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BRANDED SCHOLARLY INFORMATION SERVICES AMONG YOUNG RESEARCHERS

Irma Pasanen

HELSINKI UNIVERSITY OF TECHNOLOGY
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Abstract
The study examines the transition of scientific journals to branded scholarly information services. It has been suggested that electronic publishing systems could provide new opportunities to create advanced linking capabilities, community collaboration, and integration across research and application communities at a level not possible with print systems. The scientific journals that are licensed as web-based services include a variety of augmented services to supplement the plain journal articles and reference databases. Branding the services has offered a way to both differentiate and ensure confidence in the Internet. The study seeks to answer the following questions: how do young researchers take notice of branded scholarly information services, how do they value the augmented services, and what, if any, brand value aspects emerged between them and the electronic information services?

The theoretical background of the study derives from information-seeking behavior supplemented with marketing and consumer theories about branding and the commodification of information. The empirical research material is compiled from the views of young researchers in the fields of science and technology and the data is statistically analyzed.

The results of the study demonstrate that the brand value, the differential effect of the brand name, can be positively affected over time. The study shows that library websites together with colleagues are an important source of initial information about the electronic scholarly information services. The awareness of service brands increases significantly with the frequency of use. The results indicate that the services directly linked with the current core product are becoming an essential part of the journal services. The value of links between other services and products is found to increase significantly with experience. The ability to personalize the services is found to be more important among users with moderate experience. Satisfaction in the services is found to influence the intentions to advocate for the services. In general, young researchers are found inclined to continue using the electronic scholarly information services. However, there is no clear evidence of brand loyalty.

Keywords and classification
brands, trademarks, scholarly information
brandit, tavaramerkit, tieteellinen tiedonvälitys

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PREFACE

This study is the outcome of a three-year research project carried out in the Licentiate Program in Digital Communication organized by the University Network for Communication Sciences in Finland. The research has been conducted in the Department of Social and Political Sciences / Information Studies in Åbo Akademi University.

Director of the Licentiate Program in Digital Communication professor Pertti Hurme from Jyväskylä University and PD Gunilla Widén-Wulff from Åbo Akademi University have been my supervisors. I wish to express my heartfelt thanks for their continuous support, advice, and encouragement throughout the research process.

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Irma Pasanen

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INTRODUCTION

Access to a timely, up-to-date, and appropriate information resource is a strategic asset for any research organization. Jeremy Rifkin has characterized the 21st century as the age of access where products are turning into electronic services, ownership turns into licensed access and where premium is put on immediate access to colleagues and information (Rifkin 2000). In scholarly communication these effects of the networked environment are becoming more and more visible. In certain fields of science the volume of resources in electronic format has already exceeded that of the printed material. Scholarly journals have turned into networked services that are linked with each other in a web of scholarly information services.

The Internet was to mark the beginning of a new world where access to information would be free and without barriers, and communities would flourish without geographical or temporal boundaries. The network economy, however, operates with branding and customization, scalability and interaction. Information as a commodity of the networked society is subject to the rules, methods and actions related to the trade and exchange of any commodity. By and large, the true long-term consequence of the fundamental shift from physical ownership of collections to short-term licensing of information resources and services has not been analyzed in depth. The structural changes in scholarly communication have also been much slower than the technological change.

The research objective of this study is to examine the transition of scientific journals to branded scholarly information services. In the network environment the individual journal in electronic format ceases to be a clearly distinctive separate unit. It becomes a part of a larger entity where journal articles are supplemented with additional services. The aim of the study is to explore the significance of these branded services to researchers and to answer the research question “How quickly do young researchers become aware of, adopt and possibly become loyal to electronic information services?”

The purpose of this study is to gain deeper understanding of the relationships between the actors involved in the scholarly information dissemination process. The relevance of the study is as a contribution to the current discussion about scholarly communication.

The theoretical background of this study draws from information seeking behavior supplemented with marketing and consumer theories concerning branding and the commodification of information. The empirical research material is compiled from the views of young researchers in the fields of science and technology.

The thesis contains six chapters. The first two chapters form an introduction into the research themes. Chapter one addresses the issue of branding from the perspective of contemporary social and marketing theories. In the second chapter, the recent developments in the research environment are explored and analyzed. The underlying factors governing individual´s information seeking and consumption habits are charted in chapter three. The fourth chapter focuses on the research questions and research method in detail. In the last two chapters the results of the empirical study are provided and discussed.

The study belongs to the field of information studies, in the area of library and information science. The research topic falls into the category of information seeking but it also intersects with research on scientific and professional communication. This study lies at

the intersection of both applied and basic research. On the one hand, the research theme is external to the library profession and practices but, on the other hand, the theme is closely related to the role of the library in facilitating access to information.

1. TRANSITION TO A NETWORKED WORLD

The Internet and the World Wide Web provide easy access to information which, together with interactive communication, is available 24 hours a day across the globe. However, access to information, community involvement, and social interaction and expression over the Internet are not equally available for all. The virtual sphere is also a market place, where things have a price and economic value.

When information is linked with the means of production, it becomes a commodity and as such it is an object of trade. Scientific information is as prone to commodification as any other information. Nonetheless, in the beginning the Internet was constructed and maintained mainly in the scientific research community.

> *"Internet culture is rooted in the scholarly tradition of shared pursuit of science, of reputation by academic excellence, of peer review, and of openness in all research findings, with due credit to the authors of each discovery."*
>
> - Manuel Castells
> (Castells 2001, 40)

Initially, the Internet-based electronic journals were thought to provide the possibility of re-engineering the scholarly communication process; commercial publishers were to be bypassed. At the moment experiments are being made with new publishing models of scientific information. The structural changes, however, have been much slower than the technological change. Technology has provided the scientific community with new tools that allow new ways of communication. The following two quotations about scientific communication illustrate the technology-geared hopes as expressed a decade ago:

> *"The Internet was created, and is continuing to evolve, as the result of a collective, anarchic process among computer programmers and professional, student, and amateur users – a networked effort, so to speak. Hence it was perfectly natural to imagine that this creative and enterprising anarchic spirit, which has proven so effective in forging these remarkable new tools, should also be the means of deploying them. Indeed, the rapid proliferation of bulletin boards, discussion groups, alerting services, and preprint archives, complemented now by simple and powerful search and retrieval tools, all pointed in the direction of a new ultrademocratic approach to information production and distribution in this new medium."*
>
> - Stevan Harnad,
> (Harnad 1996, 108)

> *"It is often thought that changes will be incremental, with perhaps a few electronic journals appearing and further use of e-mail, FTP, and so on. My guess is that change will be far more drastic. Traditional scholarly journals will likely disappear within 10 to 20 years, and the electronic alternatives will be different from current periodicals, even though they may carry the same titles. There are obvious dangers in discontinuous change away from a system that has served the scholarly community well. I am convinced, however, that future systems of communication will be much better than traditional journals."*
>
> - Andrew M. Odlyzko
> (Odlyzko 1996, 91)

Both Harnad and Odlyzko foresaw that the new electronic journals would take advantage of the technology and include additional features to supplement the traditional scholarly journal. But genuine and profound changes in scholarly communication have not yet occurred and open access to scientific information is not yet reality. At the same time, the traditional modes of publishing scientific information have transformed themselves into networked scholarly information services. In order to see what is driving their overall development and why there is a need for constant change, it is necessary to explore the Internet-based information environment as a whole. In the following, the role of brands and the principles of network economy are scrutinized in more detail.

1.1. Information society or a society of information consumers

The current change is not steered by technological development alone. Two other drivers that are important for this study, are economics and commercialization. In this chapter an attempt is made to understand the current changes by looking at theories about contemporary society, network economics, and marketing.

Information society, network society, consumer society: the present-day, post-industrial environment can be described and defined in many different ways. Frank Webster has in his book identified five different approaches to the concept of the information society. Each of these approaches has its own criteria for the definition of the new era. The technological approach concentrates on the changes brought by the development of the information and communication technologies. The technological infrastucture is seen as the driving force that enables global information exchanges. The economic definition concentrates on the value of information, on the *economical worth of informational actitivities*. Changes in work and occupations are another approach to analyzing the information society. The emergence of virtual spaces presents a fourth approach where the emphasis is on information networks that connect locations and in consequence can have profound effects on the organisation of time and space. The cultural approach emphasizes the media and how they have an influence on all aspects of modern life. There symbols are used in exchanging and receiving information (Webster 2002, 8-29).

As early as 1970, symbols and relationships were seen as the major driver of modern life by Jean Baudrillard in his work ”The Consumer Society – Myths and Structures” (Baudrillard 1998)[1] . According to Baudrillard, there is a system of consumption. The development of the industrial world started with the invention of the machine that as productive force was very different from traditional tools. This produced capital as the productive force: investments, exchanges and circulation, again very different from the early forms of exchanges. Capital then produced waged labour power, an abstract productive force, different from concrete labour and workmanship. Finally, the production system produces a system of needs to complement the named three productive forces: machines, investments and labour. Needs are produced as elements of the system of production and in this system marketing and advertisements are seen as fundamental elements of the productive forces. In this system, commodities are not defined by their usability or functionality but by the signs they convey. The significance is established as a result of relations between objects found inside the system of all commoditites and signs: individual goods and services are defined in relation to other goods and services (Baudrillard 1998, 25-98).

In his work ”The rise of the network society” Manuel Castells takes note of Baudrillard´s work on symbols. In discussing virtual reality, Castells concludes that reality has always

[1] Original La société de consommation 1970.

been virtual because there is no separation between reality and its symbolic representation. Experiences of realities are always perceived through symbols that convey meaning beyond the strict semantic definitions of these experiences. In all human interactive communication all symbols are somewhat displaced in relation to their assigned meaning and this, says Castells, makes perceptions of reality something only true in practice (Castells 2000, 403-404).

Because the relationships are constantly being reset, there is an infinite number of differences available in the system defined by Baudrillard, and that is why it is impossible to satisfy the needs of the consumer. Instead of particular objects, the consumer is endlessly searching for differences that Baudrillard labels as industrially-produced differences. An individual, in his/her quest to make him/herself distinct, finds this system of models of differences, of codes linked to conceptions and attaches him/herself into the model, the code. These industrially-produced differences do not, however, signify any personal meaning and therefore personalization does not produce individuals that are different from one another, argues Baudrillard. The clue is the smallest marginal difference by which it is possible to express fashion, style, and status. It is to this that individuals conform and it is the difference between groups that makes the distinction.

> *"The real differences which characterized persons made them contradictory beings. Differences of the "personalizing" type no longer set individuals one against another; these differences are all arrayed hierarchically on an indefinite scale and converge in models, on the basis of which they are subtly produced and reproduced. As a result, to differentiate oneself is precisely to affiliate to a model, to label oneself by reference to an abstract model, to a combinatorial pattern of fashion, and therefore to relinquish any real difference, any singularity, since these can only arise in concrete, conflictual relations with others and the world. This is the miracle and the tragedy of differentiation. In this way, the whole process of consumption is governed by the production of artificially diversified models."*
>
> - Jean Baudrillard
> (Baudrillard 1998, 88)

However, conformity does not mean equalization, the conscious homogenization of a group. Instead, the common code, the shared signs make the group different from another group and it is this difference between groups which creates parity within the group, unconsciously from the individual´s perspective. This is why mutual understanding is established by way of difference, and conformity is just a result of this. According to Baudrillard, the societal consequence of this analysis is that it is politically more effective to create a situation where social conflicts are solved by differentiation rather than by equalization. A revolution is not possible at a level of a code, the shared signs, because of the unconsious mechanisms of integration and control therein. At the level of the code only mundane fashion-revolutions can take place, harmless because they prevent the real revolutions (Baudrillard 1998, 25-98).

For Webster, the information society is also about evolution rather than revolution. The developments in industrial capitalism, nation states as well as the global economy, have all contributed to the acceleration of the process. Properties traditionally connected to capitalism, such as markets and inequality, are also present in information utilization. The diminishing of public space can be explained by the expansion and penetration of commercialization and markets to all aspects of life. According to Webster, the societal development is towards a business civilisation where solvency mandates the availability of both goods and services, and acquisition is based on private rather than public supply.

