However, some interesting differences in emphases across industries emerge. These are summarized in Table 3.10 below. Innovation and service improvement in general were the strongest variables of the first component, titled "organizational knowledge" in the analysis of the whole sample reported in Table 3.9. A slightly more diverse picture emerges when the data are analyzed sepa-

Table 3.10 Competitiveness by industry: summary of PCA

	Principal component 1	**Principal component 2**	**Principal component 3**
All firms	**"Organizational knowledge"**	**"Individuals' skills"**	**"Reputation"**
Industrial design	Innovation and teams	Education and training	Learning and reputation
Advertising	Improvement and reputation	Training	Innovation and education
Machine and process engineering	Innovation, marketing, training	Teams	Education
Electrical engineering	Innovation and improvement	Education	Teams
Management consulting	Improvement, teams, training	Innovation and reputation	Reputation and learning
R&D services	Innovation and teams	Training and learning	Reputation

rately for each industry. For instance, the first "industrial recipe" in advertising combines incremental service improvements with *reputation* building. Industrial design, management consulting, and R&D services emphasize that knowledge residing in *teams* complements innovation, while machine industry in particular recognizes the need for skills in this strategy, as suggested by the high score for *training*.

The second component for the whole sample was called "individuals' skills." This is reflected also in almost all of the industry-level results, with high scores for *training*, *education*, and *learning* on the job. The exception is management consulting, where the second component combines service *innovation* and *reputation* as bases of competitiveness.

Finally, reputation does not come across as such a strong factor for the engineering industries. In particular, all other industries have a

component, which either combines the building of reputation with innovation, incremental service improvements, or learning on the job, or specifies reputation as the single most important asset. In contrast, in the engineering industries reputation does not become an important variable in the three strategies discussed here that explain most of the variance within the industry.

Knowledge strategies of KIBSs

This subsection brings the different knowledge and competitiveness building activities together to examine how KIBS firms' "knowledge

Table 3.11 Strategies to create knowledge assets

	Internal & external cooperation	Learning	Formal knowledge	Suppliers, technology adoption	Reputation	Training, customers
Higher education	0.19	-0.06	**0.42**	-0.04	0.25	0.17
Training inv.	0.05	-0.09	**0.31**	**0.35**	-0.09	**0.53**
R&D inv.	0.22	-0.26	**0.32**	0.24	-0.09	-0.24
Training goals: technology adoption	0.10	0.25	-0.07	**0.36**	-0.45	-0.24
Internal cooperation	**0.31**	0.21	-0.15	-0.11	-0.26	0.18
Collaboration:						
Customers	0.26	-0.27	-0.37	0.17	0.03	**0.36**
Service firms	**0.37**	-0.21	-0.25	0.12	0.00	0.02
Competitors	**0.30**	-0.29	0.16	-0.19	0.06	-0.33
Suppliers	0.19	-0.15	-0.34	**0.48**	0.19	-0.17
Universities	**0.33**	-0.31	0.18	-0.19	-0.05	-0.24
Competitiveness:						
Education	0.26	0.20	**0.40**	0.05	-0.10	0.23
Learning on the job	0.14	**0.40**	0.12	0.29	**0.37**	-0.12
Training in-house	0.20	**0.39**	0.06	0.15	-0.20	-0.26
Marketing	0.29	0.26	-0.14	-0.39	0.13	-0.08
Reputation	0.16	0.22	-0.07	0.04	**0.61**	0.06
Teams' capabilities	**0.37**	0.14	-0.14	-0.26	-0.19	0.27
Cumulative variance explained	16%	26%	37%	44%	52%	58%

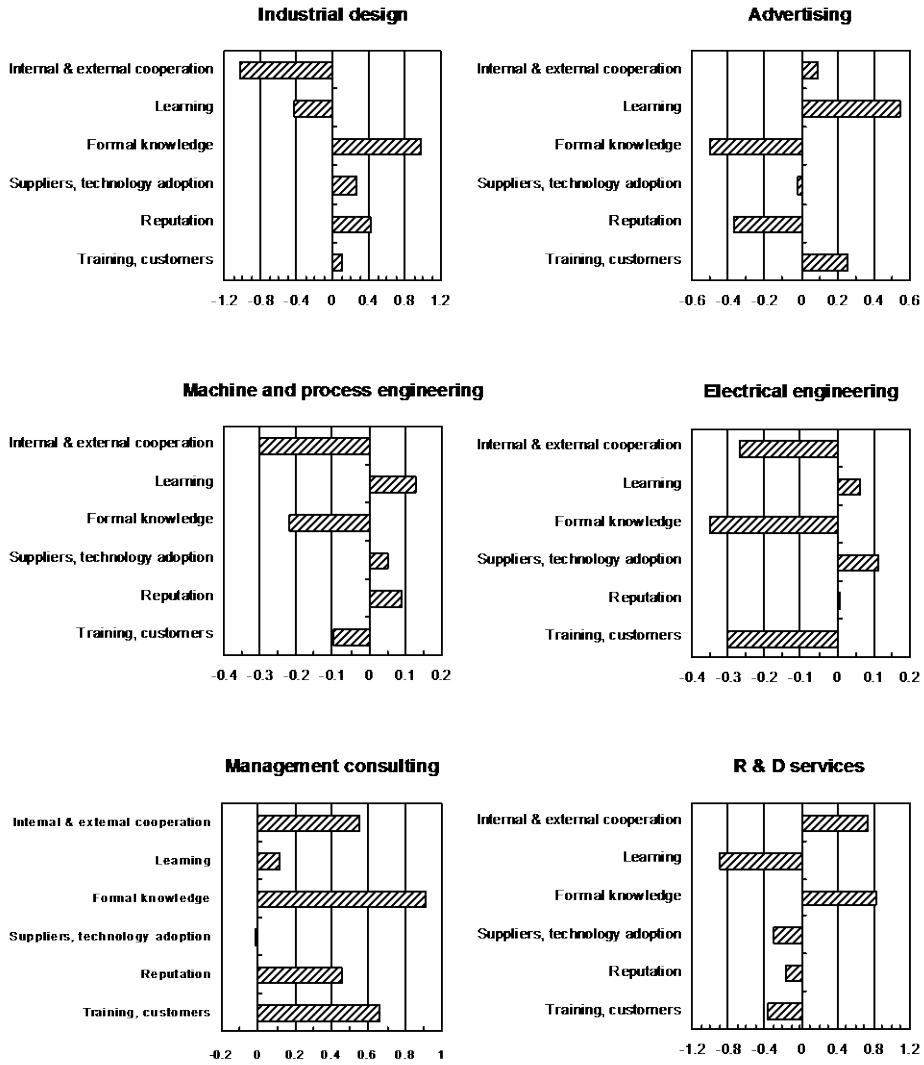
Principal component analysis. Loadings of 0.30 and higher are highlighted

strategies" vary across industries. Results of a principal component analysis for a broader set of variables from the previous subsections are in Table 3.11. Most variation in terms of these variables is explained by the component labeled *Internal and external cooperation*, which loads highly competitiveness based on internal teams and cooperation as an im-

portant goal for training, as well as external cooperation with other service firms, universities, and competitors. *Learning* component highlights competitiveness based on learning by doing and in-house training. *Formal knowledge* component emphasizes higher education, training, and R&D investments. The fourth component combines technology adoption and collaboration with suppliers, pointing to a high relevance of knowledge from technology suppliers. The last components emphasize *Reputation* and *Training and customers*, respectively.

Figure 3.4 displays the knowledge creation profiles of each industry. Formal knowledge is valued by design, management and R&D service firms. Certain management and R&D firms also engage strongly in the

Figure 3.4 Knowledge strategies in different KIBS industries



strategy of internal and external cooperation. Advertising agencies' principal approach relies on learning and on-the-job training, while the engineering industries do not show up as significant practitioners of any strategy. This may be caused by high heterogeneity within engineering industries. If anything, engineering firms depend on learning, reputation, suppliers, and technology adoption. In this more comprehensive view, management consulting firms indeed do rely on reputation, contrary to the analysis of sources of competitiveness alone, while advertising firms score here higher on learning and training than on reputation. In summary, management and R&D firms rely on practices that, according to extant literature, are more conducive to radical service innovation than firms in advertising and engineering industries do. Advertising and engineering firms' approaches are more in line with a strategy of incremental improvement.

In subsequent chapters these strategies toward knowledge creation will be used in analysis of firm performance in terms of innovation, growth, exports, and profitability.

3.2 Conclusions

This chapter reports a descriptive analysis of a new survey dataset. The survey on Knowledge-Intensive Business Service firms was carried out in 2001. The dataset contains information about 168 Finnish business service firms in six industries: industrial design, advertising, machine and process engineering, electrical engineering, management consulting, and R&D services. The main focus of the survey is on knowledge creation practices of KIBS firms. The purpose of the descriptive analysis in this chapter was to assess, to what extent KIBS actually invest in creating new knowledge, in addition to the useful function of circulating knowledge within the innovation system.

KIBS firms in the six industries studied are small and innovative. In certain technological areas, KIBS firms can also be highly export oriented. In advertising, management consulting, and design, in contrast, activities tend to be largely oriented towards local markets. Close contact with clients is critical for most firms in these industries.

More than forty percent of firms in all industries report having introduced completely new services within the past three years. Incremental service improvements are even more common, more than half of the surveyed firms report these. Hence, many KIBS firms are innovative in their own activities. New and improved services are generated

by investing significant amounts of time and other resources in training, R&D, and collaborative service development. Most common collaboration partners are clients, service firms (other than direct competitors), and equipment and software suppliers. Additionally, universities are a very important partner for firms providing R&D services.

Firms in the six industries examined demonstrate interesting similarities and differences. For example, sources of competitiveness as viewed by firms themselves vary by industry. Management consulting, advertising, and R&D service firms tend to rely on *organizational knowledge*, characterized by important role of innovation activities, marketing, reputation, and team-based competencies in building competitiveness. In contrast, *individuals' skills* are more relevant for firms in the engineering industries, although some management consulting agencies are geared towards this alternative strategy.

Knowledge strategies were evaluated with principal component analysis. This method classifies firms by their knowledge creation "profiles." Average profiles across the six industries differ quite dramatically from one another. Most advertising agencies rely on learning, training, and sourcing knowledge from clients. The two engineering industries' profiles are rather similar to one another, emphasizing incremental learning by doing and technology adoption from suppliers. Finally, in management consulting and R&D services, internal and external cooperation and formal knowledge acquired through recruiting highly educated employees and investing in R&D are the most important strategies.

Interestingly, knowledge strategies in R&D services resemble those in management consulting more than those in engineering. Management and R&D services are the most actively engaged in formal knowledge creation activities, including collaborative innovation, R&D, and employing people with very high levels of education, while advertising and engineering rely more on learning by doing. In the latter case, knowledge builds up incrementally, and circulation of knowledge from one client to another may figure more prominently than creating completely new knowledge.

4 Participation and reification: Do learning and organization interact?

4.1 Introduction

The communities of practice framework (Wenger, 1998; Lave and Wenger, 1991) argues that organizational learning and innovation are fundamentally social processes. The framework emphasizes the complementarity of *participation* and *reification* in collective learning. Participation consists of the processes of communication and cooperation within the community, while reification refers to the importance of "codifying" practice through forms, documents, rules, instruments, and so on. Participation (interaction) makes up for the inherent limitations and misalignment of reification:

> "We send ambassadors with our treaties and hire judges to interpret our laws; we offer 800 numbers as customer service for our products in addition to our careful documentation; we convene a meeting to introduce a new policy in order to avoid misunderstandings; we discuss what we read in order to compare and enrich our interpretations." (Wenger, 1998: 63-64)

Similarly, reification makes up for the limitations of participation.

> "We create monuments to remember the dead; we take notes to remind ourselves of decisions made in the past; we share our notes with colleagues who could not attend a meeting; we are surprised by the way someone else describes a common event or object; we clarify our intentions with explanations and representational devices; we coordinate our coming and going with clocks. Mirroring the role of participation, reification is essential to repairing the potential misalignments inherent in participation: when the informality of participation is confusingly loose, when the fluidity of its implicitness impedes coordination, when its locality is too confining or its partiality too narrow, then it is reification that comes to the rescue." (*ibid*: 64)

Collaboration between a business service firm and its client does not necessarily constitute a complete community of practice. However, the purpose of the relationship is to exchange knowledge and enable mutual learning in a joint enterprise, and thus the communities of practice framework may help us to understand the associated organizational behavior. Hence, even though the organizational setting is not as stable as that described by Wenger, similar features are at play. The relationship between a service firm and the client is often characterized by repeated interaction, sometimes extending over decades, through which individuals in the two organizations get to know each other and learn to communicate and cooperate. This long-term nature of the relationship generates trust among the participants lowering the organizational friction (transaction costs) in joint projects.

In line with the idea of complementarity of participation and reification, formal contracts and organizational structures are complementary with the social processes of communication, cooperation, and creation of meaning and identity, which underlie learning and innovation. In the language of the economics of organization, we can say that even though contracts are incomplete, what *is* written in the contract – what is being reified and how – does matter. Contracts shape the incentives and directions of learning and innovation. The results of learning and innovation, that is, new knowledge, is stored both in the firm's organizational routines (Nelson and Winter, 1982) and the people re-enacting the routines.

Löwendahl (1997) has proposed a conceptual framework to analyze the knowledge base and associated strategy of professional service firms. Building on the resource-based view of the firm, she argues that a service firm's resources shape its potential to generate competitive advantage. In particular, a key dimension is whether knowledge resources are organizationally or individually controlled. Resources are *organizationally controlled* when the performance of the service process depends primarily on organizational procedures, firm-specific assets such as reputation or intellectual property, and team-based skills. *Individual control* of resources implies that individual professionals, experts, are the critical source of competence, not teams with sophisticated shared routines. A study by Hansen et al. (1999) identified similar strategies. However, instead of organizational vs. expert control of resources they emphasized codification of knowledge vs. tacit expert skills.

In Löwendahl's framework, firms with individually controlled resources are highly flexible and able to apply their expertise to any relevant problem a client might have. As a result, their strategic focus is on *client relations*. In contrast, organizationally oriented firms are efficient

due to their ability to create economies of scale by repeating the same solution or service procedure over and over again. The growth potential of these firms is higher, too, because of the increasing returns to repetition. Their strategic focus is on the *adaptation of existing solutions* (Löwendahl, 1997:115). In the empirical analysis to follow, I will examine how these two contrasting resource orientations are reflected in the contractual choices of firms.

As discussed in Chapters 1 and 2, from the contractual point of view knowledge-intensive services are vulnerable to problems arising from asymmetric information among economic actors. At the same time, there are organizational problems related to sharing strategic knowledge between the service provider and the client. Additionally, intensive interaction among business organizations poses the hazard of involuntary knowledge spillovers. As suggested earlier, the client seeks to make available to the service firm all the information needed in the current project, yet it wants to protect against leakage of other knowledge assets. The service provider might work with the client's direct competitors in the future. On the other hand, the service supplier may prefer to retain control rights to its knowledge so as to be able to use these resources fully in future projects.

This chapter assesses empirically, first, how to deal with inefficencies arising from asymmetric information, and second, how to enable knowledge exchange and yet reduce undesired knowledge leakage. Collaborative partners' success in addressing these institutional design challenges will shape the extent to which external knowledge service providers participate in sensitive, strategic activities of their clients, and as a result, in the innovation system. In thinking about these questions, it is important to recognize they are intertwined. Organizational or contractual solutions to the problem of asymmetric information may have ramifications for the problem of managing knowledge flows, and vice versa.

One way to mitigate agency problems is to link the service firm's project compensation to its performance. Performance contracts generate higher-powered incentives for the service firm than time-based contracts, thus improving incentive alignment between the two firms. However, performance measurement is not a simple task in most service industries. More often than not, measurement is based on subjective assessments of quality or customer satisfaction. As a result, in practice, even performance contracts are to a significant degree based on trust and reputation. They are sustained by the implicit agreement by the parties that supporting the relationship generates long-term rewards, while breaching would cancel these rewards.