Here markets govern the supply, competition is seen as the best mechanism to organize economic matters, different functions are turned into commodities and a price is put on relationships.

Webster´s views are not unique. Similar concerns about the present state of development have been expressed by many critics of the contemporary society at the turn of the millennium (Katz and Rice 2002). There have been two extreme viewpoints that have been present in the discussion: the optimistic, utopian view and the negative, dystopian view. The former emphasizes the positive social outcomes and possibilities of new forms of interaction, egalitarianism, and freedom of expression. The latter perspective opposes these views and the same issues are viewed differently. Instead of equality there is the digital divide, interaction is governed by corporations and immorality is encouraged (Katz and Rice 2002, 1-14).

In 1996, a report about the information society outlined the areas for subsequent research in Finland. The report concluded that together with the new technology globalization was the main driver of the information society. In the report, social cohesion, where mutual trust, togetherness, and solidarity are present, was seen as an essential part of the Finnish information society. The inevitable change was seen in optimistic terms (Hautamäki 1996).

Five years later, in their analysis of the Finnish model of the information society Castells and Himanen summarized the Finnish model as an open society which is based on social well-being and where government has facilitated change. Castells and Himanen also conclude that there are several challenges for the Finnish model: the division between the old and the new economies, the collision between the administrative structures of the information society and the industrial era, growth in the new modes of inequality, the lack of business-oriented entrepreneurship among young people, the gap between old protestant values of duty-bound work and passion-based hacker ethics, the fragility of the economy caused by globalization, and the contradiction between national identity and multicultural integration (Castells and Himanen 2001).

For Castells branding and customization are essential parts of the new network economy. Castells explains – using religion to illustrate his point – that the new communication system of digitized production, distribution and exchange of signals weakens the power of those who hold to the traditional way of communication and fail to adopt the new code. Those adopting or adapting and recoding themselves can see their power multiply by the new electronic relationships. Here Castells, however, doubts that any power can become superhuman because of the multifaceted and heterogeneous nature of the Internet where often compensatory or competing information sources and communication possibilities are simultaneously present. In a world where official documents can be accessed together with videos, music, chat, and X-rated channels it is possible that individuals can each construct their own image worlds (Castells 2000, 406).

In his analysis of the network economy, Castells sees branding as a recognized sign of value. In the network economy, customers have multiple choices and investors need a symbol of acknowledged capacity for value creation. Castells also points out the necessity of the brand owner to exercise good quality control over the whole sequence of distributed production. Customization, the adjustment of products - goods and services - to the individual user is conducted by personalized, iterative online interaction. The process is aided by the automated profiling incorporated in the model of online transactions and thus business is able to target specific consumer preferences. In spite of the acknowledged dangers to privacy and consumer rights, Castells recognizes customization, the building of a dynamic database for the adaptation of production to market demand as an efficient method to target advertisement and sales. In addition to branding and customization,

the Internet has contributed to new business models with three other elements, namely scalability, interactivity, and management of flexibility. In this way, Castells writes, the Internet adds to the business models of the new global economy the capacity to evolve organically with innovation, production systems, and market demand, while keeping its focus on the ultimate goal of any business: money-making (Castells 2001, 64-115).

Some thirty years before the network economy ”materialized”, Baudrillard emphasized the crucial role of branding. Branding together with the display of objects, advertisement, and producer imposes a coherent collective vision. The consumer is drawn into a series of complex motivations where the total signification of objects matters, not the object alone in its specific utility (Baudrillard 1998, 27). Indeed, the brand name is the super sign where everything culminates says Baudrillard (Baudrillard 1998, 148).

Naomi Klein notes that there was a change in the ideology of marketing in the late 1980´s and beginning of 1990´s. Instead of selling commodities as such, the focus shifted to a model where the emphasis was on the brand, not on the product itself. Klein illustrates with examples that this fetish strategy was one of the succesful strategies in overcoming the global economic recession during the early 1990´s (Klein 2001, 45-58). It is worth noticing here that the advent of the Internet coincided with the growing interest and importance of branding in marketing. In the virtual world of the Internet where intangibles are exchanged, branding provided an excellent marketing tool for differentiation.

Finally, Jeremy Rifkin, a controversial globalization critic[2], points out two factors which he feels have been neglected in discussion of the networked society. First, all goods are transforming into services. Products change character from fixed items to interactive, information-intensive, and continually upgraded objects. Their value lies less in their physical appearance or the container they come in and more in the access to services they provide. Second, the nature of services is changing. The applications of electronic commerce, such as customization, are the key drivers in this process where services are turning into versatile long-term relationships between those who provide services and their clients. In this world as described by Rifkin, it is much more important to be able to access than to own.

> *”At the time when the commercial sphere is transforming itself from the selling of goods and services to providing access to commodified relationships, cultural productions, and lived experiences, the dramaturgical perspective provides just the right methodology for making sense of this way of conducting business. It places communications at the heart of human activity, redefines the self in relational terms, makes experience itself a theatrical affair, and transforms property into symbols that help people act out their many dramatic roles as they flit in and out of networks of lived experiences, each representing a different aspect of their life story”*
>
> - Jeremy Rifkin
> (Rifkin 2001, 216)

Indeed, in 1970 Baudrillard had pointed out that everything in consumer society is a service (Baudrillard 1998, 159). For Baudrillard nothing is purely bought, possessed and used for a particular purpose but there is always a personal service connection which gives consumption its meaning. Baudrillard also proposes that the right to something only emerges when there no longer is enough of this something for everyone to share. For

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[2] Manuel Castells critizises (Castells 2000, 276) among others, Rifkin´s earlier work ”The end of work” and claims it lacks proper analysis.

him the discussion about ”the right to clean air” signifies the loss of clean air as a natural good, its transition to commodity status and its unequal social redistribution. Moreover, the progressive transformation of all concrete and natural values into productive forms (commodities) makes them sources of economic profit and social privileges (Baudrillard 1998, 58).

The consumer society as described by Baudrillard is indeed quite timely. Both Baudrillard and Webster consider evolution a more likely trend of development than revolution. By definition, evolution is the development or growth, according to its inherent tendencies, of anything that may be compared to a living organism (e.g. of a political constitution, science, language, etc.) ; it is sometimes contrasted with revolution. It is also, the rise or origination of anything by natural development, as distinguished from its production by a specific act; “growing” as opposed to “being made” (Oxford English dictionary).

1.2. Symbols: branding and trademarks

For Baudrillard, everything culminates in the super sign of the brand name. The noun brand and the verb branding have their origins in the middle age where ownership was recorded by marking the livestock of farmers. Only later, in line with industrial development, did it come to have a meaning beyond agriculture. *The Oxford English Dictionary Online* (© Oxford University Press 2004) dates the etymology of the term “brand” in the sense of mark by burning to the mid 1500´s and in the sense of trademark to 1827. Some decades later the latter evolved into a transferred sense where brand is defined as a “particular sort or class of goods, as indicated by the trade-marks on them”. The rise of marketing and advertising is then highlighted by the additional attributes that appear in conjunction with the noun ‘brand’. In the early 1920´s brand name in the meaning of trade or proprietary name came into use. The tendency of a consumer to continue buying the same brand of goods despite the availability of competing brands was first described as brand loyalty in 1934. The term ‘brand manager’ was first used in 1944 to mean an executive responsible for supervising the promotion of a particular brand of goods, and in 1952 this activity is broadened to brand management that can be carried out by departments as well as individuals. At the same time ‘brand awareness emerged’ in the sense of consumer familiarity with the name, image, or distinctive qualities of a particular brand of goods or services. In 1958, the impression of a product in the minds of potential users or consumers was described as a ‘brand-image’.

The brand definitions used in the marketing business contain additional descriptive attributes. A brand is a name, term, sign, symbol, or design, or a combination of these, intended to identify the goods or services of one seller or group of sellers and to differentiate them from those of competitors. Its value, the brand equity, is the positive differential effect that knowing the brand name has on customer response to the product or service. Brand equity results in customers showing a preference for one product over another when they are basically identical (Kotler 2003, 422). Brand equity is composed of dimensions such as brand awareness, perceived quality, brand associations and brand loyalty and a powerful brand has high brand equity (Aaker and Joachimsthaler 2000, 38-39).

A brand conveys several meanings, which reside in the minds of the consumers. These meanings may include product-related or non-product-related attributes, the former being the ingredients necessary for performing the service and the latter the external aspects such as price information, packaging, user imaginary (good, reliable, high-prestige etc.) and usage imaginative (when, with whom etc.). The perceived benefits can be functional, experienced or symbolic by nature and they represent the personal value consumers attach to the service attributes. The functional benefits are true advantages, whereas those

experienced correspond to how it feels to use the service. The symbolic benefits often relate to the underlying needs for social approval or personal expression. Hence consumers may value the prestige, exclusivity or fashion of a brand because of how it relates to their self concept (Keller K.L. 1993). This set of associations linked to the brand that consumers hold in memory is the brand image but brand identity is something the brand owner aims to achieve, what the owner wants the brand to mean.

When consumers actively think about and elaborate on the significance of service information, stronger associations are created in the memory. In almost all cases, some product category associations that are linked to the brand are shared with other brands in the same product category. Shared associations can help to establish category membership and the product category attitudes can be a particularly important determinant of consumer response. If a consumer thinks banks are basically unfriendly or bad, he or she will probably have similarly unfavorable beliefs about, and attitude toward any particular bank because it is in the category. Thus the strength of the brand associations with the product category is an important determinant of brand awareness. Belief associations about attributes and benefits are created on the basis of direct experience with the service, but also by information about the service communicated by the company, other commercial sources, or word of mouth. The direct experience may create stronger associations in memory (Keller K.L. 1993).

Naomi Klein points out that it was the industrial production of goods in the late 1800´s that was instrumental in the spreading of the branding idea because the associations linked to products was the only means to differentiate otherwise equal goods (Klein 2001, 33). She also notes that recently, in the early 1990´s, an important change occurred: no longer was marketing centered on the product itself. Instead, argues Klein, the product became secondary and the primary selling line was the brand. And a brand – contrary to concrete matters – is something almost spiritual (Klein 2001, 51).

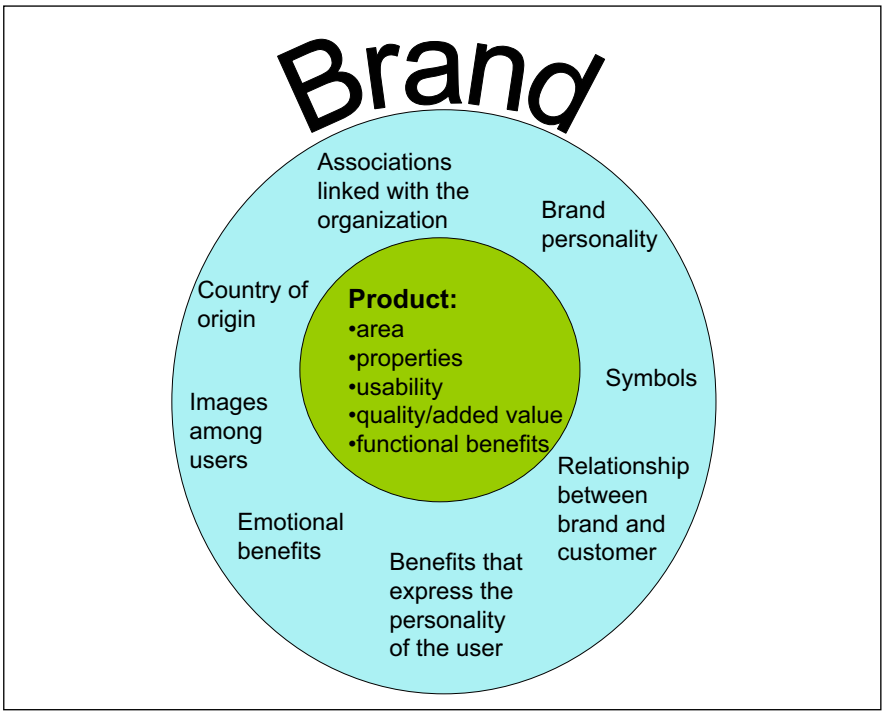

Figure 1.1 Brand is more than a product (Aaker and Joachimsthaler 2000, 82).

Figure 1.1 illustrates the difference between a product and a brand. A product belongs to a product branch, it has properties and there are ways of using it. A product has functional benefits and a certain quality. The brand includes all the characteristics of the product supplemented with the images among the users, country of origin, associations linked with the organization, brand personality and symbols, and the relationships between the brand and the customer. In addition, the brand can provide emotional benefits and benefits that express the personality of the user. The three most important characteristics are the brand associations linked with the organization, brand personality, and symbols (Aaker and Joachimsthaler 2000, 81-85; Kotler 2003, 419). In branches where the organization is closely linked with the customer, the feelings, beliefs and knowledge about the brand among the customers are important. Services, high technology and durable goods production represent such branches. The specific human characteristics that may be connected to the brand are important because they can differentiate brands even in equal supply markets. The symbol can be anything that represents the brand: a logo, a tune, a figure, a slogan, a package, a program. Its function is to strengthen the brand identity by making the brand easier to recognize and remember.

High levels of brand awareness and a positive brand image should increase the probability of brand choice as well as produce greater consumer (and retailer) loyalty and decrease vulnerability to competetive marketing actions (Keller K.L. 1993). Also, a familiar brand with a positive brand image can also provide licensing opportunities and support brand extensions. However, because the basis of brand meaning may be different for brand loyal and non-loyal users, there can be a risk that extensions create unwanted effects and the brand becomes diluted. Loyal users have a richer, more developed knowledge structure of the brand, and may have deeper convictions regarding what is central to brand meaning than non-users. A strong brand with a great deal of brand equity permits future growth opportunities but also helps to provide a defense against failed brand extensions (Keller K.L. and Sood 2003).

The Internet has contributed to brand construction in several ways. First by strengthening the personal experience. The interactive nature and possibility of participation make the Internet a medium different from the traditional media. This enhances the effect of personal experience. The active participation of the user also promotes bonding between the brand and the customer. Thanks to personal participation and experience, brand associations will become stronger. Secondly, the Internet offers a medium for supplying up-to-date and complex information. Brand information can be linked to the service and thus offer easy access to company information such as its inheritance, values and symbols, and this will probably enhance the customer-brand relationship. Thirdly, the Internet enables personal customization. This can be done without the expressed consent of the customer by automated transaction log analysis. A database with information about the customer´s previous selections, choices, and use can tailor the next visit just for him. It is also possible to target a brand to a certain segment or a group of users. Customization makes branding even more profitable. With the help of the Internet it is also possible to build a network brand that makes the brand associations more strong. Consequently brand personality is nurtured by interactivity and versatility. The Internet is a tool that provides an experience. The challenge is to connect the experience with the brand. And a brand is the only thing that cannot be copied (Aaker and Joachimsthaler 2000, 324-369).

Brand names can indeed be protected and the symbols owned. The World Intellectual Property Organization WIPO[3] defines trademarks as follows:

> *"A trademark is a distinctive sign which identifies certain goods or services as those produced or provided by a specific person or enterprise. Its origin dates back to ancient times, when craftsmen reproduced their signatures, or "marks" on their artistic or utilitarian products. Over the years these marks evolved into today's system of trademark registration and protection. The system helps consumers identify and purchase a product or service because its nature and quality, indicated by its unique trademark, meets their needs."*

The protection provided by a trademark includes the exclusive right to use the mark to identify the service. Protection is valid for a limited time period but can be renewed. By and large, trademarks can give global recognition and prevent competitors from taking such unwanted, and unfair, actions that might harm the interests of the trademark owner. Trademarks can be registered as Internet domain names to ensure easy retrieval of websites. Technological developments also allow new possibilities for the creation of marks. Marks exploiting multimedia elements can prove useful in the Internet-based advertising environment. Among the successful trademarks is the Internet search engine Google that has been voted as one of the most influencal brand names in 2003 and 2004 by advertising professionals (WIPO 2005).

In autumn 2004 Google launched the beta version of its new scholarly information search engine Google Scholar. Soon after, in December 2004 the American Chemical Society (ACS) took legal action against Google because Google's use of the trademark "Scholar" for its Google Scholar literature-search engine constitutes trademark infringement and unfair competition with ACS SciFinder Scholar trademark.

> *"The field of scientific research and related services is, of course, open to all," said Flint Lewis, ACS's secretary and general counsel, in a statement. "But when someone uses a trademark similar to ours, we have no choice but to take action—to protect the goodwill that we have built over the years and to prevent the likelihood of confusion in the marketplace."*
> *Chemical & Engineering News, Dec. 27th 2004. ISSN 0009-2347*

The development of an information society that is governed by economic values emphasizes consumption in the global networked environment. There success requires differentiation and it can be achieved by branding, and by giving products and services meanings to convey. Associations affect the way people think and at the point of choice the decisions are often made subconsciously. Here the brand is an entity that generates such added value to the product that can be transformed into monetary assets.

[3] WIPO URL http://www.wipo.int/about-ip/en/trademarks.html.

Scalability, interactivity, management of flexibility, branding, and customization are factors that have contributed to new network business models, according to Castells. Furthermore, the capacity to evolve organically with innovation, production systems, and market demand is another element that the Internet adds to the business models of the new global economy. According to Castells, it is not so much the activities that have changed (in contrast to moving from agriculturure to industrialism) but the technological ability of humankind to use symbols as a productive force (Castells 2001, 100).

Technology has changed but the Internet as a means of transmitting information does not necessarily change the laws of economics. Economists Liebowitz and Shapiro argue that the basic, fundamental economical rules and the laws of supply and demand are still true in the network economy (Liebowitz 2002, 9-57, 69-75; Shapiro 1999, 19-51, 103-171). The value creation of the Internet is heavily built on the network effect and the economies of scale, both of which existed prior to the Internet. The network effect, as explained by Liebowitz, is created when a product becomes more useful to consumers the more people are using the same product. Markets where interaction among consumers is important are likely candidates for strong network effects and therefore an Internet auction house or a dating service is more profitable the more people use the service. Similarly, in the non-network economy, the more cars there were, the more service stations there were, or the more fax-machines or mobile phones there were, the more useful the apparatus was. Economies of scale refer to the fact that the average costs of production per item are reduced as production volumes grow. Digitized products with little if any marginal costs (the cost of producing additional copies) have thus excellent scalability but the concept of economies of scale has nevertheless been known for the non-network economy. Liebowitz points out that both network effects and scalability work to the advantage of large companies over small ones.

> *"Large networks, by definition, have stronger network effects than do small networks, meaning that, everything else being equal, consumers should be willing to pay more to join a large network. This should enhance the profitability of the large network relative to the small network. Similarly, economies of scale imply that large companies have lower costs than do small companies, thus providing them with larger profits. In terms of outcomes, these two economic forces are virtually indistinguishable from one another since each provides an advantage to large companies and networks relative to smaller rivals."*
>
> - Stan J. Liebowitz
> (Liebowitz 2002, 16)

The advantage of large over small leads to a winner-take-all situation, especially if the products are considered identical. Another important factor is the attachment that is formed between consumers and producers. For example, investments made in technology prevent consumers from changing from one product to another. Choices made in the selection of software and platforms may restrict or govern the long-term choices of consumers. Both these two factors increase the impact of the network effect and economies of scale. The one thing Liebowitz does single out as a fundamental change brought about by the Internet is the importance of owning a symbol, a trademark (Liebowitz 2002, 9-57, 69-75; Shapiro 1999, 19-51, 103-171).

The markets for digitized information are governed by intellectual property rights. In the European Union the public sector has a copyright on its information products, unlike in the

United States. This has been seen as a factor that limits the possibilities of the private sector entering or becoming profitable in the European information market. The possibities of refining the raw data produced by the public sector ought to be left to the private sector for the overall benefit of the society, argue economists Heli Koski, Petri Rouvinen and Pekka Ylä-Anttila (Koski et al. 2002, 99-113). The public sector is by definition that part of an economy which is controlled by the state at any level of government, and universities in Finland are part of the public sector. Are they, too, to leave the refinement of their information products, the research results, to the private sector for the overall benefit of the society? Clearly a more precise definition of information products and raw data is needed in this respect, but nevertheless, universities produce information that can have commercial value.

1.4. Branding in the network economy

In the information society symbols are used as a productive force (Castells 2001, 100), and as goods are replaced by services and access supersedes ownership (Rifkin 2001, 216, Baudrillard 1998, 159) it has become important to own the symbol (Liebowitz 2002, 9-57, 69-75). Commodities are defined by brands which represent a recognized sign of value and convey the meanings that reside in the minds of the consumers (Baudrillard 1998, 25-27, 148; Castells 2001, 64-115; Keller K.L. 1993). The differentiation is a result of individuals sharing within a group the same meaning that is divergent from other groups (Baudrillard 25-98, Keller K.L. 1993). Because a brand cannot be copied, it is an excellent tool for differentiating the product or service and ensuring future business (Aaker and Joachimsthaler 2000, 324-369; Keller K.L. 1993; Keller K.L. and Sood 2003; Klein 2001, 33-51). In the network environment branding, scalability, and the network effect are keys to successful business (Castells 2001, 64-115; Liebowitz 2002, 9-57, 69-75; Shapiro 1999, 19-51, 103-171).

The economies of scale in electronic publishing, where additional copies can be produced without extra costs, form an important driver of the activity. However, the more new investments the continuing technological change calls for, the more beneficial the economies of scale become for the large actors in the business at the expense of the small. Furthermore, exploiting the network effect in electronic publishing materializes in a web of services, where similar services are joined with advanced linking systems. The larger the network of information services, the more possibilities there are to link across services, and the more tempting it is for the user of the service. Again, the advantage is with large actors, the large publisher networks.

When the scientific publishing community has adapted itself to the networked environment, it has on the one hand, resulted in large publishing company mergers, but, on the other hand, there has been an increase in the number of small and often non-profit actors in electronic publishing. Symbols of distinction, such as the brand logos of networked scholarly information services have been registered in parallel with the development of the Internet (as illustrated in Appendix 2). Network economy also emphasizes the importance of attracting users. In this respect, marketing the services is crucial.

The principles of network economy and branding are important for the purpose of this study. They explain the advantage of the large scholarly information services over the small or emerging open access services. Also, they raise the question of whether scholarly information services as branded services have such bonding characteristics as proposed by sociologists and economists alike.

2. SCIENTIFIC INFORMATION AS A COMMODITY

2.1. (R)evolutionary growth

The overall expansion of the world´s population is reflected on the size of the global research community. The development where more researchers conduct more research has lead to the increase of research results, and quite recently the Internet has become an important delivery channel of research information and publications (Meadows 1998, 13-37, 227-238).

In the following, the growth in the number of researchers, the availability and accessibility of research information are presented from a Finnish perspective. The growth in research publications is explored from an international viewpoint.

2.1.1. Growth in the number of researchers/users

In the mid-1990´s a system of doctoral schools was established in Finland to supplement the traditional postgraduate education. The aim has been to ensure high-quality postgraduate education and dynamic researcher communities, which have active contacts and close interaction with Finnish society and business. Furthermore, the aim has been to intensify doctoral education so that it is possible to obtain a doctorate in a few years after a master's level degree and that the age of new PhDs would be around 30 (Oksanen et al. 2003).

As Figure 2.1 illustrates, the system has proven successful and during the last decade the annual output of academic doctoral degrees granted by Finnish universities has doubled. Currently some 1,200 doctoral candidates finish their studies every year. Doctoral studies are most often conducted in disciplines such as science, technology and medicine where research funding has also been most easily available. The academic environment that offers possibilities of full-time research seems to stimulate and speed up the doctoral studies: those who participate in doctoral schools tend to be younger at the point of graduation than those pursuing their studies in a less organized manner. In 2001, the average age of a doctoral graduate in the fields of science and technology was between 35-36 years, whereas for those in a doctoral school the average age was 32.4 years (Tohtoreiden työllistyminen, sijoittuminen ja tarve 2004).