Performance measurement is also costly. Therefore, in cases where the quality of service is obvious for the participants, yet it is non-contractible, the parties may rely on time-based compensation. Performance incentives are then created by the "shadow of the future." According to interviews with Finnish business services' clients (see Chapter 8), client firms often admit to behaving in a "satisficing" fashion: if quality is below an "acceptable" level, the client will stop buying from the service provider. If quality is above the threshold level, the client is likely to continue sourcing from the service firm. The reason is that searching for alternative suppliers is time-consuming and costly, and the service firm learns some technological and procedural characteristics specific to this particular client. Hence, it is possible that after the competence and quality of the service firm are sufficiently known by the client, it will rely on incentives created by potential future projects rather than on costly and imperfect performance measurement, particularly in areas where the cost of measurement is very high.

Another key dimension of the client contract is allocation of control rights to service output, intellectual assets, and more tangible assets. These control rights define the ability of the service firm to control its intellectual property and knowledge flows to the client. If property rights to the output (design, organizational tool, technical design or plan) are handed over to the client, the potential for the service firm to continue to benefit from the design and pursue cumulative learning are significantly reduced. This dampens the incentives to expend effort and produce innovative services. Similarly, clauses that prohibit the service firm from selling to the client's competitors reduce the up-side potential from repetition. However, depending on the environment, these characteristics may make the relationship more sustainable as learning takes place *within* the client-service vendor partnership.

4.2 Empirical framework

The general goal of the empirical analysis here is to assess how organizational choices (contracts) and firms' strategic and resource orientation are related. Specifically, the factors behind client contracts are examined. The contractual elements considered here are (i) performance pricing (bonus payments) and (ii) control rights to the service output (i.e., design, concept) and to the service firm's resources.

Building on the property rights and agency literatures (Hart and Moore, 1990; Salanié, 1997) performance pricing is expected to be more likely under the following conditions.

- Asymmetric information about the service firm's competencies, motivation, and quality is high.
- The cost of performance measurement is low.
- The service firm works independently of the client, making monitoring difficult.
- The service firm's contribution to the project is more important than that of the client.

Service firms are expected to yield control rights with higher probability under the following conditions.

- The client's contribution is more important than that of the service firm.
- The service firm's resource base features individual rather than organizational knowledge assets.
- The service firm's bargaining power is low.

Service firms with a greater emphasis on organizational resources are hypothesized to keep control rights for the following reasons: When the service process builds on organizational routines, the efficiency and competitiveness arise from honing the routines through constant repetition. Therefore, the service itself is likely to be a solution or a package that can be repeatedly delivered. Signing a clause that prevents the repetition of the solution would destroy the service firm's profit opportunities. In contrast, if the resource base builds on individuals' skills, then competitiveness originates from flexible application of individual professionals' expertise to a variety of different problems. Here, each solution is different, and no scale economies can be generated from repetition. As a consequence, property rights to the service output have no further commercial value.

A potential problem in testing these hypotheses stems from ambiguity as to the unit of analysis. In spite of the fact that the hypotheses largely deal with the organization of individual projects and relationships, the analysis is at the level of the service firm. Most firms, except perhaps the very smallest ones, engage in many different kinds of transactions and customer relationships. Firms are likely to employ a wide range of contracting procedures simultaneously. The survey questionnaire attempts to mitigate this issue by asking the respondent to base their answers on relationships with "key customers" or "most important customers."

4.3 Descriptive analysis of client relationships

KIBS firms' client relationships can be characterized in terms of formal contracts (pricing, control rights) on the one hand, and informal roles (initiative, cooperation, leadership), on the other hand.

Table 4.1 Characteristics of relationships with key clients (scale: 0 (never) – 3 (always))

	All firms	Industrial design	Advertising	Machine and process	Electrical engineering	Management consulting	R&D services
Project planning:							
Customer plans	1.7	1.5	1.6	1.9	1.8	1.3	1.7
KIBS participates	1.8	1.7	1.9	1.7	1.7	2.0	1.9
KIBS plans *for* client	1.4	1.2	1.5	1.4	1.1	1.5	1.4
KIBS *initiates* projects	1.5	1.0	1.7	1.4	1.3	1.8	1.5
KIBS' role:							
Outside expert	2.1	2.4	2.3	1.9	1.9	2.1	2.1
Project leader	0.8	0.2	0.8	0.9	0.7	1.3	0.6
Service solutions	1.3	0.6	1.3	1.3	1.2	1.9	0.9
Independent	1.9	2.2	1.8	1.9	1.9	1.6	1.9

Table 4.1 presents means for the survey questions on informal roles, that is, how the KIBS firm participates in the planning of clients' projects and operates in the relationship. Most often the KIBS firm participates in project planning and preparation, but almost as often the client carries this phase out alone and approaches the service provider only when the needs and specifications have been defined. Slightly less frequently the client asks the KIBS provider to prepare and plan the project ("plans for client"). Some KIBS firms also suggest new projects to their clients ("initiates projects"). Advertising and management consulting firms are most likely to adopt this last role, which implies significant effort and proactive role within the relationship. These variables will be used in the empirical analysis as indicators of KIBS firm's effort within its customer relationships.

Within service projects, KIBS firms' role is to operate most often as outside experts and work rather independently, after the project specifications have been laid out (see lower panel in Table 4.1). This is particularly true of industrial designers. Fewer firms rely on predefined

service solutions they have developed themselves, and fewer still act as project leaders, taking more responsibility of project outcomes. Management consultants assume these roles more often than other types of service providers.

The patterns of using formal contracts are displayed in table 4.2. The most common and most traditional way of pricing services is based on time, either hourly or daily compensation. Time billed by the service firm is usually not monitored, however, so even this simple pricing scheme is an incomplete contract. Almost as common is the most market-like pricing method: specifying a fixed price for a service package or a solution. Then the service process and output generally have to be relatively well specified or standardized. Management consultants use time-based pricing more often than the solution-based one, while industrial designers operate more often under the fixed price schedule.

Table 4.2 Formal contracts

	All firms	Industrial design	Advertising	Machine and process	Electrical engineering	Management consulting	R&D services
Pricing:							
Time	1.8	1.9	1.6	1.8	1.8	2.2	1.8
Package/solution	1.7	2.2	1.8	1.7	1.8	1.3	1.7
Performance	1.0	0.8	0.8	1.0	0.9	1.3	1.3
Control rights:							
No competition clause	1.9	2.5	1.8	2.0	1.7	2.0	1.6
Property rights to client	2.2	2.8	2.4	2.2	2.1	2.1	1.7
Internal incentives:							
Any incentive scheme	74%	40%	82%	82%	70%	94%	74%
Of firms with inc. schemes:							
Individual performance	71%	n.a.	69%	59%	71%	94%	100%
Team performance	26%	n.a.	33%	25%	14%	29%	27%
Firm performance	60%	n.a.	69%	69%	43%	71%	36%
Profitability measures	100%	n.a.	97%	100%	94%	73%	95%
Qualitative measures	57%	n.a.	56%	53%	52%	71%	73%
Non-economic incentives	59%	n.a.	13%	25%	50%	36%	38%

Note: Industrial design has too few observations in the lower panel.

Finally, either of these two pricing schemes can be associated with some performance bonus clause, whereby higher performance yields higher returns to the service firm. This practice is less frequent than the simple time-based or solution-based pricing schemes. One reason for less frequent usage is that this scheme needs to be associated with

some method of measuring performance, which gives rise to information costs. In some KIBS areas, particularly process engineering, productivity can be measured somewhat objectively. In most cases, however, objective measures are lacking. Then performance measurement may be based on the client's more qualitative and subjective assessments. In fact, small-scale customer satisfaction surveys are the most common practice in performance measurement, according to these Finnish firms. As a result, performance measurement is usually based on highly subjective views. In the survey dataset, performance bonuses are found most often in R&D and management services.

The second dimension of formal contracts evaluated in the survey is control rights: who retains these rights to the essential knowledge asset, be it skills or service output. If the service firm signs some type of a no-competition clause, for example, that they will not provide the same service or technology to the client's direct competitors, they effectively hand over some of the control rights to their own skills and knowledge to the client. Then the client has some say in terms of where and how the service competencies are deployed. Another control right dimension is ownership of the service output: design, process plan, campaign, or technology. If the service firm agrees to give the property rights to the service output to the client, then it again hands over some control rights as to the use of its intellectual property.

The two ends of the industry spectrum in terms of control rights are found in industrial design and R&D services. Designers tend to hand over the control rights, perhaps reflecting the low bargaining power of these small firms and the strategic importance of new product design projects to the clients. R&D service providers, on the other hand, despite contributing to the client's R&D activities, are most likely to retain control rights.

Finally, firms were asked about their internal incentive schemes. In Table 4.2, incentive variables include the following: whether or not the firm has any incentive schemes in place, and if so, what is the level of performance measurement: individual, team, or firm. This is an interesting aspect of motivating employees, because it has implications for employees' willingness to cooperate with other employees or teams. For example, if cooperation across teams is very important for firm performance, firms should be cautious about implementing incentives based on team level performance. Incentives in general are used by about three out of four firms in the sample. Among firms that reported some incentive system, most common levels of compensation are the individual employee (70%) and the whole organization (60%). Teams

and other organizational subunits are the performance unit in 26 percent of firms using incentive schemes. Firms can have overlapping systems, whereby several or even all levels of performance measurement are used. Incentives do not need to be based on profits or productivity. While most incentive-using firms have some profitability based compensation, 57 percent of them also use subjective, qualitative measures of performance. Similarly, compensation does not have to be monetary. Travel, training and other such rewards are used in 59 percent of firms with incentive schemes.

R&D services tend to find individual employees as the key actors, since all firms with an incentive system have individual level performance compensation. Similarly, management consulting firms have strong incentives for individuals, but in most firms these are complemented by firm-level performance rewards. Machine and process engineering industry is exceptional in the sense that firm performance is viewed more important to reward than individual employees' performance. It is possible that internal cooperation is more important for performance in this industry, relative to other business services. Future research could evaluate, to what extent the need for cooperation across units is matched with the choice of level for implementing incentive schemes. The survey data used here do indicate that firms using team level performance compensation assess teams as a strong source of competitiveness, as well as cite internal cooperation as an important goal of in-house training.

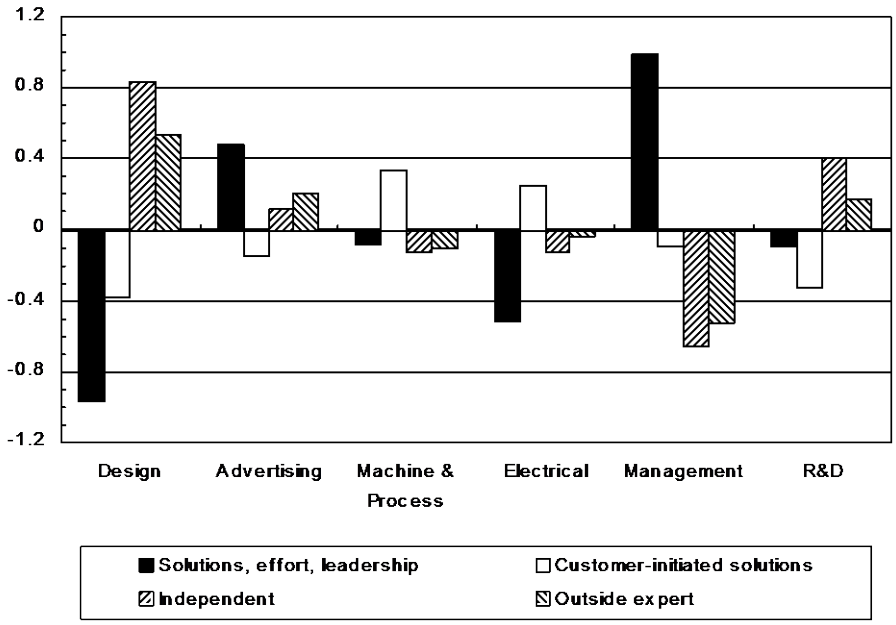
Next, the statistical material concerning service relationships discussed previously was analyzed with principal components (Table 4.3). Quite intuitive results are obtained at the industry level, as displayed in Figure 4.1. High initiative combined with service solutions and project leadership ("solutions, effort and leadership") is demonstrated by advertising firms and management consultants, while design and electrical engineering appear to rarely suggest new projects or be active in project planning and preparation. Engineering industries rely on the client's leadership, whereas design and R&D tend to work most often independently of the client as outside experts. This is the alternative strategy also in advertising.

Table 4.3 Principal components of KIBS' client relationships

	Solutions, effort and leadership	Customer-initiated solutions	Independent	Outside expert
Customer plans	-0.05	**0.61**	-0.12	**0.34**

KIBS participates	**0.41**	-0.34	0.09	**0.35**
KIBS plans for client	**0.45**	-0.13	0.25	-0.21
KIBS initiates projects	**0.46**	-0.21	0.05	-0.21
Expert	**0.33**	0.14	0.15	**0.72**
Leader	**0.42**	**0.35**	-0.13	-0.16
Service solutions	**0.36**	**0.39**	-0.41	-0.30
Independent	-0.03	**0.39**	**0.84**	-0.21
Cumulative	0.32	0.48	0.61	0.72

Figure 4.1 Principal components of service relationships by industry



Cf. Table 4.3

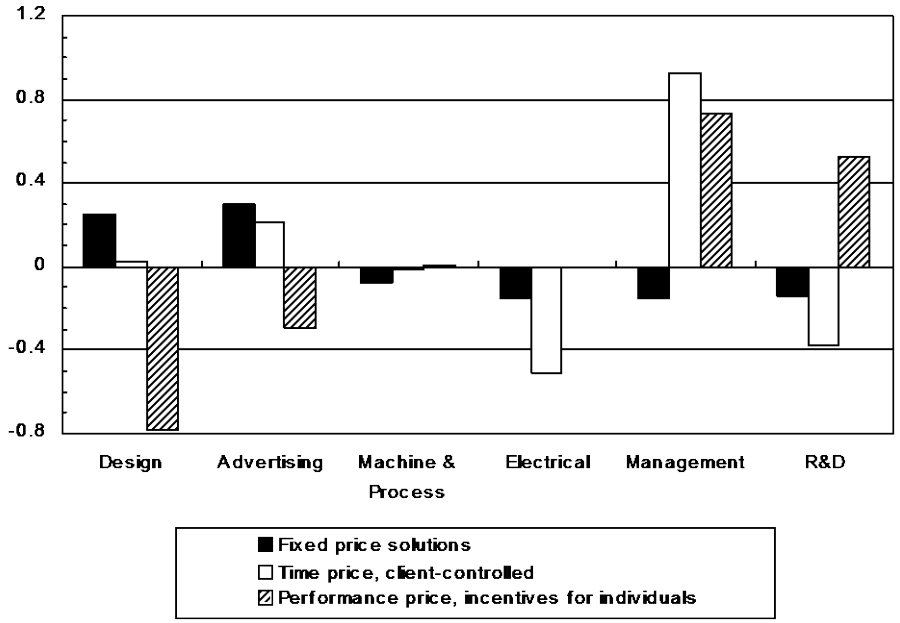
In terms of formal contracts, offering *solutions* tends to be associated with non-economic incentives. Design and advertising rely on this approach to pricing (see Table 4.4 and Figure 4.2). Firms engaged in *time-based pricing* frequently yield control rights to their clients. If incentive systems are used, they tend to be non-economic and geared towards joint performance of the company. This strategy is particularly common

Table 4.4 Principal components of service contracts

	Fixed price solutions	Time-based price, client-controlled	Performance price, individuals' effort
Pricing:			

Time	-0.51	**0.42**	0.15
Concept/solution	**0.54**	-0.38	-0.19
Performance	**0.30**	-0.09	**0.61**
Control rights:			
No competition clause	0.29	**0.47**	0.04
Property rights to client	0.08	**0.35**	-0.39
Internal incentives:			
For individuals	0.21	0.28	**0.59**
For all employees	0.23	**0.39**	-0.22
Non-economic incentives	**0.42**	**0.32**	-0.14
Cumulative	0.20	0.37	0.53

Figure 4.2 Principal components of service contracts



in management consulting. Finally, *performance pricing* in client contracts is associated with internal performance measures for individual employees. This strategy is very strong in R&D services, and appears to be the alternative strategy for management consulting companies. Engineering industries, once again, do not show any clear pattern, perhaps due to heterogeneity. Nevertheless, these tentative results suggest that firms' schemes related to internal and external incentives are linked. More research needs to be completed to provide more robust theoretical and empirical understanding of the linkages.