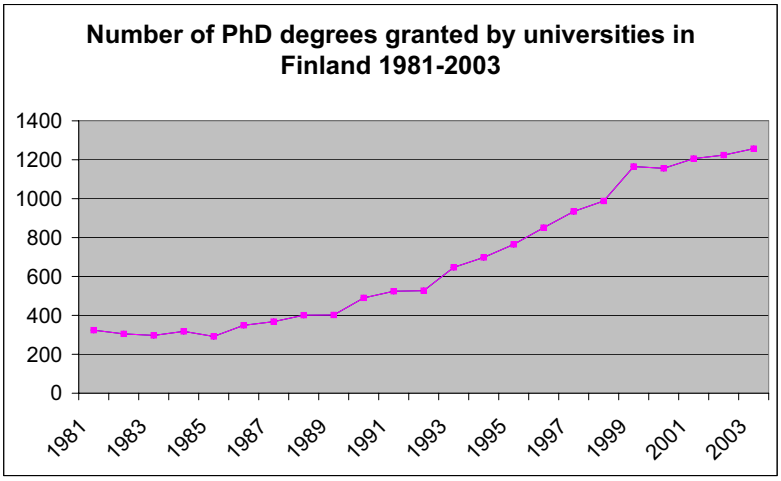

Figure 2.1 The number of doctoral degrees granted by Finnish Universities 1981-2003. Source KOTA database.

The emphasis on competition is not limited to the pressures to earn the degree while one´s funding is secured under the auspices of the doctoral school. Increased competition has been evident since the mid-1990´s. Research grant applications to the Academy of Finland and the National Technology Agency, TEKES, are evaluated and projects receiving the best evaluations will be funded. Competition within universities has also increased (Tutkimus- ja kehittämisrahoitus valtion talousarviossa 2004). According to Ylijoki and Mäntylä research projects receiving external funding may be managed industry-wise. Tight time control may be applied and it is important that every working hour is properly documented and project accounts demonstrate the research input. Researchers point out the importance of achieving recognition and prestige within the scientific community as an important motivational force to continue in their academic careers (Ylijoki 2003, Ylijoki and Mäntylä 2003). Some 70 % of the doctoral graduates remain in universities after their graduation in spite of the poor prospects in terms of tenure (Tohtoreiden työllistyminen, sijoittuminen ja tarve 2004).

2.1.2. Growth in publications

Publishing is the most important outlet of scientific research results. Indeed, the pressure for publishing has always been extremely strong and the academic reward system itself encourages the publication of more and more professional articles (Schauder 1994). Research assessment is closely linked with publishing in recognized refereed journals and as such it forms a significant factor supporting the continuation and growth of formal academic publishing. The increasing number of doctoral students has been one reason for the rising figures in publications, as indicated in Table 2.1. The table also illustrates that increased competition has lead to greater awareness of publishing in internationally recognized peer-reviewed publications at the expense of publishing in Finnish journals. The investments made in applied science and technology research are also evident in the figures concerning research output.

Discipline	Increase/decrease in publications in Finnish journals 1998-2002 %	Increase in international peer-review publications 1998-2002 %	Increase/decrease in the total number of publications 1998-2002 %
Natural Sciences	-28	11	1.4
Technology	-15	66	28.7
Medicine and Nursing	10	11	7.8
Agriculture and Forestry	-21	20	0.1
Social Sciences	-6	22	7.9
Humanities	-18	48	-10

Table 2.1 The trend in publishing among Finnish researchers (Source Oksanen et al. 2003).

The trend of growth is international, and a greater number of researchers around the world are publishing more and more journal contents. This has recently been illustrated by the average number of articles in peer-reviewed journals. Tenopir and King have reported an average of 25.2% increase in 1995-2001 among U.S. scientific journals and an average of 32.7% increase in the number of article pages (Tenopir and King 2004, 115). Similarly, Liu has reported a rise of 32.4% in the number of article pages in the Journal of the American Chemical Society, 21.9% in the American Journal of Mathematics and 12%

in the American Journal of Sociology between 1990-2000. An increase in the number of authors per article has also been reported by Liu. In chemistry in the past hundred years the average number of authors had risen from 1.36 to 4.30, in mathematics from 1.04 to 1.45 and in social sciences from 1.0 to 1.58. It is increasingly difficult to gain attention as the numbers have soared. Similarly, because the quantity of information grows, the possibilities to derive meaning from the vast amount of information have become more complicated (Liu 2003).

There is no figure available for the exact number of scientific journals. In 1987 Meadows estimated there were some 71,000 scientific serial publications in the world (Meadows 1998, 15). Elsevier has estimated that there is an annual growth of 3.3% in the number of journal titles (Regazzi 2004; Brown 2001). With these figures one could approximate that currently there are some 125,000 serials being published around the world. A much more modest figure is supplied by the Ulrich´s database where 21,603 journals were categorized as refereed academic and scholarly journals in December 2004. The real figure is probably somewhere in between because serial titles have also ceased publication and journals may have merged or split.

The journals and their contents may be packaged and sold in bundles. The Ulrich´s database lists over 80 vendors of electronic journal services. A directory of publications that are accessible online in full text, the Fulltext Sources Online FSO, lists 28 aggregator services that cover over 23,000 periodicals, newspapers, newsletters, newswires, and TV or radio transcripts (http://www.fso-online.com).

2.1.3. Growth in availability

The transformation of scholarly journals into electronic information services has been a gradual process. It was in the 1960´s that the abstracting and indexing journals were first prepared in electronic format for printing purposes. These files were then introduced as online databases in the early 1970´s. Access was restricted to those having special knowledge about computer-mediated information retrieval. In the next decade, the 1980´s, CD-ROM databases were often made available for users via the local area networks. These databases allowed direct end-user searching on a much larger scale as the costs of searching were predictable by a subscription price. However, these abstracting and indexing databases rarely contained full-text material. During the 1990´s, the full-text delivery of documents over the Internet was enabled by the World Wide Web and rapid progress was made in making the established print journals available as online services.

In the mid 1990´s, the Finnish government denationalized publicly-owned businesses such as the Finnish Telecom. The increased public funding, generated by privatization, was directed selectively to promote the work of the national innovation system for the benefit of the economy, employment and the business sector. The funding was channeled primarily into technological research through TEKES and basic research through the universities and the Academy of Finland. The growth in research funding was not directly evident in research library budgets, which had not recovered from the economic cuts of the recession of the early 1990´s. However, the government decision to raise the level of research funding fostered benefits to libraries. The national electronic library was first outlined in 1997 as an integrated networked resource and service arrangement. The realization of the plan, FinELib, has been the major facilitator of licensing networked scholarly information resources in Finland (Pasanen-Tuomainen 1999).

In less than a decade, a tremendous shift from print to electronic has taken place in scholarly publishing. In science and technology, the most important publications today are

available in electronic format, and in many cases made available in universities through a FinELib license. Most university libraries in Finland can make available thousands of scientific journals and over a hundred reference (indexing and abstracting) databases.

Today, parallel subscriptions of print and electronic publications are rare due to financial constraints. In Helsinki University of Technology Library, for instance, a decision of principle was made already in 2001 to prioritize the electronic format. Printed journals are subscribed only if no electronic version is available. This means that the users of the library have little choice in the matter.

2.1.4. Growth in accessibility

Funet (Finnish University and Research Network) is a high-speed data communications network serving the Finnish research community. It connects more than 80 research organizations and 300,000 users. Funet services are maintained by CSC, the Finnish information technology center for science, owned by the Ministry of Education. Via NORDUnet, the Funet network offers access to commercial Internet and other academic networks. NORDUnet is the Nordic Internet highway to research and education networks in Denmark, Finland, Iceland, Norway and Sweden, and provides the Nordic backbone to the global network. Today the bandwidth of domestic and international connections provided by Funet varies in speed between 155 Mbit/s and 10 Gbit/s (Finnish University and Research Network).

As early as in 2002, Statistics Finland reported that over half of households with residents between the ages 16-50 had acquired Internet access from home. Those with tertiary education were even more likely (58%) to have access to the Internet from their home computer (Nordic Information Society Statistics 2002). In Finland the number of households with broadband access to the Internet is rising rapidly. In July 2004 there were roughly 350,000 households with broadband access. Together with corporate access, the total number of broadband subscriptions was close to 600,000[4]. A year later, on May 15th 2005, Helsingin Sanomat reported that the number of broadband subscriptions had risen to roughly one million. A recent Ministry of Transport and Communications report indicates that broadband access is most common among young full-time students. Broadband access at home is more likely in households meeting one or more of the following criteria: annual income exceeds 30,000 €, household size equals or is more than 3 persons, city location, respondent is a student, respondent is employed, respondent has a university degree, respondent is less than 45 years of age (Broadband services from user's viewpoint 2004). As indicated in the reports, young doctoral students are likely to be quite familiar with the Internet and thus offer a suitable source for studying the use of networked scholarly information services.

2.2. From ownership to licensing

The electronic journal systems that are currently subscribed to via licenses by libraries have evolved into entities that no longer bear the characteristics of the physical goods such as printed journals. They are no longer tangible, homogeneous items which are produced in printing houses and distributed via mail. Nor are they stored or owned by their subscribers. Instead, the electronic journals reside in external servers and remain intangible until an

[4] http://www.ficora.fi/suomi/ajankoht/laajakaista260704.htm.

individual article regains its physical form at the moment it is printed out by someone who has a predefined permission to use the system. Furthermore, these license-based journal systems encompass a number of enhanced features, not present in the physical journal.

Jeremy Rifkin has characterized the 21st century as the age of access where products turn into electronic services, ownership turns into licensed access and where premium is put on immediate access to colleagues and information. Charles Oppenheim has analyzed the differences between ownership and licensing. Contracts and licenses are, like trademarks, a form of intellectual property rights:

> *"A particular characteristic of intellectual property is the existence of contracts (often called licenses) for the exploitation of that material. This is particularly true in the electronic information industry. The owner of the intellectual property permits (licenses) one or more third parties to use the property (usually) on payment of a fee, for example a one-off fee, a percentage of sales, or a license fee based upon the amount of usage. Such a license does not pass the ownership of the property to the third party, it merely gives the 3rd party rights to enjoy the fruits of the owner´s labor. It is therefore equivalent to renting out your (physical) property. In short, the license is a promise that the copyright owner will not sue for infringement, provided the license terms and conditions are met."*
>
> - *Charles Oppenheim*
> (Oppenheim 2001, 15)

Typically services are something intangible and are activity-like rather than things, they are at least to some extent produced and consumed simultaneously, and the customer participates in the production process. In service business, customer retention is the core of business (Grönroos 1990, 25-40). From the marketing perspective, services operating on the Internet are formed as a sum of four elements, the core service, functional services, supporting services, and interface (Grönroos et al. 2000).

Clearly, the electronic journal delivery systems currently licensed bear the characteristics of services. An advance release of the Oxford English Dictionary gives the following additional definition to the noun service: *"service provider, an organization that (or occasionally a person who) supplies a service of some kind; (in later use freq. spec.) a company which offers subscribers access to the Internet, or to a telephone network"* (Oxford English Dictionary New Edition: draft entry Dec. 2002)

Information as a product has unique characteristics both in terms of comparison to other products as well as to the features of goods and services. At the heart of the information product there is the core, the information itself. As a product or a service it offers such visible and invisible features that can be transformed into monetary value (Rowley 2002).