4.4 How are contracts determined?

In this section the analysis focuses on the factors behind the choice of contractual arrangements for client relationships. The underlying idea is

Table 4.5 Survey questions

Variable	Survey question	Scale
General characteristics of firms		
EMPLOYEES	Employees 1999	3-
EXPORTS	Export share (exports/sales) 1999	0-100%
AGE	Age of the firm (years)	1-90
SUBSIDIARY	Firm belongs to a service business group	0/1
Contracts		
PERFPRICE	Do you use performance-based pricing of your key clients' projects? (performance: productivity, customer satisfaction, quality, speed etc. Never—always)	0–3
Control rights:		0–3
EXCLUSIVE	Do your service contracts specify that you will not sell to the direct competitors of your customer? (never—always)	
CLIENTOWN	Do your service contracts specify that you will yield the property rights associated with the service output (design or technology) to the client? (never—always)	0–3
Roles in the relationship		
	How well do the following claims describe your role in the service relationship with your key clients (not at all—very well):	
SOLUTION	We deliver predefined, conceptualized service solutions/ packages that we have developed ourselves.	0-3
EXPERT	We participate in clients' projects as external experts.	0-3
INITIATIVE	We initiate clients' projects by making explicit suggestions.	0-3
INDEPENDENT	We carry out projects independently of clients.	0-3
Appropriability environment		
APPRO	Protecting intellectual property is possible. (disagree strongly—agree strongly)	-2 – +2
Project management/performance measurement		
PROJMGT	Our projects are phased and procedures and expected results of each phase are clearly defined.	0/1
CUSTSAT	How often do you evaluate customer satisfaction? never – after each project	0-4

that structure, service strategy, and knowledge base of KIBS firms have an impact on the kinds of contractual alternatives are available to structure their client relationship. The variables to be used in the analysis are in Table 4.5 below. Most of these variables were already introduced in section 4.2.

Ordinal survey variables are next transformed into binary variables. If the original response was 2 or 3 on a scale of 0 to 3, the dummy variable obtains a value of 1, otherwise the dummy value is zero. For some variables (CUSTSAT, EXCLUSIVE, CLIENTOWN), the cutoff point was changed by defining the dummy value of one as the original variable being equal to three. This way we shift the two groups defined by the dummy variable closer to a 50% - 50% split of the sample, which can be important for the consistency of estimation in the next stage of the analysis. Finally, the survey question on appropriability environment (APPRO) was originally on a scale of –2 – +2, and here the dummy is one for firms' responses of 1 or 2, otherwise the dummy is zero.

Table 4.6 Transformed ordinal variables

Variable	Transformation
APPRO	Dummy for APPRO>0
SOLUTION	Dummy for SOLUTION>1
EXPERT	Dummy for EXPERT>1
INITIATIVE	Dummy for INITIATIVE>1
INDEPENDENT	Dummy for INDEPENDENT>1
CUSTSAT	Dummy for CUSTSAT>2
EXCLUSIVE	Dummy for EXCLUSIVE>2
CLIENTOWN	Dummy for CLIENTOWN>2
PERFPRICE	Dummy for PERFPRICE>1

Let's first focus on whether or not performance bonuses are used. The dependent variable PERFPRICE is binary and the estimation method is probit maximum likelihood. The empirical model is below. Expected signs of the coefficients are in parentheses, and α is a constant and the β_i are coefficients to be estimated.

$$\begin{aligned}\text{Prob(PERFPRICE)} = f(\ & \alpha + \beta_1 * \text{EMPLOYEES (-)} + \beta_2 * \text{EXPORTS (+)} \\ & + \beta_3 * \text{AGE (-)} + \beta_4 * \text{SUBSIDIARY (?)} \\ & + \beta_5 * \text{SOLUTION (+)} + \beta_6 * \text{EXPERT (-)} \\ & + \beta_7 * \text{INDEPENDENT (+)} + \beta_8 * \text{CUSTSAT (+)} \\ & + \beta_9 * \text{PROJMGT (+)} + \beta_{10} * \text{APPRO (+)} \\ & + \text{Industry dummies)}\end{aligned}$$

Firm size, age, and exports serve as indicators for asymmetric information. The smaller and younger the firm, the less established their reputation is likely to be, thus *ex ante* quality judgments will be more difficult. Export intensity is expected to be positively related with per-

formance pricing, because asymmetric information issues are aggravated in foreign markets. Whether or not the firm is a subsidiary is used as an additional control variable, without specifying a predefined relationship with the dependent variable.

Service SOLUTIONS involve more significant leadership and risk taking by the service firm than EXPERT services, which simply extend the client's resources thus requiring project leadership by the client. Therefore, expert services are expected to be negatively and solutions services to be positively associated with performance pricing. INDEPENDENT operation in the project reduces opportunities for monitoring, in which case explicit performance incentives may be useful. Customer satisfaction assessment (CUSTSAT) and systematic project management (PROJMGT) are assumed to be elements of strategies to measure and codify service performance, hence the expected positive relationship with the dependent variable. High appropriability of knowledge (APPRO) is also expected to support performance pricing because of its important role in long-term contracting: significant involuntary spillovers are likely to break down the implicit contract associated with performance pricing. Finally, industry dummies are included in the estimation, but they do not have expected signs *a priori*.

Table 4.7 displays the estimation results. 157 observations are used in the estimation. Missing observations are due to item non-response. The results indicate that smaller firms are more likely to use performance pricing, and so are firms belonging to a larger business group. The coefficients of SOLUTION and EXPERT are not significantly different from zero. Also, the coefficient of the variable INDEPENDENT has the expected sign but is not statistically significant. In contrast, codification and measurement of performance through customer satisfaction surveys (CUSTSAT) and standardization of project management (PROJMGT) are strongly associated with the use of performance bonuses. Strong appropriability also significantly supports this contractual element. Hence, the use of performance pricing in business service contracts is driven by the need for signaling (asymmetric information), firm structure, and management practices aimed at codifying performance. Technological regime in terms of appropriability of knowledge strongly supports performance pricing. In contrast, service strategies as proxied by SOLUTION, EXPERT, and INDEPENDENT are not significant explanatory factors, contrary to hypotheses.

Table 4.7 Estimation of the likelihood of performance contracts (N=157)

Dependent variable:	PERFPRICE	
	Coeff.	Std. Error
Constant	-1.38	0.64
EMPLOYEES	-0.05**	0.02
EXPORTS	-0.01	0.02
AGE	-0.09	0.57
SUBSIDIARY	0.74**	0.36
SOLUTION	-0.35	0.36
EXPERT	0.08	0.32
INDEPENDENT	0.45	0.37
CUSTSAT	0.70**	0.31
PROJMGT	0.75**	0.36
APPRO	0.86**	0.35
Design	-1.12*	0.64
Advertising	-0.72	0.51
Machine and process	-0.11	0.50
Electrical	-0.51	0.49
Management	0.52	0.57
Log Likelihood	-53.9	
McFadden's pseudo R^2	30%	
% correct predictions	84%	

Estimation method: PROBIT ML. ** implies coefficient significant at the 95% level, * implies significance at 90% level.

The second contractual mechanism examined here is the allocation of control rights to the service output. Two dimensions of control are examined, as proxied by EXCLUSIVE and CLIENTOWN. The empirical model and expected signs are below.

$$\begin{aligned}\text{Prob(CONTROL RIGHTS)} = f(\alpha &+ \beta_1 * \text{EMPLOYEES (-)} + \beta_2 * \text{EXPORTS(-)} \\ &+ \beta_3 * \text{AGE (-)} + \beta_4 * \text{SUBSIDIARY (?)} \\ &+ \beta_5 * \text{SOLUTION (-)} + \beta_6 * \text{EXPERT (+)} \\ &+ \beta_7 * \text{INDEPENDENT (-)} \\ &+ \beta_8 * \text{INITIATIVE (-)} + \beta_8 * \text{CUSTSAT (?)} \\ &+ \beta_9 * \text{PROJMGT (?)} + \beta_{10} * \text{APPRO (+)} \\ &+ \text{Industry dummies)}\end{aligned}$$

The expected signs for size and age remain the same, negative, as smaller and younger firms are assumed to have less bargaining power in their client relationships and thus they may be more likely to yield

control rights to their clients. Service firms yielding control rights are *not* expected to emphasize a exports and growth oriented strategy; hence export intensity is likely to be low and SOLUTIONS not the chosen strategy. They are also less likely to operate independently in projects. Since clients control projects, goals and tasks can be less well defined, and constant interaction is necessary. The role of the service firm is proxied also by the variable INITIATIVE, which is expected to have a negative impact: control yielding service suppliers are expected to be relatively more passive in their relationships. On the contrary: they are not likely to even participate in the planning and specification of the project. CUSTSAT, PROJMGT, and APPRO are used as control variables for the knowledge regime. CUSTSAT and PROJMGT have no *a priori* expected signs, while high appropriability may complement yielding control rights to the client.

Table 4.8 Estimation of the likelihood of allocating the property rights associated with the design or technology to the customer (N=157)

Dependent variable:	CLIENTOWN	
	Coeff.	Std. Error
Constant	-0.03	0.41
EMPLOYEES	0.001	0.002
EXPORTS	-0.74	0.48
AGE	-0.01	0.01
SUBSIDIARY	0.11	0.25
SOLUTION	-0.32	0.26
EXPERT	0.83**	0.25
INDEPENDENT	0.16	0.26
INITIATIVE	-0.60**	0.24
CUSTSAT	0.10	0.26
PROJMGT	0.28	0.26
APPRO	-0.28	0.24
Advertising	0.06	0.35
Machine and process	-0.16	0.36
Electrical	-0.30	0.36
Management	-0.12	0.46
Log Likelihood	-91.2	
McFadden's pseudo R^2	15%	
% correct predictions	71%	

Estimation method: PROBIT ML. ** implies coefficient significant at the 95% level, * implies significance at 90% level.

Estimation results are reported in Table 4.8 for the dependent variable CLIENTOWN. Overall, the results for this contractual strategy are

weaker than those for performance pricing. However, two very strong results emerge. EXPERT strategy is strongly positively associated with using the "client obtains property rights" clause, supporting the idea that firms with a resource base composed of individuals' competencies are more likely to yield property rights to their clients. Additionally, the estimation indicates that an active role in customer relationships as measured by INITIATIVE is negatively related to the likelihood of yielding control of the product of the service relationship.

An alternative way of managing control is to include an exclusivity clause in the contract, specifying to whom the service firm cannot supply and for how long. The estimation results using this dependent variable are in Table 4.9. These control rights often accrue to clients of

Table 4.9 Estimation of the likelihood of the service firm agreeing to not sell to client's direct competitors (N=157)

Dependent variable:	EXCLUSIVE	
	Coeff.	Std. Error
Constant	0.11	0.43
EMPLOYEES	0.002	0.002
EXPORTS	-0.01	0.01
AGE	-0.96**	0.47
SUBSIDIARY	0.48*	0.25
SOLUTION	-0.28	0.26
EXPERT	0.07	0.26
INITIATIVE	-0.40*	0.24
INDEPENDENT	-0.26	0.26
CUSTSAT	0.19	0.26
PROJMGT	0.45*	0.25
APPRO	0.41*	0.24
Design	0.49	0.59
Advertising	0.01	0.38
Machine and process	0.35	0.38
Electrical	-0.24	0.39
Management	0.13	0.46
Log Likelihood	-94.6	
McFadden's pseudo R^2	11%	
% correct predictions	66%	

Estimation method: PROBIT ML. ** implies coefficient significant at the 95% level, * implies significance at 90% level.

Figure 4.3 Contractual alternatives

		Compensation	
		Time- or solution-based	*Performance bonus*
Control rights	*Service supplier*	Market	Relational contract
	Client	Spot employment	Quasi-firm

Modified from Baker et al. (1997)

young service firms that have developed standardized project management practices and operate in a high appropriability environment. These service firms are also less proactive in their client relationships. Only the first result is significant at the 95% level of confidence.

Thus both kinds of control rights tend to be *retained* by service firms that are proactive in their client relationships. Additionally, intellectual property rights to design output are often given away to clients by firms operating as outside experts, while young firms are likely to enter some arrangement of exclusivity with their clients.

Interactions among these contractual forms are explored next. The various combinations of pricing and control rights strategies are presented in the matrix below. This representation builds on the framework by Baker et al. (1997).

The idea is that giving control rights to the client reduces the strategic leverage of the service supplier, hence we can speak of a quasi-employment relationship. Performance bonuses are thought here to be associated with relationships that have a long-term potential. That is, the service provider aspires to become the client's long-term supplier by seeking to demonstrate its competence through performance clauses in the contract.

Table 4.10 displays the multinomial logit estimation results for the four possible combinations of contracts. The reference case is the most traditional arrangement, spot employment, in which service firms do not use performance pricing but yield the control rights to clients. The control rights measure here is CLIENTOWN. The results lend further support for the proposition that the EXPERT strategy is negatively associated with settings in which the KIBS firm retains intellectual property rights, that is market transaction and relational contract. These contractual forms also support high INITIATIVE.

Table 4.10 Estimation of the choice of organizational form (N=162); Performance pricing and property rights to the service output

	Market		Relational contract		Quasi-firm	
	Co-efficient	Std. Error	Co-efficient	Std. Error	Co-efficient	Std. Error
Constant	0.10	0.56	-3.51**	1.30	-3.51**	1.36
EMPLOYEES	-0.001	0.002	-0.09**	0.04	-0.04	0.03
EXPORTS	0.69	0.92	0.99	1.31	0.17	1.47
SUBSIDIARY	0.14	0.45	0.95	0.84	1.68*	0.92
EXPERT	-1.36**	0.46	-1.48*	0.77	0.71	0.80
CUSTSAT	-0.09	0.46	0.85	0.73	1.11	0.77
INITIATIVE	0.93**	0.44	2.43**	0.78	0.37	0.82
INDEPENDENT	-0.19	0.45	0.73	0.81	1.07	0.94
APPRO	0.06	0.44	2.28**	0.95	0.08	0.83
Advertising	-0.07	0.54	-1.20	1.01	-0.97	1.11
Electrical	0.59	0.57	0.49	0.99	0.77	1.10
Management	0.88	0.84	1.33	1.19	1.83	1.27
R&D services	1.90**	0.87	1.92*	1.17	1.98	1.35
Log Likelihood	-145.5					
% of correct predictions	62%					

Estimation method: Multinomial Logit ML.
** implies coefficient significant at the 95% level, * implies significance at 90% level
Not all industry dummies were used because of identification problems for some contract classes.

Further, relational contracts differ from markets in two respects: relational contracts are adopted by generally smaller firms operating in a strong regime of appropriability. Relational contracts also tend to be used by firms with SOLUTION orientation, but due to data problems, this correlation cannot be estimated.[9] Finally, quasi-firm arrangement does not differ very drastically from spot employment according the present results. Only business group membership appears to be more likely for firms yielding control rights but implementing performance contracts at the same time. The results can be interpreted to imply that property rights are stronger incentive drivers than performance pricing.

[9] Estimating with the original SOLUTION variable is not feasible, because Quasi-Firms have no observations with the dummy for SOLUTION=1. However, there appears to be some positive correlation between solution strategy and relational contracting in the original data.

Industry dummy variables remain insignificant, except that representing R&D services. R&D is an area where intellectual property rights are commercially important, as demonstrated by the result that firms in this industry tend to hold on to the control rights to the design or service output. In summary, this specification lends further support for the hypotheses concerning the significant role of the service supplier's strategic orientation in determining the use of contractual mechanisms, while at the same time allowing for the possibility that the elements of the contractual configuration are not optimized independently of one another.

Table 4.11 Determinants of performance pricing (N = 131)

Dependent variable: PERFPRICE	Coeff.	Std. err.
Constant	-1.59	0.77
EMPLOYEES	-0.07**	0.02
AGE	-0.03	0.03
EXPORTS	0.22	0.66
SUBSIDIARY	0.86**	0.42
KNOWLEDGE STRATEGIES:		
Internal and external cooperation	-0.05	0.12
Learning	-0.07	0.16
Formal knowledge	-0.31**	0.15
Technology adoption from suppliers	-0.26*	0.16
Reputation	-0.03	0.17
Training and customers	-0.44**	0.20
SOLUTION	-0.17	0.44
EXPERT	0.18	0.38
INDEPENDENT	0.79*	0.47
CUSTSAT	0.59	0.37
PROJMGT	0.97**	0.46
APPRO	1.17**	0.46
Industrial design	-0.90	0.79
Advertising	-0.79	0.65
Machine and process engineering	-0.41	0.65
Electrical engineering	-0.70	0.64
Management consulting	1.17	0.78
Log Likelihood	-42.4	
McFadden's pseudo R^2	40%	
% of correct predictions	82%	

Estimation method: PROBIT ML. ** implies coefficient significant at the 95% level, * implies significance at 90% level.

The last set of results concern the effects of knowledge profiles created with the principal component analysis and discussed in the previous chapter on the choice of contractual form for the client relationship. In Table 4.11 the use of performance pricing is explained by the same model as in Table 4.7, added with the six knowledge profiles. Some significant new results emerge. Performance bonuses are *not* likely to be used by firms relying strongly on either formal knowledge (R&D, education), technology adoption, or on-the-job training. In fact, none of the knowledge strategies have *positive* effects on the use of performance bonuses. As before, the strongest determinants of performance pricing are firm size, firm structure, project management practices, and the appropriability environment.

Table 4.12 Determinants of control rights: property rights to output

Dependent variable: CLIENTOWN	Coeff.	Std. err.
Constant	0.57	0.56
EMPLOYEES	0.004	0.002
EXPORTS	-0.83	0.60
AGE	-0.01	0.01
SUBSIDIARY	-0.03	0.30
KNOWLEDGE STRATEGIES:		
Internal and external cooperation	-0.19*	0.11
Learning	0.51**	0.14
Formal knowledge	-0.27*	0.14
Technology adoption from suppliers	0.24*	0.14
Reputation	0.37**	0.15
Training and customers	0.35**	0.16
SOLUTION	-0.04	0.36
EXPERT	0.54*	0.32
INITIATIVE	-0.95**	0.34
INDEPENDENT	-0.33	0.36
CUSTSAT	-0.27	0.33
PROJMGT	1.12**	0.36
APPRO	0.11	0.31
Advertising	-1.02	0.52
Machine and process engineering	-1.25**	0.53
Electrical engineering	-1.67**	0.58
Management consulting	-0.90	0.64
Log Likelihood	-59.9	
McFadden's pseudo R^2	33%	
% of correct predictions	79%	

Table 4.12 presents the results for the allocation of control rights, with property rights to output as the control indicator. In this case, several strong results are obtained. Knowledge strategies of incremental learning correlate very significantly with the allocation of control to the client. Client obtains control rights when the service firm's knowledge is based on learning by doing, technology adoption, reputation, or training on the job. In contrast, internal and external cooperation strategy and formal knowledge strategy are negatively associated with this contractual clause.

Table 4.13 Estimation of the choice of organizational form (N=133); Performance pricing and property rights to the service output

	Market		Relational contract		Quasi-firm	
	Coeffi-cient	Std Error	Coeffi-cient	Std. Error	Coeffi-cient	Std. Error
Constant	-0.55	0.82	-6.81**	2.19	-4.71**	1.91
EMPLOYEES	0.00	0.00	-0.20**	0.07	-0.09**	0.04
EXPORTS	1.17	1.09	1.77	1.69	-0.77	1.94
SUBSIDIARY	0.28	0.53	1.88*	1.09	2.40**	1.08
KNOWLEDGE STRATEGIES:						
Internal and external cooperation	0.06	0.19	-0.04	0.28	-0.19	0.36
Learning	-0.51**	0.22	-0.64*	0.36	0.19	0.43
Formal knowledge	0.02	0.23	-0.47	0.34	-1.04**	0.51
Technology adoption from suppliers	-0.35	0.25	-0.72*	0.39	-1.43**	0.52
Reputation	-0.56**	0.25	-0.78*	0.44	-0.32	0.52
Training and customers	-0.49*	0.27	-2.09**	0.62	-0.72	0.60
CUSTSAT	0.06	0.52	1.61*	0.93	1.27	0.90
INITIATIVE	1.31**	0.57	4.12**	1.18	1.14	0.98
INDEPENDENT	0.47	0.59	3.05**	1.19	3.03**	1.35
APPRO	-0.45	0.52	2.68**	1.23	0.83	0.97
Advertising	-0.23	0.71	-0.90	1.19	-1.92	1.41
Electrical	0.74	0.71	1.51	1.20	-0.16	1.40
Management	1.26	1.06	4.24**	1.78	3.20*	1.73
R&D services	1.38	1.05	2.06	1.69	2.19	1.63
Log Likelihood	-109.2					
% of correct predictions	62%					

Estimation method: Multinomial Logit ML.
** implies coefficient significant at the 95% level, * implies significance at 90% level

Not all industry dummies were used because of identification problems for some contract classes.

A possible interpretation for these results is that firms relying on "soft" knowledge accumulated by incremental learning and training are engaged in providing highly customized services (cf. Löwendahl, 1997). Indeed, EXPERT strategy is weakly positively associated with this contractual clause. In this case, handing over the control rights to the output does not threaten the knowledge accumulation in the firm, as learning is very tacit and takes place on the job. In contrast, firms based on "hard," organizational, and explicit knowledge accumulated through external and internal innovation activities in a way codify (or *reify*; in the language of Wenger, 1998) their learning in the new service concepts and solutions. Here, the service firm does not want to give up the control rights to the solution, because that would reduce the possibilities to benefit from economies of scale generated by the underlying knowledge in the future.

The last table of the chapter, 4.13, presents the estimation results for the empirical model for the four organizational forms for client relationships with knowledge strategies as additional explanatory variables. In line with earlier models, firms implementing spot employment relationships are clearly more likely than firms adopting market and relational contracts to rely on learning and training on the job, as well as reputation. In other words, spot employment is associated with incremental learning strategies. Additionally, both contractual arrangements adopting performance pricing (relational and quasi-firm contracts) are less reliant on technology adoption than spot employment. Both performance contracts also tend to be associated with firms operating independently in their client relationships, supporting the idea that when monitoring is costly or difficult, performance measurement becomes more feasible.

4.5 Conclusions

This chapter has explored the interactions between KIBS firms' resource base and strategy, on the one hand, and the formal organization of their client relationships, on the other hand. The results suggest that learning and organization, or in the words of Lave and Wenger, participation and reification, are significantly related.

The descriptive analysis indicates that KIBS firms tend to operate in service projects most often rather independently as an outside expert. Management consulting firms differ from other industries in respect of

their roles and contracts with clients. On average, management consultants initiate projects to their clients more often; they also lead the projects more often, and are more likely to provide service solutions, instead of pure expert skills, than firms in other KIBS industries. Additionally, they use performance bonuses in service pricing more intensively, and more firms in management consulting have internal incentive schemes in place than in other industries. In terms of control rights to the service process and output, R&D services are most likely among the industries studied to retain such rights, while industrial designers are most likely to yield the rights to their clients.

The cross-sectional estimation results here suggest that the differences across industries in the allocation of control rights may partly be due to such firm-level differences as size, experience, and structure of firms, but more significant and intriguing explanatory factors are the knowledge base and service strategy of firms. These characteristics are approximated here by whether the service firm operates as an outside expert or a service solutions supplier and by their knowledge creation profiles. Statistically significant results are obtained with respect to the choice of contractual mode.

Service firms operating as outside experts are less likely to retain ownership of the service output. Generally firms giving up control are also less proactive in their client relationships, rarely suggesting new projects and ideas to their clients. Additionally, firm strategies toward knowledge creation influence the allocation of control rights. In particular, clients are more likely to obtain ownership of service output of KIBS firms whose knowledge is accumulated through incremental learning by doing, on the job training, or technology adoption from equipment and software suppliers. KIBS firms giving control rights to clients may also rely on building a good reputation. In contrast, high investments in R&D and hiring highly educated employees, or supporting extensive internal and external cooperation to create new knowledge are associated with service firms that keep the control rights.

KIBS firms' approaches to pricing their services were also studied in this chapter. In particular, factors behind the use of performance bonuses for successful project outcomes were examined. According to the empirical results, the most important determinants of performance pricing include small firm size, business group structure, and appropriability environment. Hence, asymmetric information situations support performance contracting, as suggested by the theory of the firm. In contrast, the importance of appropriability environment is a novel result. It shows that leakage of knowledge considerations enter signifi-

cantly in the choice of organizational form. Additionally, firms' efforts towards measuring customer satisfaction and standardizing project management significantly support the use of performance pricing. These practices codify performance and procedures, and hence lower (or proxy for) the costs of using performance measures in project pricing.

Theory of the firm submits that agency problems can and should be mitigated by performance contracts. In reality, performance contracts are not very common in service relationships. The theory clearly ignores the costs of measuring performance. Under prohibitively high measurement costs, contracting firms rely on other mechanisms, particularly reputation-based implicit long-term contracts. Moreover, in inter-firm contracting situations, an important but neglected source of motivation is ownership. In the context of knowledge-intensive business services, the most relevant assets are skills, competencies, and intellectual property. The empirical analysis here has characterized firms that retain property rights to these knowledge assets as opposed to firms that give them away to their clients. Ownership clearly correlates with proactive effort in the relationship, but even more interestingly, it correlates with service strategies and knowledge creation profiles. Incremental learning and expert services are associated with giving up control of intellectual assets. Service solutions and broader external sourcing of knowledge are thus more likely to be observed in firms that retain the rights to their intellectual assets, and consequently, have stronger dynamic incentives to innovate and learn. This illustrates the important interaction between organizational arrangements and firms' knowledge base. Organization form is significantly associated with the dynamic processes related to knowledge creation, which underlie firms' long-term evolution and performance.

5 Determinants of Business Service Innovation

Service innovation has been characterized as more informal and "ad hoc" than innovation activities in the manufacturing sector. This chapter shows that there are different types of innovation, as well as different ways of organizing innovation activities within business services. Some firms invest heavily in formal R&D activities, others may rely on more incremental learning and training of employees, while yet other firms may source knowledge and technology from external suppliers. Hence, even within the relatively narrow group of business services, sweeping generalizations may be inappropriate if we want to understand the richness of innovation behavior. The key issues explored here include the roles of resource base, strategic orientation, and formal contracts with clients in determining innovation performance.

Table 5.1 Estimation variables

	Variable	Description
Dependent variables	IMPROVEMENT	Significant service improvements (0/1)
	INNOVATION	Service innovations (0/1)
	INNOSALES	Share of new and innovative services in sales (0-100%)
Firm characteristics & management practices	EMPLOYEES	Number of employees 1999
	EXPORTS	Export intensity 1999
	AGE	Age of the firm
	SUBSIDIARY	Subsidiary or member in a business group
	SOLUTION	Service solutions (0/1)
	EXPERT	Outside expert (0/1)
	PERFPRICE	Performance pricing (0/1)
	CLIENTOWN	Client obtains property rights to output (0/1)
	APPRO	Strong appropriability environment (0/1)
Sources of knowledge	Customers, competitors, suppliers	
	Education, internal	
	Universities	
Knowledge strategy	Internal and external cooperation	
	Learning	
	Formal knowledge	
	Suppliers, technology adoption	

The analysis in this chapter builds on the concepts and principal component analysis of knowledge creation in KIBS firms introduced in chapters 3 and 4. Using principal components for the knowledge-related variables mitigates the problem of multicollinearity that is likely to be acute in this kind of a survey dataset. Identifying the effects of education, training, R&D, and R&D collaboration separately would be difficult, as the variables are highly correlated. Table 5.1 displays the variables used in the estimations. More discussion of these variables can be found in Chapters 3 and 4.

The empirical model below specifies a firm's innovation output as a function of its general and structural characteristics (size, export orientation, business group), strategic orientation (outside expert or service solutions), contractual relations with clients, and appropriability environment. In addition, the firm's knowledge sourcing and creation practices are assumed to have an effect on innovation performance. The expected signs of coefficients are in parentheses.

INNOVATION OUTPUT

$$= f(\alpha + \beta_1 * \text{SIZE } (+) + \beta_2 * \text{EXPORTS } (+) + \beta_3 * \text{AGE } (+/-)$$
$$+ \beta_4 * \text{SUBSIDIARY } (+) + \beta_5 * \text{SOLUTION } (+)$$
$$+ \beta_3 * \text{EXPERT } (-) + \beta_3 * \text{PERFPRICE } (+)$$
$$+ \beta_3 * \text{CLIENTOWN } (-) + \beta_3 * \text{APPROPRIABILITY } (+)$$
$$+ \text{KNOWLEDGE SOURCES AND STRATEGIES}$$
$$+ \text{INDUSTRY DUMMIES})$$

The expected effects are justified as follows. Firm size can be expected to impact innovation positively, if there are significant increasing returns to scale in innovation activities. This has been found to be the case in manufacturing industries (Leiponen, 2001). Tougher competition in export markets is expected to provide incentives to create new and innovative services. Involvement in a business group may enable the firm to benefit from knowledge flows from the headquarters' R&D function, hence the expected sign for SUBSIDIARY is positive. Focusing on service solutions instead of supplying expert skills makes the firm better positioned to benefit from innovation activities cumulatively. Therefore SOLUTION strategy is expected to motivate investments in innovation, and EXPERT to discourage them. Similarly, performance pricing provides positive incentives to innovate, while relationships where clients control the service output reduce these incentives. Finally, environments of strong appropriability of knowledge are expected to support innovation, along the lines of existing literature (Cohen and Levinthal, 1989). On the other hand, a weak regime of appropriability can also support improving the service through imitation.

Unfortunately separating these effects is not possible with the current dataset.

Knowledge sources and strategies are hypothesized to be related to the type of innovation. This is assessed through comparison of the determinants of IMPROVEMENT, that is, incremental improvements to existing services, and INNOVATION, in other words introduction of completely new services. A priori one can expect contracts, general firm characteristics, and the environment to impact both types of innovation as specified above. In contrast, the nature of the firm's knowledge base is expected to support improvement and innovation differently. In particular, cumulative learning by doing may be useful for incremental service improvements, but for radical innovations, broader sourcing of knowledge, as well as combining more diverse inputs in the innovation process are hypothesized to be critical (Jewkes et al., 1958; Cohen and Malerba, 2000).

Table 5.2 Determinants of service innovation (I)

Dependent variable:	IMPROVEMENT		INNOVATION	
	Coeff.	Std.error	Coeff.	Std.error
Constant	-0.58	0.39	-0.09	0.37
EMPLOYEES	0.002	0.002	0.002	0.002
EXPORT	-0.40	0.46	-0.68	0.49
AGE	0.01	0.01	0.01	0.01
SUBSIDIARY	0.75**	0.25	0.39	0.24
SOLUTION	0.54**	0.25	0.22	0.24
EXPERT	-0.07	0.27	-0.36	0.27
PERFPRICE	0.37	0.30	-0.21	0.30
CLIENTOWN	-0.47*	0.25	-0.60**	0.25
APPRO	0.22	0.25	0.17	0.24
Design	-0.38	0.59	0.80	0.54
Advertising	0.36	0.38	-0.02	0.37
Machine and process	-0.04	0.37	-0.13	0.36
Electrical engineering	-0.20	0.39	-0.87**	0.40
Management	0.46	0.50	-0.02	0.46
Log Likelihood	-87.9		-94.3	
McFadden's Pseudo R^2	19%		14%	
% correct predictions	73%		67%	
Observations	157		160	

Probit Maximum Likelihood. ** implies 95% significance, * implies 90% significance.

First consider the results for the determination of business service innovation performance in Table 5.2. Dependent variables are binary indicators for firms that made incremental service improvements (IMPROVEMENT) or more radical service innovations (INNOVATION). Explanatory variables include firm size, export intensity, firm age, strategic orientation in terms of service solutions and expert services, and contractual variables performance pricing and property rights to service output. Ordinal survey variables are used in their transformed, binary form (cf. Chapter 4). Industry differences are controlled for with industry dummies. The estimation method is probit maximum likelihood.

The strongest determinants of significantly improved business services are firm structure with respect to being subsidiary in a business group and strategy with respect to focusing on service solutions. Business group or parent organization thus appears to be an important source of knowledge spillover for improving services. Additionally, if clients obtain control rights to service output, service improvement is negatively affected.

The last two columns in Table 5.2 show the results for the dependent variable INNOVATION, which describes more radical changes in the set of services supplied. Now only property rights to the service output are significantly (negatively) associated with the dependent variable. Group structure and strategic orientation do not have significant effects. Contrary to expectations, appropriability regime does not show up significantly in these results. Both for service improvements and innovations, its coefficients are insignificant.