Therefore, in the spirit of Rowley, it may be concluded that the core product of the currently licensed services of today are the electronic journal contents, the articles. Initially the customer demand was focused on the journal contents. However, in economics and marketing in general, a product is seen as a compilation of different product levels. According to Philip Kotler a product consists of five different levels, each of which adds value to the product in terms of customer benefit. The first level is the core benefit: the service or the benefit the customer is buying. The second level includes the core product: the core benefit turned into a marketable product. On the third level the core product is supplemented with expected attributes and conditions describing the core product. The fourth level is the augmented product which exceeds customer expectations. This is the level where differentiation can be and is currently being made to a great extent. The fifth level of a product is the potential product, i.e. a future product not yet on the market. It is

important to note here that augmentation always adds costs and that augmented benefits soon become expected benefits (Kotler 2003, 406-412).

The scholarly electronic information services all have an augmented level to the core product. These enhanced features include alerting services, forums and bulletin boards to facilitate online communication and interaction among peers, polling and user surveys etc. Some service providers have augmented their service with special members-only areas.

Finally, Jeremy Rifkin is concerned with the fact that interaction among peers is increasingly being founded on monetary exchanges. He writes:

> *"Services do not qualify as property. They are immaterial and intangible. They are performed, not produced. They exist only at the moment they are rendered. They cannot be held, accumulated or inherited. While products are bought, services are made available. In a service economy, it is human time that is being commodified, not places or things. Services always invoke a relationship between human beings as opposed to a relationship between a human being and a thing. Access to one another, as social being, becomes increasingly mediated by pecuniary relationships."*
>
> - *Jeremy Rifkin*
> (Rifkin 2000, 84)

Clearly, the appearance of the scholarly communities within the licensed information resources supports the fears that only money can buy the access to one´s peers.

A license does not grant ownership. Instead, it is a lease with a defined term of contract. From the business perspective it is important to be able to continue the business relationship with the existing customers because it is always more costly to obtain new customers. In general, consumer satisfaction is the main driver of sustainable customer relationships. However, it has been proposed that mere satisfaction as such is not sufficient but there are other factors as well which deal with customer defection (Jones et al. 2000; Arantola 2002). These factors can make it more difficult or costly for consumers to change providers but they can also enhance customers´ willingness to stay in the relationship with the provider. In other words, they are bonds that keep the consumers with the service even if an alternative service offering similar content would emerge on the market.

2.3. Differentiation among the many

2.3.1. Product differentiation

The scholarly information services, i.e. web-based services which contain scientific journals and/or reference databases, are continuously evolving. Today they include a variety of enhancements - additional services - to supplement the plain journal articles and reference databases. These augmented services are the means to differentiate from others offering similar or equal core services. However, the successful augmented services are not just about to become expected services, but also copied by other services. Thus they become a part of the core service the customers/consumers require, and a new feature will replace the role of an augmented service.

As discussed in the previous chapter, branding is another tool for differentiation. The importance of branding is emphasized in the online environment, where consumers are naturally cautious, traders may be remotely located and there is little or no physical contact to reassure purchasers of a company's financial security and/or good intentions. Consumers need to have brand awareness and reliance on brand performance in order to secure

their confidence to e-commerce. Indeed, a good number of electronic scholarly services have protected their brand names via trademarks in recent years. Today the services are increasingly linked with each other, allowing smooth transfer from one service to another. Figure 2.2 illustrates this web of scholarly information services, where service trademarks are used to identify individual services.

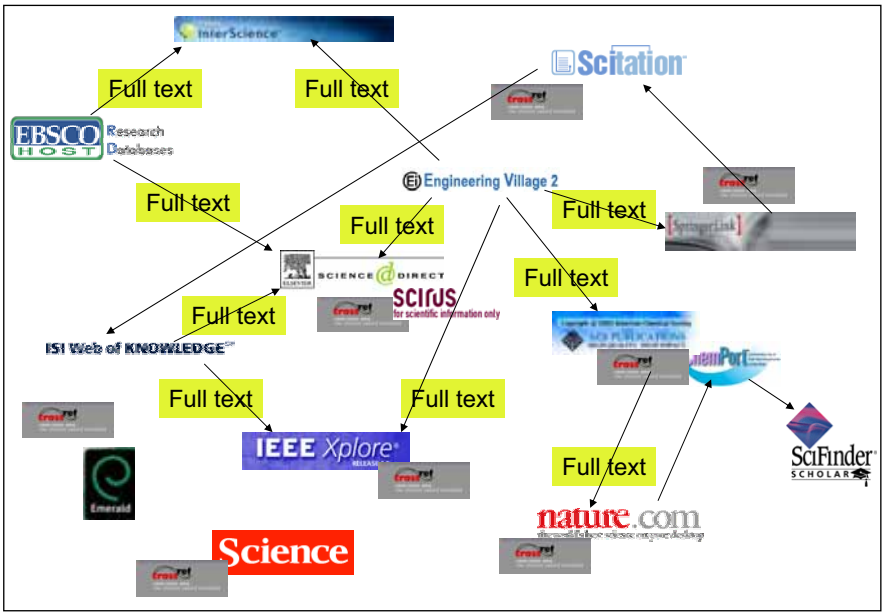

Figure 2.2 The interlinked scholarly information services.

Today one of the most interesting augmentations is the Crossref service, which enables cross-searching in reference databases and cross-linking among full-text documents (URL http://www.crossref.org). The picture in Figure 2.2 is a generalized illustration how Crossref can drive traffic towards and between the different publisher servers. The backbone of Crossref is the Digital Object Identifier (DOI), a system providing all articles a unique number by which they may be recognized. The Crossref service is thereby able to provide reference citation links to scholarly and research materials published by others. Researchers may thus move from one article to another, from one service to another, and view articles instantly on screen. Crossref is a brand name, a protected trademark for a service which enables searching and resource discovery for authorized and authentic scientific, technical, medical and other scholarly articles and other works, as well as provision of reference citation links to scholarly and research materials published by others, via a global computer network. The owner of the trademark Crossref is the Publishers International Linking Association, which consists of both commercial and learned society publishers as well as a number of libraries.

Smooth transfer from one document to another requires users to have rights to do so as part of a subscription or site license. Alternatively they can buy individual articles via a pay-per-view system (Brown 2001). Because it is an expensive process to provide cross-linking between services, concern has been expressed that there is a danger that cross-linking will become an exclusive right of the big publishers (Bérard 2002).

2.3.2. The growth in service trademarks

It is possible to analyze branding from the perspective of trademarks. When a brand name represents the essence of the ideas and feelings associated with a product or service, the protection given by a trademark can be crucial to the institution behind the brand name. In scholarly communication the services are mostly protected by service marks or trademarks. The International Classification for Goods and Services of the World Intellectual Property Organization WIPO reserves the Class 042 for the following items: "Scientific and technological services and research and design relating thereto; industrial analysis and research services; design and development of computer hardware and software; legal services." More specifically, there are subclasses to 042 such as "Licensing of intellectual property" and "Creating and maintaining websites for others" (http://www.wipo.int/classifications/en/). Brand names familiar to scholarly publishing such as IEEE Xplore, ScienceDirect, ISI Web of Knowledge, and others have been protected by service marks.

Trademark applications reflect the economic development as a whole, and optimism on markets leads to more applications. As the applications also reflect the ideas of the marketers, they can provide an insight into the assumptions of consumer preferences. WIPO has an international trademark registration system, the Madrid system, that offers the ability to seek trademark registration in multiple countries with one application. According to WIPO statistics, the top user countries in 2004 of the Madrid system were Germany, France, Italy, the Benelux countries, Switzerland, and the USA, with some 2,000-5,000 applications filed. The international figures are, however, modest compared with the figures of the United States Patent Office that alone receives more than 200,000 applications annually (WIPO 2005).

2.4. Growth compressed and condensed

Research education in the form of university-based doctoral schools has significantly increased the number of young researchers in Finland. Students enrolled in doctoral schools aim to pursue a career in research and often receive grants that enable them to study full-time. Doctoral studies are most often conducted in disciplines such as science, technology and medicine, where research funding has also been most easily available. These investments made in applied science and technology research are also illustrated by the increasing number of publications in these fields (Oksanen et al. 2003; Tohtoreiden työllistyminen, sijoittuminen ja tarve 2004).

Because of competition and recognition, it is important to publish in international forums. In science and technology today, such publications are available in electronic format, and in many cases they are made available in universities through a license. Instead of ownership of journals, there is a service license, a lease agreement with a defined term of contract (Oppenheim 2001, 15).

Both researchers and service providers alike need to stand out among the many (Oksanen et al. 2003; Tohtoreiden työllistyminen, sijoittuminen ja tarve 2004; Brown 2001; Liu 2003; Regazzi 2004; Tenopir and King 2004, 115). In the network of intangible services it is also about trust. Branding the services has offered a way to both differentiate and ensure confidence. The business perspective on branding, however, emphasizes the potential to profit financially from the brand name (Grönroos 1990, 25-48; Kotler 2003, 406-412).

There is an increasing number of professionally trained young researchers using the branded services in a working environment that is becoming more and more competitive. The market-driven research is often short-sighted and looks for applicable results. Industry-

university cooperation in research, found typically in disciplines such as science, technology and medicine, may bring the pressures for immediate results to the universities (Tutkimus- ja kehittämisrahoitus valtion talousarviossa 2004; Ylijoki 2003, Ylijoki and Mäntylä 2003). Research that changes directions may have special requirements for the services it is using. Long-term commitments do not necessarily fit in the profile of such research. On the other hand, the service providers aim to ensure customer retention (Grönroos 1990, 25-48; Jones et al. 2000; Arantola 2002; Kotler 2003, 406-412).

3. INFORMATION SEEKING AND BRAND LOYALTY

Information seeking, the activity whereby information is acquired, has been affected by the modern web-based information delivery via the Internet. Users today have rapid access to a broad range of information sources, which can be accessed in a variety of ways. Services containing scholarly articles and abstracting and indexing databases of various kinds are often available from users' own computers. There is novel ease of use and immediate access to information resources. How have the users responded to the new modes of information seeking, and how have the electronic services been adopted in research communities? Furthermore, how are services, instead of goods, consumed and perceived in the networked environment of scientific publishing?

When the Internet and the World Wide Web were introduced to the research community on a large scale, the scholarly publishing industry began to experiment with the networked environment (Schauder 1994). Once the big scientific publishers of established print journals went online during the late 1990´s, they were offered for licensing as large package deals. User authentication was conducted via IP-addresses enabling easy access. At the turn of the century, users had thousands of journals delivered at their desktops. At first there were only the most recent volumes incorporated in the services, but recently backfiles of older journal content have been added to the services.

Library users have been shown to borrow books in a manner that follows the repeat buying pattern of consumers (Emery 1993). In marketing terms, repeat buying or return to the service, is an indication of brand loyalty, a subset of brand value. Information seeking is about choosing between information sources and brands. In the following section, recent research in information seeking and online brand loyalty is reviewed.

3.1. General information seeking characteristics

Information seeking is influenced by many factors ranging from the scope of the task and the amount of detail to the requirements set by the social and organizational environment. According to Savolainen, the extensive empirical research in the area of information seeking has shown that it is a highly personal, situation-based and task-oriented activity. Presenting a single and comprehensive theory of information seeking is therefore challenging. However, the empirical research conducted since the 1950´s allows for the following conclusions about information seeking (Savolainen 2000, 73-109):

1. information seeking is often based on routines that can only be replaced with something that is found to be more useful
2. information seeking is purpose-oriented
3. on the one hand, information seeking serves individual problem solving; on the other hand, it provides a method to keep up with current issues
4. information seeking is often tuned to the requirements of the problem or task
5. information seeking is defined by subjective projections of how costly (time, money, and effort) it will be to use different information sources
6. the ease of access often directs information seeking
7. information seeking often originates from the occasion, and lack of time may restrict the use of information sources
8. information seeking is more often targeted to relative rather than absolute satisfaction of information needs

Although information seeking is an individual and situation-based process, it is obvious that there are many contextual factors affecting this behavior. Therefore, it is interesting to study special groups and their collective behavior in a specific information environment. Researchers and scientists have been in the forefront of exploiting the web-based information resources and are thus an appropriate target group for studies concerning the use of electronic services.