The next models in Table 5.3 incorporate the principal component variables representing the use of internal and external knowledge sources. For service improvements, the most important knowledge sources are represented by the second principal component emphasizing higher education and internal knowledge creation. The first component that emphasizes a broad set of sources of knowledge relevant for innovation – clients, competitors, suppliers and universities – increases the likelihood of more drastic service innovations. In contrast, using universities alone (the third knowledge source component) significantly reduces the chances of coming up with completely new kinds of services. This hints at the importance of combining basic research with other competencies to make innovations that succeed in the marketplace. As before, orientation toward service solutions remains a positive factor of service improvements, while client owning the output reduces service innovation. Now also performance pricing appears positively but weakly related to improvement to existing services.

Table 5.3 Determinants of service innovation (II)

Dependent variable:	IMPROVEMENT		INNOVATION	
	Coeff.	Std.error	Coeff.	Std.error
Constant	-0.62	0.46	0.33	0.43
EMPLOYEES	0.003	0.002	0.002	0.002
EXPORT	-0.58	0.49	-0.83	0.52
AGE	0.01	0.01	0.01	0.01
SUBSIDIARY	0.80**	0.28	0.41	0.27
KNOWLEDGE SOURCES:				
Customers, competitors, suppliers, and universities	0.19*	0.11	0.24**	0.10
Education, internal	0.58**	0.15	0.38**	0.14
Universities	-0.04	0.15	-0.33**	0.15
SOLUTION	0.65**	0.29	0.07	0.27
EXPERT	-0.23	0.30	-0.35	0.29
PERFPRICE	0.60*	0.32	-0.15	0.31
CLIENTOWN	-0.21	0.28	-0.63**	0.28
Design	-0.83	0.66	0.18	0.60
Advertising	0.50	0.48	-0.33	0.46
Machine and process	-0.06	0.45	-0.59	0.43
Electrical engineering	0.25	0.46	-0.98**	0.46
Management	-0.26	0.58	-0.58	0.54
Log Likelihood	-71.1		-78.0	
McFadden's Pseudo R^2	29%		23%	
% correct predictions	72%		72%	
Observations	146		147	

Probit Maximum Likelihood. ** implies 95% significance, * implies 90% significance.

Table 5.4 replaces knowledge sources with principal components representing more comprehensive knowledge strategies. The first knowledge strategy describes firms that engage extensively in external cooperation with clients, universities, and other service firms. These firms also emphasize teams as a source of competitiveness and support internal cooperation through company training programs. Firms behaving according to this strategy are significantly more likely to both improve their services and innovate completely new services. An alternative knowledge strategy for service improvers is *Formal knowledge*, for firms hiring highly educated employees and investing in training and R&D. This strategy does not correlate with successful new service in-

troductions, however: in the specification for INNOVATION, the coefficient on *Formal knowledge* does not differ significantly from zero.

Table 5.4 Determinants of service innovation (III)

Dependent variable:	IMPROVEMENT		INNOVATION	
	Coeff.	Std.error	Coeff.	Std.error
Constant	-1.33**	0.58	-0.90	0.58
EMPLOYEES	0.002	0.002	0.001	0.002
EXPORT	-0.35	0.52	-0.64	0.58
AGE	0.02	0.01	0.02	0.01
SUBSIDIARY	0.81**	0.29	0.37	0.28
KNOWLEDGE STRATEGIES:				
Internal and external co-operation	0.37**	0.10	0.42**	0.10
Learning	-0.18	0.12	-0.40**	0.13
Formal knowledge	0.23*	0.12	0.08	0.12
Suppliers, technology adoption	-0.15	0.13	-0.06	0.13
SOLUTION	0.64**	0.31	0.28	0.30
EXPERT	0.03	0.33	-0.41	0.33
PERFPRICE	0.43	0.32	-0.21	0.34
CLIENTOWN	-0.19	0.30	-0.32	0.30
Design	0.40	0.74	1.71**	0.76
Advertising	1.23**	0.56	0.88	0.54
Machine and process	0.57	0.56	0.83	0.54
Electrical engineering	0.49	0.56	-0.44	0.59
Management	0.54	0.60	0.48	0.60
Log Likelihood	-62.8		-62.4	
McFadden's Pseudo R^2	30%		32%	
% correct predictions	77%		80%	
Observations	132		133	

Probit Maximum Likelihood. ** implies 95% significance, * implies 90% significance.

Finally, the strategy of relying on learning by doing and training (*Learning*) is significantly negatively associated with service innovations.

The share of innovative services in sales revenue measures the extent of innovation. As before, results of three different specifications are presented (Table 5.5). The first model contains the basic firm characteristics, strategic orientation, contracts, and appropriability, in addition to industry dummy control variables.

Among the firm structural variables, now only export orientation is significantly related to innovativeness. Interestingly, the relationship is negative: firms with strong export orientation are *not* likely to have a high

Table 5.5 Determinants of sales of innovative services

Dependent variable: INNOSALES	(1)		(2)		(3)	
	Coeff.	Std. error	Coeff.	Std. error	Coeff.	Std. error
Constant	3.26	7.81	12.65**	6.32	-1.74	9.53
EMPLOYEES	0.000	0.03	-0.01	0.02	-0.01	0.03
EXPORT	-22.84**	11.42	-19.27**	8.82	-21.97*	11.71
AGE	-0.02	0.18	0.05	0.14	0.06	0.18
SUBSIDIARY	6.81	5.28	2.37	4.18	5.05	5.42
KNOWLEDGE SOURCES:						
Customers, competitors, suppliers			4.53**	1.60		
Education, internal			8.61**	2.18		
Universities			-9.59**	2.28		
KNOWLEDGE STRATEGIES:						
Internal and external cooperation					3.99**	1.75
Learning					-4.36*	2.27
Formal knowledge					0.12	2.26
Suppliers, technology adoption					0.11	2.29
SOLUTION	3.28	5.27				
EXPERT	-2.03**	5.78				
PERFPRICE	-4.84	6.84	-1.46	5.26	-5.82	6.91
CLIENTOWN	-9.97*	5.42	-8.88**	4.34	-11.07*	5.88
APPRO	-1.78	5.02	-4.50	4.06	-4.28	5.62
Design	2.84	11.41	-8.78	9.26	16.14	13.23
Advertising	-7.49	7.97	-15.75**	6.90	-1.85	9.72
Machine and process	-1.24	7.60	-11.58	6.40	8.98	9.02
Electrical engineering	-21.20*	8.86	-19.62**	7.20	-16.26	10.51
Management	-4.45	9.83	-20.27**	7.74	3.52	9.84
Sigma	24.0**	2.30	17.57	1.71	22.78	2.38
Log Likelihood	-340.4		-294.32		-278.58	
Observations	155		144.00		130.00	

Tobit Maximum Likelihood. ** implies 95% significance, * implies 90% significance.

share of innovative services. In business services, it appears that export competition does not create innovation incentives. Due to the local nature of these services, domestic competition may be more relevant for most service firms.

Operating as an outside expert now becomes a significant negative factor of service innovation. Service solutions, in contrast, are no longer significantly related. Again, appropriability conditions in the technological environment are not a relevant factor in service innovation performance. In this study, appropriability environment has only been a significant determinant of contractual forms (Chapter 4). The results concerning the property rights to service output (CLIENTOWN) are similar to those earlier in this chapter. Clients gaining strong control rights reduce the service firm's incentives to make commercially important innovations.

The estimation results on the roles of knowledge sources and strategies are very similar to those in Tables 5.3 and 5.4. A broad set of sources represented by *Customers, competitors, suppliers* or strong internal competencies (*Education, internal*) can both support radical service innovation. Alternatively, extensive sourcing and combining diverse competencies both internally and externally, as suggested by the first knowledge strategy, characterizes the knowledge creation approach of highly innovative service providers. This supports the view of the importance of bringing together knowledge from diverse sources for significant innovations to emerge. Relying on internal learning and cumulatively building on existing services (*Learning*) does not provide a fertile ground for major business service innovations.

Conclusion

This chapter has examined the characteristics of innovative knowledge-intensive business service firms. The analysis builds on the concepts and variables developed in the previous chapters. The focus is on firms' strategic orientation, contractual forms, and practices towards knowledge sourcing and creation. All three elements are found to have significant effects on innovation performance.

General firm characteristics such as size, export orientation, and age have little impact on the innovation processes of the KIBS firms in the sample. The insignificance of firm size suggests that there are no benefits to large scale in business service R&D: small firms are as likely to innovate as are large firms. Export intensity has a significant negative effect only on the extent of innovation. This is an interesting difference from the manufacturing sector. In manufacturing, exports are strongly and positively associated with innovation activities. In contrast, most of the innovative KIBS firms appear to be oriented towards domestic markets. The process of growth and evolution of highly innova-

tive new business service firms may be quite different from that in manufacturing industries.

An intriguing difference between incremental service improvements and more radical innovations is that only the former type of service development is strongly associated with the firm being a subsidiary in a business group. Centralized knowledge creation activities can thus be useful through distribution of new knowledge to all subunits and organizations in the group. Economies of scale support service innovation in this way: size of the firm itself does not matter as much as access to a larger knowledge sharing group. However, for more radical innovations it seems that access to a broader set of *external* resources is necessary.

Strategic orientation of firms in terms of supplying service solutions or expert skills has implications for innovativeness. Solution suppliers are likely to make incremental service improvements, while expert skill suppliers are unlikely to make any significant innovations. These results lend support for the idea that relying on organizational competencies required in creating and supplying service solutions instead of individuals' expert skills is more conducive to new service development. A possible reason is that a service supplier benefits more from innovation activities when the new knowledge becomes embedded in service solutions or packages that can be improved cumulatively. Expert skills applied to a variety of problems are likely to lead mainly to learning by individuals, not the whole organization. Moreover, expert employees can expropriate the rents on this learning from the firm, and this dependence on key employees makes the firm vulnerable to loosing them.

Incentives to innovate are implicated in the contractual problem of whether or not to give control rights to service output to the client. In some service industries, particularly industrial design, the norm appears to be to give the control rights to the clients. This is to protect clients' strategically sensitive product development activities, in which the service supplier participates. However, in other industries control rights may not be as critical for the client as in product design. The results in this chapter indicate that firms operating under client control of output are significantly less innovative. In particular, introductions of completely new services are less frequent for these firms. Client firms should keep this in mind when crafting long-term contracts with their knowledge suppliers. In the longer run, the client may benefit more from the dynamics of knowledge creation by the service supplier than

from the control of existing intellectual assets. Dynamic and creative knowledge service suppliers should not be kept in too short a leash.

There appear to be two successful strategies to gain access to knowledge requisite for innovation. The first strategy combines knowledge from several external sources, including customers, competitors, suppliers and universities. The second strategy relies more on internally developed competencies and skills from higher education. Both strategies are in significant positive relation to incremental and drastic innovations. Among knowledge *creation* practices, combining knowledge from internal and external sources through cooperation is the most successful innovation strategy. Learning by doing and training, on the contrary, is clearly negatively associated with service innovations. These results suggest that innovation indeed can be characterized as a process of combining knowledge from diverse sources. Relying on cumulative learning from client projects is not as conducive to new and innovative service ideas.

6 Growth and exports of KIBS firms

6.1 Growth of service firms

This chapter assesses the implications of firm characteristics and strategy for firm growth and export performance. Growth and exports are interesting dimensions of KIBS firm performance, because of the small size and domestic orientation of most firms in these industries. On average KIBS firms have only some dozens of employees, but there is a handful of globally operating service firms with thousands of employees. Typically these giants are found in management consulting and advertising, but also to some extent in engineering. Why do some firms succeed in growing and expanding internationally, while for most firms this seems to be an impossible task?

In this chapter I seek to answer this question by using the survey data to analyze the factors behind export orientation and firm growth. Profitable growth and exports necessitate some source of increasing returns to scale. Otherwise it is not economically feasible to expand operations – and competition will eventually drive inefficient suppliers out of the markets. As the firms we are concerned with are suppliers of knowledge, scale economies should be found in the core activity, that is, knowledge production and dissemination. Hence, growth oriented firms must focus on creating new services or improving existing services, and most importantly, sharing knowledge among subsidiaries, subunits, or employees within the organization. Profitable growth and international expansion in business services thus require efficient knowledge creation and dissemination practices. As discussed in earlier chapters, sharing knowledge involves socialization, cooperation, and distribution through codification. However, sharing knowledge through socialization and personal communication is generally not possible over long distances, and would take too much time within a very large organization. Therefore, generating increasing returns to scale based on creation, learning, and sharing of knowledge within a business service organization necessitates efficient processes of knowledge codification.

Codification of knowledge underlying service can take different forms. There may be a standardized service package, there may be well-defined standard procedures that are applied to a variety of client problems, or there might exist a powerful shared databank that sup-

ports solving of similar problems in different locations or points in time. These kinds of information support services are widely used in large management consulting and engineering firms, and they reduce the need for keeping reinventing the wheel.

Hence, the basic hypothesis in this chapter is that firms' growth and export performance depends on their abilities to generate increasing returns by knowledge creation and sharing within the organization. Knowledge-related practices and strategies are assessed with our variables relating to the strategic orientation and knowledge base of the firm. In addition, the differences in technological conditions and industry characteristics may support or hamper firm growth. More specifically, growth and exports are expected to depend on the following variables:

Table 6.1 Explanatory variables and expected signs

Variable	Expected effect
SIZE	Nonlinear
AGE	-
SUBSIDIARY	?
PERFPRICE	+
SOLUTION	+
EXPERT	-
INDEPENDENT	+
PROJMGT	+
COMPET 1	+
COMPET 2	-
COMPET 3	?
KNOWLEDGE 1	+
KNOWLEDGE 2	-
KNOWLEDGE 3	+
KNOWLEDGE 4	?
APPRO	+

Size of the firm affects growth nonlinearly, because there may be a threshold below which larger size makes growth easier, and above which growth starts to slow down. Hence, the smallest firms may have a difficult time growing in the beginning, as they are constrained by limited excess resources available. Also, young firms are more likely to grow fast than old and institutionalized firms. Being part of a business group may support growth to some degree through access to re-

sources, but on the other hand, large groups do not necessarily grow by increasing the size of units, but by increasing the number of units.

The presence of replicable knowledge assets are first approximated by the strategic orientation towards expert services or service solutions. Solutions are hypothesized to be more conducive to replication, as opposed to expert skills, which are tacit and largely embedded in individuals. Another dimension of replicability is routinization of project management procedures. Then the service process is standardized across clients and service teams, assuring a certain level of quality even if different people or teams are delivering the service. Hence, standardized project management variable (PROJMGT) is assumed to be positively related to growth and export intensity of KIBS firms.

The relationship between knowledge creation practices and firm expansion are also examined. To this end, the principal component variables for characterising the sources of competitiveness and strategies toward knowledge creation are used (see Chapter 3). Among the competitiveness components, the first one labeled *organizational knowledge* emphasizing variables such as innovation, marketing, and team-based knowledge, is expected to support growth and exporting. Similarly, among knowledge strategies the first one labeled *internal and external cooperation* is expected to be positively associated with the accumulation of organizational knowledge, as opposed to individual employees' skills, and hence it is expected to support growth and exports. In contrast, both the second competitiveness component *individuals' skills* and the second knowledge strategy *learning* are hypothesized to be negatively correlated with growth and exports. The knowledge strategy of *formal knowledge* creation is again hypothesized to be positively associated with growth.

Finally, the technological regime evaluated by the survey variable APPRO is expected to have an impact on the opportunities and profitability of growth particularly through exports. Sharing and distributing codified knowledge or practices internationally is more profitable when this knowledge can be protected through secrecy or intellectual property rights from spilling over to competitors. In this kind of an environment, both creation of knowledge and growth and exporting are more lucrative options.

6.2 Estimation results

The results from statistical analysis with the growth of KIBS firms over the period 1997-1999 are in Table 6.2. The period of study is very short

and therefore the results must be interpreted with caution. Nevertheless, some intriguing results emerge.

Table 6.2 Determinants of KIBS growth

	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Constant	0.55**	0.123	0.45**	0.12	0.46**	0.10	0.49**	0.11
EMPLOYEES	0.003**	0.00	0.003**	0.00	0.003**	0.001	0.003**	0.001
EMPLOYEES^2	-5.0E-06*	2.8E-06	-4.3E-06	2.7E-06	-4.2E-06*	2.4E-06	-4.1E-06	2.5E-06
EXPORTS			0.39**	0.14	0.21	0.13	0.20	0.13
AGE	-0.01**	0.003	-0.01**	0.003	-0.01**	0.003	-0.01**	0.003
SUBSIDIARY	0.09	0.09	0.04	0.09	0.06	0.07	0.10	0.08
SOLUTION	0.07	0.08	0.09	0.08				
EXPERT	0.08	0.09	0.05	0.09				
PROJMGT	0.06	0.08	0.03	0.08				
COMPETITIVENESS:								
Organizational knowledge					0.05**	0.02		
Individuals' skills					-0.01	0.03		
Reputation					-0.03	0.03		
KNOWLEDGE STRATEGIES:								
Internal and external cooperation							0.05**	0.02
Learning							0.04	0.03
Formal knowledge							-0.03	0.03
Suppliers, technology adoption							0.00	0.03
Design	-0.30*	0.17	-0.19	0.17	-0.14	0.15	-0.02	0.18
Advertising	-0.41**	0.12	-0.28**	0.13	-0.21*	0.11	-0.29**	0.13
Machine and process	-0.38**	0.13	-0.37**	0.12	-0.26**	0.11	-0.31**	0.13
Electrical	-0.27**	0.12	-0.19	0.12	-0.07	0.11	-0.17	0.13
Management	-0.37**	0.16	-0.32**	0.16	-0.27**	0.14	-0.26*	0.14
Adjusted R^2	13%		18%		17%		16%	
N	132		132		130		117	

Dependent variable: Employment growth 1999-1997. Estimation method: Ordinary Least Squares.

Clearly, KIBS firms' growth momentum depends on the firm's age and phase in the life cycle. Younger firms are more likely to grow rapidly, but at the same time there seems to be a threshold level. Within the group of small firms, relatively larger firms grow faster, but for the group of large firms, the opposite is true. Growth of firm size appears also to be related to exports. Highly export oriented firms grow faster than others. However, the significance of this result disappears when

we include the competitiveness and knowledge variables, perhaps due to multicollinearity.

Table 6.3 Determinants of export intensity

	Coeff.	Std.Error	Coeff.	Std.Error
Constant	-0.13	0.18	0.04	0.19
EMPLOYEES	0.000	0.001	0.000	0.001
AGE	-0.010**	0.004	-0.009**	0.004
SUBSIDIARY	0.30**	0.11	0.27**	0.11
PERFPRICE	0.06	0.13	0.06	0.13
SOLUTION	-0.06	0.11	-0.17	0.12
EXPERT	-0.11	0.12	-0.22*	0.13
INDEPENDENT	0.13	0.12	0.08	0.12
PROJMGT	0.20*	0.12	0.13	0.12
APPRO	0.20*	0.11	0.22**	0.12
KNOWLEDGE STRATEGIES:				
Internal and external cooperation			0.01	0.04
Learning			0.05	0.05
Formal knowledge			0.05	0.04
Suppliers, technology adoption			0.03	0.05
Design	-0.81**	0.28	-0.75**	0.29
Advertising	-0.76**	0.18	-0.66**	0.20
Machine and process	-0.04	0.15	-0.05	0.17
Electrical	-0.37**	0.16	-0.36*	0.19
Management	-0.62**	0.23	-0.65**	0.25
Sigma	0.46**	0.05	0.44**	0.05
Log Likelihood	-73.9		-63.6	
N	157		131	

Estimation method: Tobit Maximum Likelihood.

The strategy variables SOLUTION and EXPERT are not significantly related with the dependent variable. Also, the firm's business group member status is not a relevant factor in growth. Neither is the firm's project routinization through PROJMGT. More relevant variables are found among the competitiveness and knowledge creation strategies. The first components of each set of variables are significantly and positively related with firm growth. Hence, as hypothesized, creation of organizational knowledge bodes well with expansion, more so than improvement of individual employees' skills.

Almost the same model is estimated in Table 6.3 with export intensity as the dependent variable. Younger firms in the sample tend to be

more export oriented, as well as subsidiaries of larger chains or business groups. Project management standardization facilitates (weakly – significance is only at the 90% level) growth through exports. Also, firms operating in a strong environment of appropriability of knowledge appear to have it easier to export. In contrast, ICT investments or innovations were not found to correlate with export intensity (not reported in the table). Perhaps surprisingly, knowledge strategies in the second specification were not found to be in any significant relationship with exports, either.

6.3 Conclusions

The most rapid growth of KIBS firms is achieved by young but relatively large firms. Competitiveness based on organizational knowledge and knowledge creation based on combining internal and external sources of knowledge through cooperation are significantly related to the measure of firm growth used here. For export orientation, being a subsidiary or business group member is a positive factor. Appropriability of knowledge also has a strong effect on the capacity to export. Surprisingly, however, knowledge creation practices do not explain export orientation of KIBS firms.

7 Investments in Information and Communication Technologies by Business Service Firms

7.1 Introduction

Information and communication technologies (ICT) are expected to have a great impact on the productivity and growth of service industries. Business services are intensive users of ICT. Almost all design activities are nowadays carried out with the help of CAD/CAE computer software, in many cases 3D versions of these programs. This has resulted in faster, cheaper, and more efficient design.

In addition, business service firms' customer interaction is greatly facilitated by ICT equipment. Previously, physical designs and blueprints were mailed back and forth between the KIBS and the client, but now email and various intranet/extranet systems have replaced physical mail and courier services almost completely. The next step, already under development in some firms, is to enable real time collaboration between the service firm employees and client's employees in the web. In contrast, it is not clear to what extent do the new technologies serve as a foundation for completely new kinds of business services. This chapter provides a preliminary assessment of the role of ICT in new service innovation, and characterizes firms that are positioned to take advantage of the new business opportunities.

7.2 Survey data and empirical analysis

Table 7.1 below displays the survey results on the effects of ICT adoption on KIBS firms' business activities. ICT investments are on average 3.2% of sales, varying between 0.1% and 20% of sales. 67% of firms in the sample report having identified new business opportunities enabled by ICT, and 38% have introduced new services based on ICT.

More qualitative effects of ICT were also approached in the survey questionnaire. The most significant impact of ICT appears to be related to communication and interaction with clients. On a scale of 0 to 3, respondents scored on average 2.3 for the question about the impact

Table 7.1 ICT investments and effects of adoption on KIBS activities

	Mean
ICT investments per sales	3.2%
New ICT-based business	67%
ICT-based innovation	38%
Effects of ICT:	
Lower hierarchy	1.19
Larger geographic area of operation	1.67
Growth of exports	0.68
Improved internal communication	1.87
Improved customer communication	2.28
Fewer internal meetings	1.39
Fewer meetings with customers	1.26
Improved productivity	1.70

Effects: Likert scale 0—3.

of ICT on communication with customers. Internal communication in the firm, improvements in productivity and larger geographic area are the next most important positive implications. However, ICT doesn't seem to have changed the organizational hierarchy, nor reduced meetings internally or with customers that drastically. Finally, according to this survey material, exports are the least impacted by ICT adoption.

Next I will analyze the survey information on new services (ICTINNO) and new business opportunities (ICTBUSI) based on ICT. Table 7.2 shows estimation results for the determinants of these two variables. The usual suspects include firm structure, learning strategies, and contractual arrangements, in addition to industry controls.

Results indicate first of all, that new ICT-based innovation and business opportunities tend to be identified by business group subsidiaries and affiliates. Second, strategic focus on service solutions appears to be more conducive to efficient and creative use of ICT. Internal and external sourcing of knowledge is also important. The coefficient on the second knowledge source component indicating that higher education and internal sources are important for ICT based innovation is positive and significant for both dependent variables. Hence, employees' skills and competencies facilitate exploiting new technological opportunities. The first knowledge source component is also strongly associated with ICT business opportunities. This component represents broad external sourcing of knowledge.

Table 7.2 Determinants of ICT innovation and ICT-based new business

Dependent variable:	ICTINNO				ICTBUSI			
	Coeff.	Std. error	Coeff.	Std. error	Coeff.	Std. error	Coeff.	Std. error
Constant	-0.73*	0.40	-1.17**	0.47	-0.22	0.44	-0.26	0.47
EMPLOYEES	0.002	0.002	0.003*	0.002	0.003	0.002	0.002	0.002
EXPORTS	-0.06	0.47	-0.03	0.50	-0.73	0.50	-0.42	0.52
AGE	-0.01	0.01	0.00	0.01	0.00	0.01	0.001	0.01
SUBSIDIARY	0.64**	0.26	0.76**	0.27	0.60**	0.30	0.81**	0.33
SOLUTION	0.47*	0.27	0.38	0.28	0.60**	0.30	0.57*	0.33
EXPERT	-0.40	0.28	-0.41	0.31	-0.56*	0.30	-0.39	0.33
CUSTSAT	0.10	0.26	0.20	0.27	-0.40	0.29	-0.35	0.30
APPRO	0.24	0.25	0.31	0.28	0.47*	0.28	0.50	0.32
KNOWLEDGE SOURCES:								
Customers, competitors, suppliers	0.14	0.10			0.32**	0.11		
Education, internal	0.35**	0.13			0.31**	0.14		
Universities	0.05	0.13			0.14	0.14		
KNOWLEDGE STRATEGIES:								
Internal and external cooperation			0.05	0.08			0.16*	0.09
Learning			0.02	0.11			-0.01	0.11
Formal knowledge			0.12	0.10			-0.19	0.11
Suppliers, technology adoption			0.10	0.11			0.08	0.12
Design	-0.15	0.58	0.60	0.64	0.03	0.58	0.62	0.63
Advertising	0.29	0.43	0.52	0.48	0.91**	0.45	0.74	0.51
Machine and process	-0.33	0.41	-0.23	0.48	0.59	0.43	0.08	0.48
Electrical	0.38	0.42	0.31	0.49	0.65	0.45	0.07	0.49
Management	-0.56	0.51	0.01	0.53	0.63	0.59	0.80	0.56
Log Likelihood	-84.6		-75.4		-69.8		-62.6	
McFadden's R^2	13%		13%		22%		23%	
% correct predictions	68%		69%		82%		75%	
N	146		132		146		132	

Estimation method: Probit ML.

Knowledge strategies are not as significantly related to ICT-related innovation. Only the first strategy representing internal and external cooperation weakly supports seizing ICT business opportunities.

7.3 Conclusions

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Thus far, new Information and Communication Technologies have mainly improved service firms' communication internally and with clients. Improvements in the productivity of design work can also be considerable. In contrast, communication technologies do not appear to reduce the need to meet internally or with clients significantly. Perhaps for this reason, the link between adoption of ICT and exports is weak.

Perceiving and seizing opportunities to innovate and expand business based on information and communication technologies depend on the KIBS firm's service and knowledge sourcing strategy. Orientation towards providing service solutions appears to be more conducive to seizing ICT business opportunities. Additionally, both strategies of strong internal competencies and broad external sourcing of knowledge are significantly related to exploiting business opportunities created by ICT. Finally, parent companies are very important sources of ideas for exploiting ICT opportunities and innovating.

8 Business service users' viewpoint and implications for service strategy

This chapter explores how Knowledge-Intensive Business Service (KIBS) firms' clients perceive these expert services. To this end, seven interviews with operative managers in six large Finnish companies were carried out. The goal was to evaluate how important KIBS are for the innovativeness and competitiveness of their clients and how the relationships are structured. This perspective complements that of business service firms. Additional information from service clients is useful in order to understand, for instance, how clients account for spillover hazards in collaboration and knowledge exchange with suppliers, and how they decide which service projects to carry out internally and which ones to outsource.

Most of the firms interviewed operate in the manufacturing sector: machine, food, and paper industries were represented. In addition, one of the firms is a telecommunications operator. These firms are some of the largest and most successful Finnish firms. They are highly export-oriented. The basis for choosing these firms was that according to the survey data analyzed in the previous chapters, these firms are key clients of many Finnish KIBS firms. Hence, they were expected to be interesting cases of long-term collaboration with knowledge service providers.

8.1 Use of Knowledge-Intensive Business Services

Services procured by the interviewed managers included machine and process engineering, electrical engineering, computer programming, advertising and market communication, management consulting, and R&D services. These services have rather different effects on the client firms' knowledge creation and innovation.

Engineering and software development

Engineering and software industries are most likely to participate in product and process development of their clients, but there is large variation as to how "strategic" this relationship is to the client. Some of the outsourced tasks can be characterized as routine engineering design strictly according to the client's specifications. In this case there

are usually a lot of potential suppliers, as the required skills are standard. In the other end of the spectrum there are service relationships in which the service firm's engineers participate in the client's innovation process as important contributors of highly specialized skills. Even then, however, the skills provided by the service firm are not likely to be unique to the extent that the client firm does not employ any of them and becomes significantly dependent on the service supplier. The clients interviewed emphasize that they maintain relationships with several suppliers, and retain all critical knowledge inside the firm in order to protect and develop the sources of long-term competitiveness. Thus, it is the lack of bredth of internal resources, rather than the lack of specialized competencies, that usually drives the decision to outsource technical and software services.

In forest and paper-related engineering, Finnish service suppliers are among the global leaders. This makes them desirable suppliers even to clients' projects taking place in geographically faraway locations. In other areas of technical service, leaders may be elsewhere. Then Finnish clients tend to source engineering from local partners wherever the project in question takes place. In just a few areas the specialized capabilities of global leaders may be essential, in which case their services are demanded instead of those of local suppliers. Of course, global service firms also attempt to compete locally by establishing country offices in key markets.

Management consulting

Management consulting services can have a considerable role in their clients' processes of "strategy innovation." In particular, in more fundamental strategy revisions, or after significant structural changes such as large mergers or acquisitions, strategy consultants provide important tools and skills to effect changes. Consultants act as catalysts by asking questions, providing an outside view, and by facilitating constructive discussion among the managers of the firm. They bring in organizational tools to structure and speed up this process. Additionally, they carry out analyses of markets and competitors on which strategy is formed. According to the interviewed managers, management consultants are an important source of new ideas and management thinking in strategic change.

In management consulting, local service is generally important, but country offices benefit greatly from the resources of the global group or network. In significant strategy projects of Finnish corporate clients, for example, industry specialists are called in from the central or other

local offices, and market analyses make use of the consulting firm's global databases.

Advertising

Advertising and communication functions are subordinate to both strategy and innovation processes within firms – they implement strategy rather than contribute to its evolution. Marketing function, apart from advertising, is usually held inside the firm. One of the most important tasks of marketing managers and product managers is to feed information about customers' needs and characteristics back to production and R&D activities within the firm. Advertising and market communication, in contrast, is generally used only for one-way transmission, that is, from the firm to its actual or potential customers. As a result, advertising and media services do not play a seminal role in suggesting new product ideas, distribution channels, or market segments. Overall, there do not appear to be providers of more strategically oriented marketing services. The closest existing examples of this emerged with the recent wave of Customer Relationship Management (CRM), although these services focus on developing software solutions for managing customer accounts, not on the qualitative integration of clients, marketing, and innovation activities in the firm. However, this strategic integration has been found to be one of the key factors behind successful innovations (cf. Rothwell et al., 1974). Therefore, a market niche may exist between advertising services and strategic management consulting.

As in most services, the choice of partner in advertising depends largely on teams' capabilities within agencies. No longer do large firms maintain a "house agency" for all advertising and marketing communication. For instance, the large consumer products firm in the sample works with one large partner with whom they carry out most projects, but in addition, there are several smaller advertising suppliers who specialize in certain product groups due to their competencies and experience.

In the case of simple product variation, designing an advertising campaign is a rather routine and standardized task. Completely new product concepts, in contrast, require thoroughly investigating the markets, designing new packaging, generating advertising and testing it. In new product launches, the advertising agency has to understand the culture, strategy, operations and products of the client rather profoundly, which is the reason for continued, long-term service partnerships.

The advertising users in the sample suggest that the quality of Finnish advertising is generally high, particularly if compared with the neighboring Nordic countries. Moreover, the price of advertising services is very competitive relative to Central European suppliers. However, one deficiency mentioned in the interviews is the lack of professional copywriters in English language. Naturally, most agencies being part in international chains or networks, they can request for help from their foreign counterparts. However, on an ongoing basis, this model may be too rigid to operate efficiently. Clients generally prefer to have the advertising team geographically close.