3.2. Factors behind routines of information seeking in electronic journals

Information seeking routines have a close link to the customs, traditions and cultures of disciplines. As a whole, science, technology and medicine are disciplines where scholarly journals have formed the major channel for disseminating research results and this affects the acquisition and use of information in these disciplines. Differences in the use of electronic journals between disciplines have been reported by numerous studies such as Tenopir and King, Brown, Cochenour and Moothart, Törmä and Vakkari, and Talja and Maula (Tenopir and King 2004; King et al. 2003; Brown 2001; Cochenour and Moothart 2003; Törmä 2003; Törmä and Vakkari 2004; Talja and Maula 2003). There was also a link found during the print era between research funding and the number of journals a discipline can support. The more funds, the more journal outlets (Meadows 1998, 66-69).

Physicists are known to have exchanged unpublished material in an organized manner in the print era. In the particle physics laboratory CERN, the need to improve the functionality of the archives that were by then already digital led to the development of the World Wide Web. The preprint archives of high-energy physics have been used as an example of revolutionary scientific information dissemination. (Meadows 1998, 66-69; Kling and McKim 2000). There are enthusiastic researchers and library professionals who advocate establishing similar systems across all disciplines. However, the routines, the accepted practices of communication adopted in the print era are not necessarily easily replaced.

Kling and McKim (Kling and McKim 2000) and Hahn (Hahn 2001) warn against assuming that accepted practices could simply be transmitted from one scientific community to another. Hahn is concerned about preserving the current diversity of scholarly communication systems and fears individual community needs are not appreciated adequately if digital developments are squeezed into one single model. Kling and Kim point out that in some fields it is more customary to share and be aware of the work of the others well in advance of the formal publication of research. The degree of industrial integration has an influence on the way research results are made public. Industrial collaborations, especially those that may readily result in income from patents and trade secrets, put pressure on academics to be more conservative about sharing data. Sometimes they may even delay publication of their methods and results. Also, in some fields, the high cost of research may increase collaboration and sharing of information. In addition, high-profile research may call for internal reviews prior to formal publishing. The number of outlets for publishing research results vary from one discipline to another, and in fields with a limited number of possible outlets, visibility is gained more easily (Kling and McKim 2000).

Engineers in research and development often work with a specific objective in mind: the particular product to be delivered to the client. Studies conducted in the United States show this type of research is not restricted to industry but may be conducted in a university environment, as well. Such work can be contracted or commissioned, it is always constrained by time, and is often conducted in an atmosphere of secrecy and confidentiality (Tenopir and King 2004, 37-55, 71-87; Leckie et al. 1996). Similar characteristics have also

been found in Finnish universities (Ylijoki and Mäntylä 2003, Ylijoki 2003).

Recognition together with readership is important when academic researchers choose their outlets of research results. On the one hand, recognition and prestige are linked with reputation and quality, acceptance and continuity, found among the established publishing practices. On the other hand, readership is linked with open access to research articles. A few are excluded when research articles are freely available on the Internet. Within contemporary scholarly communication the ideas of prestige and readership are sometimes viewed as contradictory, but nevertheless equally important to the academic researchers (Schauder 1994).

The scholarly community has worked out ways to deal with issues about trust and legitimacy in the world of printed journals. Consequently, services that are readily organized in ways that protect the traditional concerns have higher priority, and this is why the electronic versions of established journals are more easily accepted than pure new electronic journals which lack prior recognition (Kling and McKim 2000; Speier et al. 1999). If journal materials have been the primary source of information, it is likely that the traditional source will be sustained in the electronic environment, and journals – if available in digital format – will be accepted. However, information-seeking patterns as a whole do not alter in a simple way with the change of the journal format (Talja and Maula 2003; Mahé 2004; and Tenopir 2002).

Something that is so useful that it will change routines might be on its way. It has been suggested that electronic publishing systems could provide new opportunities of the creation of advanced linking capabilities, community collaboration, and integration across research and application communities at a level not possible with print systems (Hahn 2001, 60; Mahé 2004; Talja and Maula 2003). Publishers have also seen this as an opportunity. The mere replication of the printed version on the Internet was not regarded as a viable option. Rather, the new medium offered new opportunities and services to add value to the process of scholarly communication. The fact that each subject area may have its own requirements could be taken into consideration as these services assist the academic work (Oppenheim et al. 2000). However, the race in new product development may not be economically feasible for all those involved. Providing services with added value such as cross-linking between documents is an expensive process and therefore not necessarily possible for some of the non-profit publishers (Bérard 2002).

Another factor affecting information-seeking practices are the Internet search engines, such as Google. Researchers rely increasingly on search engines in their professional information-seeking activities, and experiments such as Google Scholar (URL http://scholar.google.com/) and PubMed (URL http://www.ncbi.nlm.nih.gov/entrez/) promote this development.

3.3. Purpose and task-oriented use of electronic journals

The purposes for which electronic journals are used vary according to the tasks of the users, including research, keeping up-to-date, individual problem solving and teaching purposes (Törmä 2003; Törmä and Vakkari 2004; Talja and Maula 2003; Tenopir and King 2004). Usually researchers act in several roles during the course of the day and these roles may include that of a service provider, administrator, manager, researcher, educator, and student (Leckie et al. 1996; Ylijoki and Mäntylä 2003). The main factors that affect information seeking of professionals are the availability of sources and awareness of sources. When deciding which sources to use, familiarity with the source, prior success in using the source, reliability, convenience, usefulness, timeliness, relative cost-effectiveness, quality,

and accessibility are considered (Leckie et al 1996; Savolainen 2000, 73-109).

In Finland Törmä and Vakkari found that the availability of material is more important than the discipline when explaining and predicting the use of electronic materials. Satisfaction towards the FinELib services was influenced by the availability of materials central to the researcher´s needs rather than by his or her discipline. Awareness of the services was encouraged by a positive community atmosphere towards the services. There was a correlation between the perceived availability of materials and the use of materials in various tasks, such as teaching, research, and keeping up-to-date. Törmä and Vakkari propose that availability is a significant predictor of use when materials are used for research and teaching. In tasks that relate to one´s pursuit of keeping up-to-date, predictions can also be made by discipline. This is because the disciplinary characteristics, such as the nature of research, may affect the use of electronic resources (Törmä and Vakkari 2004).

The way a discipline has organized its information flows affects the use of electronic journals. Fields such as natural sciences where well-indexed subject-based databases are common are likely to benefit from the electronic journal services. Furthermore, in fields where systematic literature reviews are needed but where sources are scattered, the electronic journal services can provide assistance (Talja and Maula 2003).

Awareness and use of electronic journals has risen rapidly once the major scientific publishers of established print journals went online on a large scale during the late 1990´s. In 1998 Speier, Palmer, Wren and Hahn observed an extremely low awareness of electronic journals among the academic faculty: only 16% of faculty members had used electronic journals (Speier et al. 1999). Just a few years later it was found that among university researchers about 40% of the reading of articles was from electronic format, and compared with other academics, scientists were reading substantially more from electronic journals than other groups among the university faculty. Scientists tended also to read more articles than before. Because the time frame of reading had not grown respectively, it was argued that people spend less time in reading an individual article (King et al. 2003).

At the turn of the millennium, the younger generation of researchers was found to be significantly more likely to prefer electronic delivery of journal articles than the older generation (Assumptions versus reality, 97-123). The assumption that young researchers could revolutionize the traditional modes of communication and other practises of their community was not supported by Covi who found that doctoral students were very conscious of publishing their work in prestigious journals (Covi 2000). The advisors of doctoral students had the role of passing on the accepted communication traditions of the field, and those who successfully promoted new innovative ways of sharing information within disciplines had already earned their credentials. When students move on to become faculty members, they can carry along work practices that are helpful in the essential activities, but technology alone is not enough to change the values associated with doctoral research (Covi 2000).

Hewitson found that the impetus to start using electronic journals was often personal, such as research for doctoral studies. The PhD students were also high-level users of the electronic information services and they consulted a wider range of sources than other academics that he observed at a UK university. The doctoral students were also more inclined to incorporate these materials into their teaching (Hewitson 2002). In Finland, among the active FinELib users, i.e. those who answered the web-based user survey in 2002, young researchers with teaching responsibilities represented the majority of users (Törmä 2003, 48-49).

3.4. Convenience and ease of use

Before electronic journal services became commonplace, there was anticipation of the future services. Stewart found chemistry researchers being anxious to change their habits as soon as they had electronic access to recognized journals. They would read more complete articles, spend their reading time more efficiently, and read articles sooner after publication (Stewart 1996). Indeed, this lack of access to the primary material, i.e. journal articles, conference proceedings, reports etc., was considered a strong reason for the nonuse of the databases among Finnish energy researchers in the early 1990´s (Schröder 1991). Schauder found that the academics preferred access to professional articles over entire journal issues before the electronic journal services had fully materialized in the early 1990´s (Schauder 1994). Contrary to this preconception, Kortelainen recently found that people downloaded more articles from services where journal issues were present and less from the aggregate services where a reference database is supplemented with links to article collections. Kortelainen proposes that the additional services not present in the aggregate services might offer an explanation for this difference. She also proposes that users might perceive the aggregate service article files as more complex than services based on journal issues (Kortelainen 2004).

Researchers need computer skills before information technology can be exploited. Publishers in the UK did not consider the computer literacy skills of research staff a problem, but feared for the inadequacy of the hardware (Oppenheim et al. 2000). In information-seeking research, insufficient skills have been seen as a barrier for use of electronic journals (Hewitson 2002; Talja and Maula 2003) but others see that the overall computerization of society has already made electronic journals mundane in this respect (Mahé 2004). Cochenour et al. found that younger respondents were more confident about their computer and information-retrieval skills than their older counterparts. The use of computers and the level of overall knowledge about them vary in different disciplines. The engineering, science and business faculties have been reported to experience fewer problems in viewing electronic journals than other faculties (Cochenour et al. 2003).

Regarding the cost of information, the publishers agreed upon the fact that customers are reluctant to pay a realistic price for electronic products (Oppenheim et al. 2000; Regazzi 2004). Because of the lack of mature payment mechanisms, business development has been slowed down but the access method of pay-per-view is expected to be increasingly important in the years to come (Oppenheim et al. 2000; Assumptions versus reality 2001; Keller A. 2001).

3.5. Reliability and recognition requirements

The establishment of a reliable information system that fulfils the needs of a scientific community takes time, and the diversity of independent and long-standing peer-reviewed journals has secured the ability to validate research (Schauder 1994, Hahn 2001; Bérard 2002). A careful balance between for-profit and non-profit publishers has existed, and competition has been seen as a way to ensure quality. The concern for the future has been the long-term preservation of well-identified reliable sources (Bérard 2002).

In science, where the amount of scatter (Meadows 1998, 218-219) is somewhat smaller than in more interdisciplinary fields such as technology, journals can more easily be ranked according to their prestige. Hahn divides science journals into three categories: high-prestige general science journals, top discipline journals, and specialized journals. The high-prestige general science journals have an extremely large cross-disciplinary

audience, and publishing in such a journal is therefore the ambition of most scientists. The top discipline journals offer a venue for general interest articles, whereas the specialized journals serve the needs of those requiring an outlet for sharing specialized information among experts (Hahn 2001). Citations made to a given article in a given journal are used to calculate the relative value of the article and the journal, allowing the ranking of scientists (Oksanen et al. 2003).

The first electronic journals did not necessarily have a counterpart in the print world, and therefore they lacked the required recognition even if the journals were peer-reviewed. Harter measured the impact of electronic journals through citations made to some forty electronic journals. He found that the number of good-quality articles in electronic journals was smaller than in respective printed journals. Also, for journals with both a print and an electronic version, it was the print version that received the citations (Harter 1998). Harter and Ford found that the structure for linking other documents to articles in the journals was neither homogeneous nor consistent, and the lack of persistent URLs was evident. As a consequence it was evident that a number of links did not work, thereby affecting the quality (Harter and Ford 2000).