In an industrial products firm the marketing and advertising functions are slightly different from consumer products. First of all, there may be very few potential clients in the world, and secondly, the clients need to be trained and informed about the technical details of the product. Hence communication of technical characteristics makes a much larger part of the market communication and advertising, while the potential audience is smaller and geographically dispersed. As a consequence, TV is not likely to be a useful medium, whereas technical seminars will be used extensively. In this case, it is more likely that a firm employs internally a number of technical copywriters instead of using the ones available in advertising agencies.

8.2 Strategic partnering

An important feature of the relationship between business services and their clients is its long tenure. Repeated collaboration over years or even decades is the basis for building relationship-specific knowledge and trust. The relationship continues, even though individual projects may be procured less frequently. Often, a basic contractual framework is agreed upon annually or less often so that in each project only current technical requirements, schedules, and teams are specified. The repeated nature of the relationship significantly reduces the costs of transacting. First, the service supplier learns about the client's technology, organization, and procedures, and is better prepared to provide exactly the kinds of services the client desires. For this reason, clients often require the same team within the service supplier to engage in their projects. Second, contracting costs are lower because attempting to write comprehensive contracts is very time-consuming and gathering the necessary information is costly. Relying on trust and reputation built over time mitigates the need for this. Also, framework contracts underlying repeated projects reduce the need to rewrite basic condi-

tions about responsibilities, sanctions, and property rights, among other things. As a consequence, clients will seek to change service partners only due to some rather serious discontent. Substandard quality, inability to complete the project or drastic changes in the service team may trigger switching of suppliers.

However, repeated collaboration and mutual learning also increase the parties' dependence on one another. Over time it becomes more expensive to switch partners, because the new supplier would need to be found and trained, and new contracts would need to be written. Clients try to manage this lock-in and resulting dependence by maintaining relationships with several service suppliers simultaneously. The more specialized the supplier, the more challenging this is, although overall there are very few service suppliers that are specialized to such an extent that they provide truly critical services to their clients. In the usual case, services are based on relatively standard competencies, which, apart from the client-specific knowledge, are abundantly available. The relationship relies on professional competence and smooth interaction between the service firm's team and the project team members of the client. External services thus act as a spare resource, a skill reserve, for the client, rather than a lasting source of competitive advantage.

Technical and R&D services participate in product and process development of their clients, thus contributing to their innovation activities. Even in this activity of high strategic importance, according to the clients interviewed, service firms generally supply skills that do exist internally, but it is for the insufficient of quantity rather than quality of skills that they are outsourced. Only in very few cases do service firms provide such unique competencies that neither the client nor other service providers possess. Service suppliers are important but rarely indispensable.

In collaborative projects, organizational boundaries easily become blurred. Technical service engineers work in the client's projects exactly as the client's own engineers, the only difference being in salary accounting. It is also not unusual that clients hire engineers from service firms, and vice versa. In a small country and a stable industrial environment, this happens in most cases in mutual consent and respect. For example, a locally operating engineering service company hired employees from a machine industry firm when the latter was shifting operations from one geographic area to another. Generally, hostile and aggressive hiring from partner firms is out of the question in an environment where there are few players and a good reputation is key.

The importance of reputation also enables the blending of employees in the client's projects. Service engineers get to observe a lot of the client's core technologies and processes. According to clients, secrecy clauses and agreements that prevent the service firm from supplying to the client's closest competitors generally suffice to create an environment of trust where knowledge flows freely among the project team members, be they employed by the service company or the client.

8.3 Allocation of service tasks to internal and external providers

The decision of how to allocate tasks between internal and external service suppliers varies greatly by service field. Very few firms have internal advertising and media service functions. Hence the division of labor between internal and external activities is very clear: Internal marketing team initiates the project and writes the brief, while external advertising and media services implement according to specifications, under the marketing manager's supervision. In R&D services, the external service provider is likely to carry out a specialized research task, test, or procedure, similarly according to the specifications. On the contrary, within engineering tasks that contribute to the client's innovation processes, the interaction between the client and the service provider is likely to be much more ambiguous, less well-defined *ex ante*, and entail more intensive and frequent communication. Here the division of labor is less clear-cut, as well. In most cases the client employs people with very similar skills than the service firm.

In engineering service procurement where client firms often have very similar skills in-house than those that they outsource, there are several rationalities that firms follow in their strategies to allocate projects to internal or external suppliers. The most often cited strategy emphasizes focusing on core competencies. This means that the firm itself carries out only those tasks that utilize or enhance the activities and resources defined as "core." In this thinking, efficiency is increased by specialization and competition: specialization supports cumulative learning in closely related activities, and competition provides stronger incentives than internal organization. Therefore it makes sense for the firm to internalize skills in areas where it has special competence, and outsource other skills that are competitively supplied in the markets.

Another important reason for outsourcing particularly in industries with high demand variations is optimizing capacity utilization of engineering resources. Manufacturing firms supplying heavy investment

goods such as paper machines are highly dependent on business cycles in the global industry. Demand for engineering design skills can vary as much as 300% in the short and medium run. In these conditions, it is cost-efficient to try to keep internal engineers fully employed, and outsource more during high demand.

In areas where technological change is rapid or projects are very variable, it may be important to not be trapped with an outdated set of skills and competencies. Some managers indicated that services are outsourced in order to maintain degrees of freedom to change suppliers easily. In different projects, or due to changes in technological needs, different service providers may be required. An internal team cannot be changed or transformed as rapidly, in which case the firm may have to be content with insufficient skills in a new field of expertise. A variant of this reasoning was presented also by some industrial customers of advertising services. External procurement of advertising and media services was seen to make sense because competition creates incentives for the service team to expend effort and creativity, but also because clients want to use different designers for different kinds of products. In-house advertising team or even external ”house agency” would tie the client to one team or few teams, reducing the possibilities to draw on a more diverse base of competencies and approaches.

Another possible reason for service outsourcing is to learn from and internalize the service supplier’s knowledge. This logic of external organization is more frequently observed in management consulting than in technical services for example. Management consultants are hired in order for the client to learn about the most recent organizational tools and strategic thinking. Of course not all of the consultants’ methods are internalized, and simply the participation of an outside person may be useful in facilitating the strategy process. Nevertheless, there may be more of an attempt to internalize new ideas from the management consulting firm than there is in the case of other business services.

To summarize, KIBSs external procurement is driven to a large extent by the strategy of specializing in certain strategic core activities and outsourcing other activities. Within this line of reasoning, optimization of resource utilization, obtaining the most competent service suppliers in a changing environment, and learning about new thinking and technological developments are supplementary explanations for outsourcing. Overall, the firms interviewed expected specialization in their own industry to continue to deepen, hence, markets for knowledge-intensive services can be expected to further expand. Interesting from service suppliers strategic point of view is, in particular, that this general growth in demand also makes room for more specialized services.

8.4 Organization of service relationships

The second theme in the interviews with client firm managers was the organization of the relationship in terms of responsibilities and contracts. In line with the survey data, interviewees indicated that the role of service suppliers varies from carrying out simple routine tasks to participating in planning the projects to suggesting new projects. Taking this kind of initiative is relatively less frequent in advertising and more common in management and technical services. In all service industries, interaction can take place on very different levels of strategic importance to the client. Subcontracting of routine tasks on the one hand, and sourcing unique and specialized competencies for innovation activities represent the opposite ends of the spectrum.

Points of contact

An important aspect of the interaction and knowledge exchange with a service supplier is the role of "gatekeepers," that is, client's employees who communicate with the supplier firm's team. In advertising, there is often a single marketing manager who is responsible for explaining the brief and overseeing and guiding the supplier firm's work. The same organization with a single contact point appears to suffice in many software projects. In contrast, in strategic management consulting, a team of consultants is typically discussing and collecting inputs from a large number of managers and employees. Similarly in R&D related engineering projects, client's and service supplier's teams have multiple points of contact, whereby people working on the same area of the project communicate with each other directly without intermediaries. Arguably, the number of contacts with the client firm reflects the degree of complexity and tacitness of the knowledge involved in the project. If underlying knowledge is highly complex and tacit, a single brief or a person is not able to synthesize and explain all the relevant aspects of the service task.

Pricing and quality assessment

The most common pricing scheme according to the clients is to define a budget frame based on expected hours worked plus other costs and expenses. If this budget is exceeded, the deal is renegotiated. Sometimes with a new supplier the client may require that the budget is fixed, and thus excess costs have to be covered by the supplier. In other words, the service supplier carries more risk. With very long-term and well-trusted partners, clients may be comfortable charging just

based on hours worked. Then incentives for the service firm are created by the knowledge that bad performance risks the continuation of the relationship. Over time, though, switching partners becomes increasingly costly, which dilutes performance incentives. It is possible that the partnering firms gradually become a quasi-integrated organization, where the service supplier is not treated much differently from internal service departments.

Performance is very difficult to measure objectively in service projects. Large clients do attempt to measure success of projects consistently, but this information is intended more for internal learning and project management purposes, as opposed to tying the supplier's bonuses to it. One of the most common difficulties related to performance measurement of the supplier is that the client has a considerable effect on success. In an innovation project, for instance, performance is likely to depend at least as much on the client's team than on the supplier's team. However, if this was the only measurement issue, teams could split the success bonus. Instead, goals are often qualitative, so that whether or not they are reached cannot really be explicitly evaluated. For instance, the goal of an advertisement campaign could be to increase awareness of the product. There can also be multiple goals, while it may be possible to measure only some of these aspects. Rewarding suppliers for achieving measurable goals can be counterproductive if it diverts effort away from valuable but non-measurable goals and tasks. Finally, there may be a significant time lag between the project and the revelation of success. Due to all these factors, firms rely often on incentives created by the possibility of repeated interaction.

Repeated interaction as an incentive mechanism is surprisingly powerful. Depending on the market conditions – competition and demand – service suppliers can go to great lengths in trying to prove their capabilities and effort to the client. In fact, interviewees indicated that technical and management consultants sometimes offer to carry out the first project free of charge, because they know that there will be more projects later if the first one is successful. This is a terrific situation from the client's perspective, as long as competitive suppliers exist. Clients basically get the incentives "for free." In standard incentive alignment models, the principal and the agent split the profits in some fashion, creating a situation that is "second-best" because both cannot have optimal incentives simultaneously. In contrast, the supplier may be willing to put in a lot of effort in the expectation of future projects in exchange for a flat hourly compensation only. Then the client retains all profits, and as a consequence, becomes residual claimant and has optimal investment incentives itself.

How do clients then decide which suppliers are ”good enough”? Users of technical services assert that quality of technical and software services is relatively transparent to the buyer, even if not quantifiable, and in particular, contractible. Hence, clients feel that the assessment of whether the supplier puts in sufficiently effort and is sufficiently competent is not difficult to make. However, this usually requires that the buyer have in-house competencies similar to those being outsourced. In contrast, in advertising and management consulting quality can be more difficult to detect. Part of the problem may indeed be the lack of internal competencies to evaluate performance – few firms have advertising or management consultants internally. The repeat buying decision here may be sometimes almost wholly based on ”personal chemistry” with the supplier's consultants or designers. Clients may appreciate the smooth and swift progress of the project and easy communication and cooperation with the service team more than actual service output quality.

Control rights

For the large and international organizations that were interviewed here, the most common arrangement concerning property rights is that the client obtains the rights to the design, software, or technology after the project is finished. This reflects perhaps large clients' strong position in service relationships. Only if the service firm has developed some components of the design already before the project, and the client is time-constrained, the client might consider other ownership arrangements. This practice mitigates the service supplier's possibilities to sell the same design to other firms, particularly the client's competitors. However, it is often very difficult to enforce the property rights in practice. Most technical and management services concern the client's internal processes, and hence re-using almost the same design would never even become visible to outsiders.

Another standard practice is to require that the service firm not supply to the client's direct competitors for a specified time period. This is due to considerations of knowledge spillover and conflict of interest. In other words, the question is about protecting the client's strategic knowledge from leaking to competitors through the supplier, and making sure that the supplier's incentives are aligned with the client. However, for industry-specific services this restriction may be difficult to ensure. For example, in Finland there are a few technical service providers concentrating on forest industries, and by definition, all their clients operate in this field. In this case, if the supplier is competent and desirable, clients use the service even if they know that their competi-

tors can benefit from the same service. In the extreme case, a successful, innovative service provider may create a situation, where firms in the client industry feel that they *must* obtain the latest new service from the supplier, as serious players in the industry cannot afford to be without the new knowledge.

Spillovers of knowledge and information: The importance of social capital

Generally, client firms expressed satisfaction with the ethical norms and behavior of Finnish service suppliers. Service providers agree to keep the information concerning the client's case secret during the project and for 2-5 years after it is finished, depending on the contract. According to the client firms interviewed, there is little evidence of information leaking to competitors through service suppliers. Hence, clients do not feel the need to further restrict the information flows or mobility of personnel, in addition to the usual secrecy clauses and control rights discussed previously. This kind of social capital is easier to sustain in a small and homogeneous environment such as the Finnish economy. It remains to be seen how service contracts and practices change when Finnish KIBS firms enter foreign markets, where Finnish norms might not be as well supported, or when more foreign service suppliers start to compete in Finland, bringing in new norms and practices.

8.5 Other organizational issues related to KIBS procurement

Searching new experts

Active marketing of services is an important yet neglected investment for KIBS. The reason is that industrial clients rarely have routines to search for new talent or screen new suppliers. In fact, according to certain service buyers, whoever happens to knock on the door at the right time might get the project. Moreover, international service suppliers approach Finnish industrial clients more and more aggressively. Thus, Finnish service firms should attempt to be proactive in seeking clients, and particularly in the context of large firms, search for the right departments and right people within firms who might be interested.

Marketing of knowledge services requires publishing and advertising the underlying knowledge. The classical paradox of pricing knowledge is that before knowing it, one cannot know its value, and after knowing it, one does not want to pay anything for it. Thus, knowledge service

providers need to be very skillful in revealing enough of their skills and knowledge to show that they are competent and relevant, but not enough to destroy the value of the service. Strategies to advertise knowledge include organizing topical seminars for potential and existing clients, writing articles for trade journals and the popular press, and as already mentioned, offer to carry out a trial project for free. All these strategies aim at revealing the skill without destroying its value in the future.

Clients reported that they generally prefer continue a more or less satisfactory relationship instead of looking for new business service suppliers. Search for new partners is costly and in changing the supplier, the learning accumulated by the previous supplier is lost. Service providers should make use of this commitment by engaging in a dialogue about future developments in the field and about desirable directions for service provider's competence development.

ICT and service procurement

The most often expressed view on how Information and Communication Technologies (ICT) have changed the service process is that they have enhanced the exchange of designs and facts. Electronic mail, various kinds of extranet solutions, and video conferencing have reduced the needs for traveling and postal mail. However, few clients believe that ICT will reduce the need to meet with suppliers in person. Particularly in the beginning of the project, teams from both sides meet physically to generate ideas and discuss opportunities. Sometimes the knowledge to be shared is so complex and distributed that several people need to communicate simultaneously. Meeting in person also supports building social capital: atmosphere in and excitement about the project, trust, and personal relationships.

Service firms' size and collaborative service networks

Clients indicated that it is important to match the relative size of the service firm and the client. A small client will not be very important for a large service firm, and as a result, it will not get the necessary attention and the best consultants will not be assigned to its projects. A small client may therefore be better off sourcing from a smaller supplier. A large client, on the other hand, needs scalability of resources for its larger projects.

Generally "one stop shop" service providers are preferred to networks of collaborating service firms, because coordination and man-

agement of several suppliers can be problematic. In the experience of the managers interviewed, management of collaborating service providers is challenging. It is of utmost importance in this case to come up with very clear tasks and responsibilities for each supplier. Otherwise the whole project becomes service suppliers' battleground for resources and power. Hence, scaling up small supplier's resources by including other, similar, suppliers in the project may not be a great idea. Collaborative work may succeed, though, if the service providers have very different areas of expertise.

The service supplier may subcontract some parts of the project. However, even in this case clients generally want to be aware of the division of labor: who does what and how. It is important for clients to know who are in the team and what are their credentials and qualifications.