It has been suggested that for the near future, peer-review and quality control will remain the most important contributions of scholarly journals. The established journals have been almost the sole proprietors of quality control and reward and recognition. However, electronic journals will move to exploit new technologies far more than they are able to do at present, and other, faster and more efficient communication channels than journals will gain ground (Keller A 2001).

3.6. Brand loyalty

Brand value or brand equity is signified by satisfied customers, who as such indicate good-quality service processes. It also implies brand loyalty, which is believed to lead to successful future business. However, the branding or marketing culture has not yet reached the libraries, which through their websites and portals make available a number of licensed services, such as electronic journal services (Singh 2004). Based on consumers´ and customers´ previous choices, usage, and buying patterns, it is possible to predict their future behavior. In relation to marketing, the knowledge of customer and consumer behavior is extremely important, and detailed information about the customer´s service encounters needs to be recorded (Grönroos 1995).

Customer satisfaction has dominated the literature about service delivery in the library and information setting (Singh 2004). And in general, consumer satisfaction is the main driver of sustainable customer relationships. However, it has been suggested that the mere satisfaction as such is not sufficient, but there are other factors, as well, which deal with customer defection (Jones et al. 2000; Arantola 2002). There are factors that can make it more difficult or costly for consumers to switch, but they can also enhance willingness to stay in the relationship with the provider. In other words, they are bonds that keep the consumers loyal to the service even if an alternative service offering similar content should emerge on the market. The factors, the bonds, may be of different type, such as agreement-based economic or legal factors, knowledge gained or technical investments made during previous encounters, social and emotional factors, and factors related to time, structures, and geography (Arantola 2002, 63). Jones, Mothersbaugh and Beatty found that the effect of core-service satisfaction on repurchase intentions was reduced when a customer perceived high switching barriers, i.e. he or she was reluctant to change service providers because of the attachment to the service via the bond factors (Jones et al. 2000).

Empirical studies in the online environment about services and brand loyalty formation are scarce, due to the new and constantly changing environment. Therefore, in the following, the empirical research review is not restricted to online information services. The results of these studies are relevant to this study from the perspective of forming loyalty to intangible services.

3.6.1. The role of experience

Successful previous encounters with a service pave the way for future use and thus experience with the service is important. Oliver proposes that satisfaction is just the beginning of the process that leads, in fruitful conditions, to brand loyalty. The factors required to reach loyalty are personal determination and social support. In the beginning, there needs to be knowledge or previous experience about the brand. Affective feelings for the brand are formed only if satisfaction is experienced. When the motivation to repurchase the product or revisit the service is supplemented with readiness to act, commitment to the brand is formed. In the end, loyalty may become independent of satisfaction so that dissatisfaction will not influence the state of loyalty (Oliver 1999).

In empirical studies conducted in the service branches of Chinese medicine (Mattila and Wirtz 2002), fast food restaurants (Johnson and Matthews 1997), online brokerage firms (Chen and Hitt 2002), and online grocery stores (Danaher et al. 2003), it has been shown that consumers tend to rely on information based on their previous experience when choosing a service provider. Those consumers with little subjective knowledge are more prone to rely on word-of-mouth information communication and advertisements (Mattila and Wirtz 2002; Johnson and Matthews 1997). Here large brands can provide sufficient information for consumers to predict satisfaction without experiencing the product. Danaher, Wilson and Davis found that brand loyalty to large market-share brands bought online was significantly greater than expected, with reverse result for small-share brands (Danaher et al. 2003).

The acquired knowledge builds up every time the service is used and therefore these knowledgeable consumers are likely to be high-volume and/or long-time users (Mattila and Wirtz 2002; Chen and Hitt 2002). Experience also decreases the perceived risk associated with the service category, and consumers who think they know a lot about the service category tend to have greater confidence in their own evaluation skills (Mattila and Wirtz 2002). Because all the services within the same service category are similar, the service experience may easily influence the expectations of all the services in the same category. Expectations for service quality have been found to be strongly influenced by previous service encounters. Johnson and Matthews propose that a more recent customer could have higher expectations for quality because they are confident about the service due to the recently encoded information (Johnson and Matthews 1997). In the case of online groceries, Danaher et al. propose that quality-related conclusions drawn from well-established brand names can reduce the perceived risk in the online environment. Also, after the initial use of online (grocery) service, the paths to certain sub-brands can be stored in the information system of the provider, making it easy to select the same brands during the next encounter (Danaher et al. 2003).

3.6.2. Why switch?

Chen and Hitt found that among online brokerage services customers who had adopted

fewer service providers were more likely to stay with the provider, and those who used multiple providers were more apt to change their service providers. The rate of website activity was associated with reduced switching, whereby frequent users were less likely to become inactive and give up the service. Also, the additional services that increased the product line breadth were found to be helpful in keeping the customers and reducing switching (Chen and Hitt 2002).

Chen and Hitt also found that perceived higher website quality reduces intentions to switch service providers (Chen and Hitt 2002). On the other hand, Romaniuk and Sharp found little evidence of a certain attribute, such as quality, having more influence than other attributes on brand loyalty. This research was conducted on the print subscription market where consumers typically subscribe to only one brand for the service. There was, however, an interesting relationship between perceptions and loyalty: the more attributes there were attached to a brand, the less likely it was that the customer would choose another service provider (Romaniuk and Sharp 2003). It is known that consumers are unlikely to view an attribute as good or bad if they do not also consider it to be important. Therefore it is difficult to create a favorable association for an unimportant attribute (Keller K.L. 1993). A car marketed with attributes such as spacious, safe, and comfortable does not necessarily appeal to young men, who would rather associate their vehicles with speed, sporty looks, and beautiful women.

3.6.3. New features of the online environment

Personalization, whereby a website can be tailored to meet individual users' characteristics or preferences, is making interactions faster and easier. Consequently, it is believed to increase customer satisfaction and the likelihood of repeat visits. However, Chen and Hitt found it was not the case, personalization was not found to increase loyalty as it did not reduce the intentions to switch. Also, ease of use is a factor that has been found to have a negative effect on keeping the customers. When little effort is required in learning to use the service, the switch to an alternative service is easy (Chen and Hitt 2002).

Satisfaction with the service is the initial requirement for loyalty (Oliver 1999). Van Riel et al. found the user interface as such had only a small effect on the perceived overall satisfaction with a medical journal portal with additional services. Van Riel et al. measured satisfaction with three portal service components, the core service, supplementary services, and the user interface, and found that satisfaction with each of the elements influenced consumers´ overall satisfaction with the portal. However, van Riel and his co-authors propose also that

> *"…because the user interface is needed to access each of the offered service components, it is probable that the interface quality will moderate the effect of the other components on customer satisfaction. For example, if browsing is slow, the time to retrieve information is disproportionately long, or if the format is inappropriate or confusing, this will have a negative effect on satisfaction. We can therefore expect interaction effects between the perceived quality of the user interface and all other categories of service quality. Furthermore, the user interface may be a dissatisfier that only has a negative effect on satisfaction, value and loyalty when it fails to reach a certain standard."*
>
> - *Allard C.R. van Riel, Veronica Liljander, Petra Jurriëns*
>
> (Van Riel et al. 2001, 373)

Lu and Lin found that customer loyalty to an online newspaper service could be predicted by the customer´s perceptions of the interface effectiveness rather than by the perception of the quality of information or the technical efficiency of the service. They suggest that as consumers are exposed to free-of-charge information, they are less critical towards the quality of the information (Lu and Lin 2002).

3.7. Electronic services and information behavior in brief

As presented earlier in this chapter, familiarity or prior success, reliability, convenience, usefulness, timeliness, relative cost-effectiveness, quality, and accessibility are factors influencing the choice of information sources. Previous studies have shown that variables such as age, discipline, status, and task also affect the information seeking process. Furthermore, the traditions of formal communication in science are changing with the advent of electronic services. Previous research into information seeking among researchers has demonstrated that researchers place equal value on two features: on the one hand, free access to information, and on the other hand, recognition and reward (Schauder 1994; Kling and McKim 2000; Speier et al. 1999). The latter can only be achieved by following the research and communication paradigm of the discipline (Meadows 1998). Provided that there is this paradigm support in the scientific community, the more resources that are available in electronic format, the more likely the users are to adopt these resources (Speier et al. 1999; Törmä and Vakkari 2004).

Greater availability has resulted in more reading as predicted (Stewart 1996) but not necessarily in more time being spent on reading (King et al. 2003). Young researchers at the beginning of their career are not in the position to change the current practices (Covi 2000) but they tend to favor electronic services (Assumptions versus reality 2001; Cochenour and Moothart 2003; Hewitson 2002; Törmä 2003). Their modes for information seeking in research emphasize the need for the core material, which in science and technology is the scientific article. (Schröder 1991; Leckie et al 1996; Tenopir and King 2004; Kortelainen 2004). For publishers and readers alike, electronic media was not expected to be a replica of the print media (Oppenheim et al. 2000; Kortelainen 2004). Previous studies also indicate that values and perceptions of services change over time. Novice users are more apt to pay attention to the recommendations made by their colleagues or other partners who base their valuations on experience.

Research related to brands and online services has demonstrated that strong brands have an advantage in the networked environment (Danaher et al. 2003), experience is an important factor in brand choice (Mattila and Wirtz 2002; Johnson and Matthews 1997), and perceptions can help in predicting future decision making (Chen and Hitt 2002; van Riel et al. 2001; Romaniuk and Sharp 2003). Experience decreases the perceived risk associated with the service category (Mattila and Wirtz 2002) and therefore the associations with trust and reliability should increase with experience.

4. RESEARCH QUESTIONS AND RESEARCH METHOD

4.1. Research problem

Little longitudinal research into researchers' information seeking and augmented services offered to them has been carried out due to the short history of such services. The dimension of time was, however, regarded as an important element in this study. An adaptation of the apparent time method of sociolinguistics was found suitable in this respect. A set of time-related categories, which are believed to illustrate future development, are formed in order to distinguish trends that develop over time. It is here that this study focuses and aims at assessing, how the branded services may have an influence on information seeking over time. As illustrated in the previous chapter, experience affects the decision making of consumers when choosing a brand. It is the inexperienced users who pay attention to advertisements and word-of-mouth communication, i.e. recommendations made by others. The knowledge of services and personal previous experience also make it easier for information seekers to find the path to the service in the networked environment.

Predictions about the relationship retention between the consumers and their services can be made by measuring brand loyalty. The extreme vision is that *"brands cohere into systems that consumers create not only to aid in living but also to give meaning to their lives. Put simply, consumers do not choose brands, they choose lives."* (Fournier 1998, 370).

Researchers are the consumers of scientific information, and as such they form an appropriate reference group to chart the role of brands in their information-seeking activities.

4.2. Research questions

Can the information seeking patterns of digital library users predict brand loyalty? Previous research indicates that in scientific communities seniority defines the accepted practices. It is only when experience grows and young researchers receive senior positions that they can influence the working practices. If these young researchers today are using the scholarly information services, their perceptions will then be those that guide the new generation of researchers. Have the young researchers of today, when exposed to the brands, become loyal consumers of the licensed scholarly information services currently available?

The research problem evolved into the following question: "How quickly do young researchers become aware of, adopt and possibly become loyal to electronic information services?" This can be divided into three sub-questions:

RQ1 How do young researchers take notice of branded scholarly information services?

RQ2 How do young researchers value the augmented services in the context of branded scholarly information services?

RQ3 What, if any, brand value aspects emerged between young researchers and electronic information services?

4.3. Forming hypothesis

The key concepts of the research are those related to brand value, namely brand awareness, brand associations, brand quality, and brand loyalty. Other key concepts are the scholarly information services and the augmented services.

Brand value or brand equity can be defined as *"a set of brand assets and liabilities linked to*

the brand, its name and symbol, that add to or subtract from the value provided by a product or service to a firm and/or to that firm´s customer." (Tuominen 1995, 37). These liabilities and assets are elements that can be grouped under brand loyalty, awareness, perceived quality, brand associations and other proprietary brand assets. Customer-based brand equity has been defined as "*the differential effect of brand knowledge on consumer response to the marketing of the brand*" (Keller K.L. 1993, 8). Brand equity is the value of the brand, the positive differential effect that knowing the brand name has on customer response to the product or service (Kotler 2003, 422). Brand equity is composed of dimensions such as brand awareness, perceived quality, brand associations and brand loyalty. A powerful brand has high brand equity (Aaker and Joachimsthaler 2000, 38-39). Brand equity results in customers showing a preference for one product over another when they are basically identical (Kotler 2003, 422).