Role of public sector in service procurement

Overall, the large industrial clients interviewed did not see much need for policy intervention in knowledge service procurement. In contrast, small firms and startups may have a more difficult time searching and procuring services such as management consulting, marketing, advertising, and design. On the other hand, if they organize these functions in-house, small firms are likely to have less specialized people struggling to complete the management and marketing tasks on the side, under pressure to take care of their main production tasks. Hence, support systems and subsidies for startup firms' technology development could be complemented by support for development of their marketing, management, and design skills through interaction with competent service providers.

Technology programs consisting of collaborative R&D projects among several participants could benefit from project management leadership by an experienced consultant. This has been experimented with in the Finnish paper machine industry. A project management framework developed and supplied by an outside consultant makes the process more systematic by explicitly forcing the participants in complex technical projects to agree on goals, tasks, and responsibilities beforehand. Government funded technology programs might find this an interesting experiment.

Large Finnish companies are very comfortable collaborating with university scientists in technical fields, but very seldom they make use of academic strategy, marketing, and organization experts. However, these specialists could spar corporate executives and managers in their

areas of research and expertise and thus be a source of insight and creative thinking. Vice versa, regular contact with strategy and management practitioners might be useful for academics. Forming these mutually beneficial linkages between industry and business academia could be usefully supported with public policy.

9 Conclusions and Policy Implications

9.1 Organization of KIBS firms and their client relationships

This study has empirically analyzed knowledge-intensive business services. These services are very heterogeneous, and firms even within industries operate quite differently. In fact, there may be more variation within industries than across industries. For example, firms' strategies toward knowledge creation and service development explain more of their innovation and growth performance than industry characteristics.

In addition to innovation activities, this study has examined KIBS firms' internal organization design. Results obtained here suggest that proactive management of knowledge has potentially large and positive effects on KIBS' long-term performance. The term knowledge management has been used to describe a set of organizational practices intended, first, to enable cumulative learning with routines that support reflecting and learning from experience, and second, to share skills, knowledge, best practices, as well as reusable tools and solutions within an organization. In short, knowledge management is about converting individual experts' skills into organizational capabilities. The strategic implication is to focus on clients and projects that support building requisite competencies in order to reach the firm's long-term goals *vis à vis* market position. Strategic focus is requisite for cumulative learning.

Business services employ highly educated, and thus highly demanded, experts. Therefore, one of the key challenges for KIBS firms is to motivate and retain key employees. Possible tools to achieve this include formal incentive schemes, partnership arrangements, and simply keeping people "entertained" by offering interesting projects and trying to create a friendly atmosphere. This is emphasized by several KIBS executives. Rather than tying employees to the firm with formal contracts, they try to create an environment in which these independent-minded experts find motivating and fun tasks. That said, partnerships prospect is also an important commitment tool for key employees. More generally, when choosing among formal incentive arrangements, the firm needs to evaluate whether individual or team performance is the correct level of assessment. Encouraging individuals' effort creates stronger incentives, provided that suitable performance measures can

be found, but this may be to the detriment of informal cooperation and atmosphere within the organization. Setting up team or organization level performance assessment dilutes the incentives, but may reduce these detrimental side effects. Many Finnish service firms try to get the best of both worlds by simultaneously implementing bonus schemes at different organizational levels. The effects of this approach on employees' behavior remain yet to be studied empirically.

An internal management challenge is also to balance between the interests of very talented individuals and the development of the organization. Highly skilled experts may not be the easiest employees to manage, because their careers and motivations may occasionally undermine the organization's goals. In particular, many KIBS firms are born around an exceptionally talented "star" designer or scientist. This person brings to the new firm important assets such as reputation and existing networks of clients and collaborators. However, if, or when, the star designer leaves the firm, the organization may end up in a situation without competencies, management, organizational procedures, or vision of the future. Therefore, for a growth oriented service firm, the transformation from a team around a star designer or entrepreneur into an organization with shared knowledge, processes, and reputation is critical.

Business service transactions are hampered by moral hazard issues arising from asymmetric information and knowledge. These problems can be partially solved in the longer run by building trust between the client and the service supplier and reputation in the larger context. For new service suppliers, using additional mechanisms may accelerate the process of gaining client references and building reputation. In particular, performance bonuses to the service supplier shift some risk to the service firm, but this may create sufficient credibility that the client tries the new service supplier. However, performance-based pricing is not used very widely for reasons mainly related to measurement. First, the client may have as large an impact on the project outcome as the service firm, and the effects are often inseparable, in which case the bonus would need to be shared among the project team. This kind of a "quasi-firm" is not observed in reality, however. Second, measurement of performance as such may be excessively costly or difficult to arrange. Then quality systems and other tools to standardize service output and performance can be useful. Additionally, if the success of the project depends mainly on the service supplier, but suitable and objective performance measures do not exist, then risk and incentives can be shifted to the service firm by specifying a fixed price service contract.

Empirical analysis of the survey data suggests that small firms are more likely to use performance bonuses in pricing the service, possibly as a signaling device. Interestingly, regular measurement of customer satisfaction and development of standards for service project management also facilitate adoption of performance pricing. Thus, codification of performance makes bonus pricing possible. Pricing based on performance measurement itself can be seen as an attempt to codify the value of performance, which is otherwise difficult to communicate to new clients. Performance standards, measurement, and pricing can thus be important marketing tools for growth-oriented new KIBS firms.

Structure of KIBS firms is important for their innovation activities. According to both service firms and their clients, knowledge acquired from international affiliations, networks or chains is relevant. International training programs, research output, databases, and new service ideas represent material for learning and improving existing services. Moreover, international networks of this sort provide access to a large pool of competence, as experts of different fields from any office within the chain can be called in for special assignments. In advertising and management consulting this structure is very commonplace. Perhaps also in technical services creating international networks of collaboration and knowledge exchange would be a valuable investment. However, it is possible that genuine cooperation necessitates some kind of an ownership arrangement.

9.2 Knowledge Creation in Finnish KIBS industries

Finnish KIBS firms surveyed in the study actively improve their services and develop completely new services. They invest significantly in knowledge creation through training, service development, and collaborative innovation. Most important collaboration partners are client firms, other service firms than direct rivals, and suppliers of equipment or software. Universities are also a very important partner for suppliers of R&D service. As a result of these efforts, more than 40% of firms in the KIBS sample have introduced completely new services in the past three years, and more than 50% of firms report incremental service improvements.

Among the industries studied, management and R&D services are the most extensively engaged in the aforementioned, more formal, knowledge creation activities. Advertising and engineering firms appear to be more likely to rely on learning by doing, in which case the firm does not generate radically new knowledge or ideas.

A practical problem expressed by KIBS executives about the organization of innovation is that permanent R&D teams fail to stay current about pertinent problems clients face. By the same token, setting aside a group of consultants for extended periods of time to work on an innovation project might alienate them from clients' real issues. Creative ways of organizing work, rotating personnel in different tasks, and making use of collaborative networks might be necessary to deal with this.

One in every four of the sampled firms participates in the national innovation system as manifested by receiving R&D funding from public sources. By and large, management and advertising companies are not included, however. They may compensate to some degree by their affiliations in international service chains and networks. However, from the perspective of the broader innovation system, incorporating firms from these industries could be a welcome injection of marketing and organization competence.

The analyses carried out in the study suggest that learning and organization are interrelated. In particular, firms' service and knowledge creation strategies affect the ways firms structure their interaction with clients. For instance, allocation of control in the relationship depends on the nature of learning within the firm. Incremental learning by doing is associated with client control of the relationship, while learning by combining internal and external sources of knowledge is associated with service firms that hold the control rights themselves.

These orientations toward knowledge creation have implications for service innovation as well. Incremental learning correlates negatively with new service introductions, while "combinatory" learning emphasizing broad sourcing of knowledge and internal and external cooperation is strongly associated with successful innovation. Not only the intensity of learning but also the nature of learning matters. The management implication for KIBS' client firms is that the short-term need for control of intellectual assets must be balanced with the KIBS suppliers' long-term incentives to generate new knowledge and innovate new services.

Survey data also suggest that the firm's service strategy affects innovation performance. Two strategic orientations are identified in the study: expert strategy emphasizing individuals' skills and a strategy of service solutions emphasizing organizationally embedded and replicable solutions to predefined service problems. It turns out that the solutions strategy is more conducive to innovation than the expert strategy. An interpretation is that these strategies create very different incentives

to develop new services. Innovation is always an organizational investment, while individual experts' learning benefits them personally, as well. The firm profits more from innovation when new knowledge becomes embedded in service solutions or packages that can be improved cumulatively. In contrast, key expert employees may expropriate the rents on their own learning from the firm.

Service strategy in terms of provision of solutions or expert skills also affects the capabilities of the firm to benefit from new technologies. Results of empirical analysis imply that service solution providers may be more efficient than expert skill suppliers at seizing new business opportunities created by information and communication tehcnologies. Codification of processes and performance associated with solution provision appear to facilitate marketing and communication with new clients through electronic media.

These differences between the learning behavior and innovation performance of firms oriented differently in their service strategy have implications for the national innovation system. On the one hand, knowledge creation in solution strategy oriented firms is more conducive to economies of scale, and therefore these firms are more likely to grow larger and find opportunities for international expansion. This development strengthens the Finnish KIBS sector and generates spillovers to other sectors from highly competitive and growing KIBS supply. On the other hand, expert services are important both as a skill reserve for the manufacturing sector and as a pool of talented people who circulate knowledge in the economy and generate new insights based on their learning. Their contribution to the success of their clients' innovation activities can be considerable. Expert firms depend on individuals' skills, the development of which is supported by the education system. Applying expert skills is not likely to generate significant spillovers, which could reduce the person's incentives to improve his or her skills. In contrast, solutions oriented firms depend on organizational knowledge and innovation activities. It is well known that innovation activities generate spillovers of knowledge, due to which firms are likely to underinvest. Therefore, it seems that there are more reasons to support innovation activities of the latter kind of firms, which focus on developing completely new services and invest in codifying and standardizing their services to the extent that growth is generated by replicating the successful new services.

9.3 Politics of KIBS innovation

There are high political expectations concerning the growing role of KIBS in knowledge-based economies (OECD, 1999, 2000; VTTN, 2000). KIBS are seen as engines of innovation and productivity growth. Moreover, KIBS are expected to become a significant export sector. In particular, Information and Communication Technologies are anticipated to play a considerable role in the growth and evolution these services. In fact, VTTN emphasizes the utilization of ICT in KIBS as one of the special challences of the innovation system.

Based on the analyses of case and survey data in this report, some of these expectations of the future role of KIBS seem exaggerated. The results here suggest that, first, ICT cannot be the sole basis of knowledge-intensive service provision. New technologies provide invaluable tools to both the service tasks (e.g. CAD/CAE tools, databases and data management) and to interaction with clients (extranets, virtual workdesks, electronic mail). However, most clients emphasize the need to meet in person, and the more complex the service project, the more often. As a result, in most technical, design or management consulting services it is hard to carry out core tasks from a distance to the client.

Second, and relatedly, exports do not appear to be the main route to international trade in KIBS. International statistical data suggest that the volume of foreign direct investment is larger than that of exports in services (OECD, 1999). This arises from the need to be local and have direct customer contact in most services. Consequently, growth and internationalization of KIBS firms generally takes place through establishing local offices in new markets.

According to a study by the OECD (2000), there are few barriers of entry or competition in business services in Finland. In 1988, the Finnish Competition Authority intervened with the practice of price recommendation by trade associations. Several professional service associations, including the Finnish Association of Consultants (Suomen Konsulttien Liitto, SKOL) canceled their recommendations. Also, membership in professional associations is voluntary, and these associations do not have an overwhelming authority in regulating the industries.

In fact, regulation of business services takes place almost informally by the industry actors themselves. Trade associations make recommendations for good consulting practice, including how to avoid conflicts of interest with different clients and maintain confidentiality as well as

professional competence. Indeed, the clients interviewed indicated that these ethical norms work very well in the Finnish markets. Ruining the firm's reputation is easy and has severe consequences in a small and well-connected business community. The Finnish business service environment thus appears to be relatively "high-trust." It remains to be seen, if internationalization of these industries proceeds, to what extent foreign entrants to the Finnish markets benefit from this environment, and what are the challenges facing Finnish KIBS firms in other business environments where reputation and trust mechanisms are weaker.

Finnish political bodies in the areas of science, technology, and education constantly bring up the lack of business and marketing competence particularly among small and medium-sized enterprises (e.g. VTTN). VTTN also calls for applied research in management, business, and marketing. The interviews with business service executives as well as their clients suggest that the linkages between KIBS firms and business academia, as well as between industrial corporations and business academia are very weak. It is surprising that even management consulting and advertising services, which are intensive produces and users of business knowledge do not perceive the value of engaging in a dialogue with academic experts. In case the problem lies simply in lacking communication linkages among these parties, political support for their creation might be a feasible remedy. Research funding could be directed towards joint projects among members of the academia, KIBS, and industrial clients. If the problem is deeper and rooted in the low applicability of research in Finnish schools of business administration, a longer term focus on applied business research with practical applications is needed.

An unresolved political question is to what extent KIBS' innovation activities should be supported by public funds. A generally applicable theory is that because of spillovers, innovation creates positive externalities, for which reason firms tend to underinvest. Public R&D support can achieve this. However, the underlying idea then is that all innovation is productive and useful. The modern view of economic growth of course posits this. But the assumption then is that innovation either increases value of products or decreases production costs. With respect to business services, it may be even more difficult to assess the impact of innovations than in the case of manufacturing innovations.

On the other hand, even in industrial innovation, it is not perfectly sure *a priori* that an innovation project will lead to a useful new product or technology. Many innovations fail the test of markets. The same is true about service innovations. And to the extent that business service

innovations have the potential to improve their clients' productivity and efficiency, these innovation activities have the potential of positive spillovers both within the business service sector and across sectors. Technology agencies and funding organizations could experiment with encouraging KIBS firms' innovation activities, initially with limited goals and expenditure, gradually expanding to similar procedures as with manufacturing firms. It is clear that most KIBS firms would not be participating in these kinds of innovation programs directly, but firms with high competencies and crisp ideas but constrained by time or resources to carry out the projects, might seize the opportunity and develop broadly applicable and spillover-generating new services. Complementary policies should aim at developing measures and procedures for assessing the impact of business service innovations.

Finally, in many of the aforementioned policy documents it has been observed that small and medium-sized enterprises have fewer opportunities to procure strategic business services. There are at least two reasons for this: small firms lack both requisite financial resources to source high quality services externally and competencies to source knowledge-based services efficiently. Moreover, many service firms prefer to target large clients with sizable service budgets and multiple divisions and operations. However, this could be a useful entry point for policy intervention. Particularly small but rapidly growing technology firms could benefit from better access to marketing, management, and design services.

Appendix 1

List of Interviewees

The Association Of The Finnish Management Consultants LJK, Executive Director Jani Kekkonen

The Finnish Association of Marketing Communication Agencies MTL, Managing Director Sinikka Virkkunen

The Finnish Association of Consulting Firms SKOL, Development manager Matti Kiiskinen

Ahlström Oyj, Director of Marketing and Quality Management Laura Raitio

Andritz-Ahlström, Kraft Mill Business, Senior Vice President Hannu Tynkkynen

Creadesign Oy, CEO Hannu Kähönen

Deltamarin Ltd., Director, Business Development Markku Kanerva

E&D Design, CEO Tapani Hyvönen

Enmac Oy, CEO Martti Ala-Vainio

Evia Oyj, CEO Arto Liinpää

Innotiimi Oy, Director of R&D Kari Helin

Jaakko Pöyry Group, Director, Quality Management Risto Ryyppö

KPMG Consulting, Chief Knowledge Officer Ulla Martola

M-Real Corporation, Senior Vice President, Business Development Matti Mörsky

Mainostoimisto A.C.E., CEO Minna Pettilä

McCann Finland Oy, CEO Pekka Mäki

Metso Automation, Chief Research Engineer Jari Riihilahti

MPS Finland Consulting Oy, CEO Sakari Pitkänen

Muodos Oy, CEO Arto Ruokonen

Muotoilutoimisto Linja Oy, CEO Eljas Perheentupa

Rintekno Oy, CEO Olli Gerdt

PI-Group, Manager, Business Operations Raimo Pehrsson

Sonera Corporation, Vice President, Mobile Applications Development Pekka Keskiivari

Valio Oy, Senior Vice President, Valio International Veijo Meriläinen,

Valio Oy, Senior Vice President, Domestic Sales Pertti Paloranta

Yritystaito Oy, CEO Antti Skyttä

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