Brand awareness is a concept widely used in marketing research and literature, and Keller divides it into two; brand recall and brand recognition. Brand recall is "*correct identification of brand given product category or some other type of probe as cue*" (Keller K.L. 1993, 14) and it captures the top-of-mind accessibility of brand in memory. Brand recognition is "*the correct discrimination of brand as having been previously seen or heard*" (Keller K.L. 1993, 14). It captures the potential ability to retrieve from memory or the availability of brand in memory. Brand awareness affects consumer decision making by influencing the formation and strength of brand associations (Keller K.L. 1993).

Brand quality is "*a customer´s perception of the overall quality or superiority of a product or service relative to the alternatives*" (Tuominen 1995, 20). Perceived quality cannot necessarily be objectively determined, because perceived quality itself is a summary construct. It can be regarded as a special case of brand associations because its influence on brand associations is found on several occasions (Aaker and Joachimsthaler 2000, 39; Tuominen 1995, 20-21).

Brand associations are the brand perceptions that consumers hold in memory. Together with brand awareness, brand associations are informational nodes linked to the brand node in memory and contain the meaning of the brand for consumers. The more a consumer actively thinks about and elaborates on the significance of service information, the stronger the associations are created in the memory. Brand associations may include product attributes, customer benefits, uses, life-styles, anything that provides a mental linkage to the brand. They can vary according to their favorability, strength and uniqueness. However, unless the brand has no competitors, the brand will most likely share some associations with other brands and these shared associations can help to establish category membership. (Keller K.L. 1993).

"*Brand loyalty represents a favorable attitude toward a brand resulting in consistent purchasing of the brand over time*" (Tuominen 1995, 17). Brand loyalty can be viewed from two different viewpoints, one highlighting behavioral approach and the other emphasizing cognitive approach. The former approach views the repeat buying of one brand over time as an indication of brand loyalty with a strong stimulus-to-response link. The cognitive approach to brand loyalty underlines that behavior alone is not sufficient to explain brand loyalty and sees that loyalty implies a commitment. The commitment in turn cannot be measured only by repeat-buying behavior (Tuominen 1995, 17-19). Arantola defines customer loyalty as "*repeated buying or other experience of an offering combined with a positive attitude towards the offering or provider*" (Arantola 2002, 161). Commitment is a state of motivation to stay in a relationship, and it changes over time (Arantola 2002, 118).

Customer-based brand loyalty reflects the likelihood of customers returning to the brand or vice versa, it reflects how likely a customer is ready to switch to another brand (Tuominen 1995, 17-19). A synonym for brand loyalty is brand strength, the consumer´s level of attachment to a brand (Wood 2000). Loyalty can also be seen as an evolving ladder of relationship between the customer and the product, where the levels of awareness and experience, relationship and commitment, users and communities of users, and advocacy follow each other (Arantola 2002, 49). Similarly, the following grouping illustrates the variety of loyalty forms. Non-loyal customers are indifferent to the brand, and the brand name plays little role in their decision making. The habitual buyers are satisfied or at least they are not dissatisfied with the brand. Despite being satisfied, the third group has switching costs, i.e. there are costs in time or money associated with adapting to another brand. The fourth group´s preference to the brand may be based upon association such as a symbol, a set of use experiences or perceived high quality, and there is an emotional attachment to the brand. Finally, the committed customers feel pride in being users of a brand. The brand is highly important to them either functionally or as an expression of who they are. Their confidence in the brand is such that they will recommend it to others. Satisfaction and positive word-of-mouth are likely to be common among brand-loyal customers (Tuominen 1995, 17-19).

In general the augmented services are the add-on services to the level of an expected service. With augmented services the customer´s expectations are exceeded and the service itself is differentiated from other services (Kotler 2003, 407-409, Grönroos 1990, 71-91). Services are performed, and there is action and relationship involved in the process (Grönroos 1990, 25-48). In the context of scholarly information, Kortelainen makes a distinction between electronic journals and article files. Electronic journals have maintained the traditional journal issue structures as the core of the service. The additional services such as linking to external services, navigation between materials, and browsing of journal issues add value to the service. With article files the website hypertext structure is not utilized as much as in electronic journals and the unit of information is an article (Kortelainen 2004). Electronic journals may be electronic versions of peer-reviewed print journals or journals published in electronic format only. Access to electronic journal contents has also been possible via reference databases (Talja and Maula 2003). For the purpose of this study scholarly information services were defined to be web-based services that contain scientific journals and / or reference databases. Augmented services were defined as the additional services that supplement plain journal articles and references and perform a function of some kind.

The overall hypothesis was formed based on previous research. The assumption was that time would positively affect brand value. More specifically, the hypotheses were formulated as follows:

H1 Brand awareness about services increases over time
H2 Brand associations become more positive over time
H3 Brand loyalty becomes stronger over time

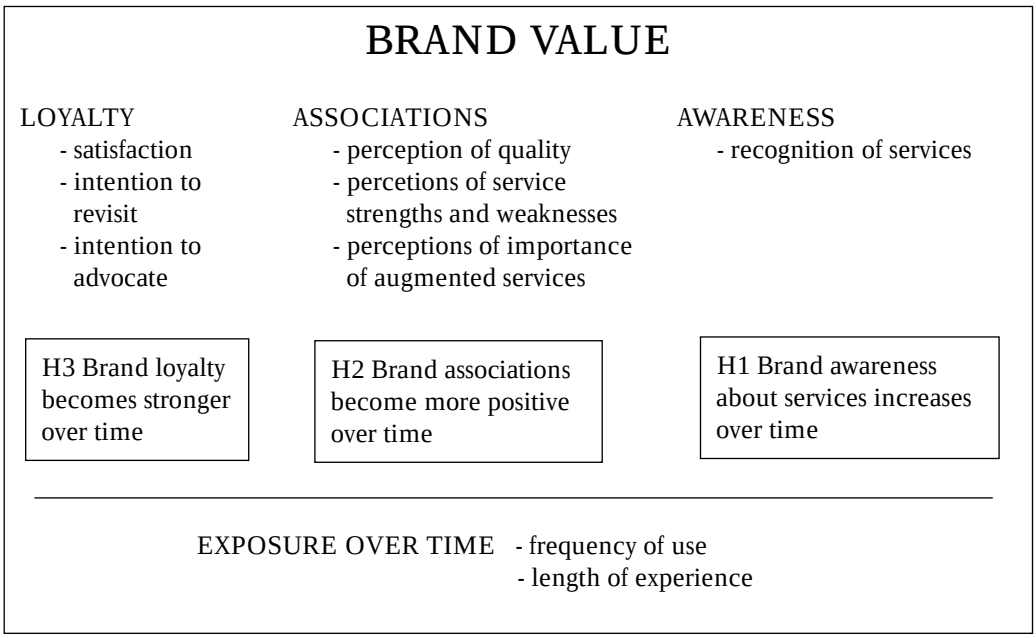

Figure 4.1 The research hypotheses that are linked with the research question ”What, if any, brand value aspects emerged between young researchers and electronic information services?”

Figure 4.1 illustrates the structure of the planned testing of the hypotheses. Two separate categories, frequency of use and length of experience, are formed to represent the change that takes place over time. The elements of brand value, awareness, associations, and loyalty are then measured against these categories. Brand awareness is about recognizing the services. It is assumed to increase over time (H1). Brand associations deal with perceptions of quality and service strengths and weaknesses, and with perceptions of the augmented services. Brand associations are expected to become more positive over time (H2). Brand loyalty is related to satisfaction and to the intentions to revisit and advocate for the services, and it is assumed to become stronger over time (H3).

4.4. From theory to practice

4.4.1. Selection of research method

The framework of the research was derived from theories of information seeking supplemented with marketing theories. The marketing theories about branding provided the structure to the framework. Information seeking was accepted into the framework through previous studies, as ready-made interpretations about researcher´s information-seeking habits. This provided a way to include a cross-section of the versatile information-seeking practises into this research. However, as the services are constantly changing, even the most recent research has only been able to grasp a moment already past.

From the ontological standpoint, the trademark logos are the protective marks of intangible services. They are the visible signs that make the concepts about branding concrete. Evidence was to be found, according to the framework, by testing the hypothesis in the context of scholarly communication. From the epistemological standpoint the logical reasoning seemed most appropriate as the research is about technological development and the evolutionary growth of things. The causality aspects are linked with evolution. The values of the researcher affected heavily the methodological decision, because the environment where research was to be conducted has high regard for information that can

be proven mathematically. The research framework where marketing theories form the structure also implicitly distanced the researcher from the object. It was difficult to partner with the consumer when testing the applicability of the view of the marketer.

The research method was subsequently required to have a clear logic and structure, and there was a need to be able to verify the theories of marketing in the information-seeking context. This was provided by the quantitative approach. The unstructured or semi-structured strategies provided by the qualitative approach did not fulfil the needs of this research at this point, as illustrated below in more detail.

The experimental research method was excluded because there was not enough evidence to support the initial research idea. First there needed to be proof that researchers and their brands follow the path described in the marketing theory. A case study would reveal detailed information about a small group or an incident, it would give a descriptive explanation but it would not provide the hard facts required to accept or reject a hypothesis. This would, however, be possible with a survey that offered a structured format for collecting descriptive, comparative, and explanatory information from a group of people.

The quantitative approach can give support to preconceptions in a format directly applicable to the work environment of the researcher. Quantitative research is accepted also in the information research and marketing research communities.

A quantitative approach applying the survey method can use either an interview or a questionnaire. When the research problem centers around young researchers and their commitment to electronic services over time, an interview would certainly give plenty of good and deep information about what services they use, how, and why they use the services. A survey interview would be flexible and offer the possibility to clarify matters whenever needed. However, because of the time constraint in the execution of this study, a survey with interviews was not considered feasible. Also, because of the research topic, there was a possibility that socially acceptable answers would dominate the interviews in a situation where also the researcher might feel biased because of her professional background in library work. A full-time doctoral school student is expected to be knowledgeable about the modern information services available to her or him in university campuses where the electronic journals largely take the place of printed library journal subscriptions.

A questionnaire is an efficient and inexpensive way to reach a good number of people and ask their opinions about various issues. It is possible to handle and analyze the data collected with a questionnaire by means of statistical analysis. It is also possible to estimate both the time and costs involved. However, it is known that interpreting the results may be difficult because the method lacks the possibility of ad hoc clarification. Also, it is impossible to know what the respondents´ true attitudes towards the questionnaire were or if they were at all familiar with the topic of the questionnaire. There is a risk of data loss. Furthermore, preparation of a good questionnaire requires both knowledge and skills (Hirsjärvi et al. 2002, 53-191; Potter 2002, 35-70).

Internationally within the library and information research community, the survey research method is still among the most popular methods. In the past decades, Finnish library and information studies research has, however, increasingly applied conceptual and historical research methods, and the trend of applying the survey method has been declining (Rochester and Vakkari 2003).

Consequently, the research method chosen was the survey method to be implemented with a questionnaire. As the questionnaire was to focus on the web-based electronic scholarly information services, it was decided to conduct the survey in the same environment. A web-based questionnaire would also offer significant cost savings.

4.4.2. Questionnaire design issues

4.4.2.1. Format of questionnaire

In general it is known that the response level in postal questionnaires can fall down to 30 - 40% (Hirsjärvi et al. 2002, 53-191). Compared with the traditional postal questionnaires the web-based questionnaires have been reported to have lower response rates. Furthermore, in terms of coverage, web-based questionnaires require access to a computer and the Internet. However, populations such as university staff and students can have a considerably high Internet usage. Recent research has shown that in such a population the differences between response rates of postal and web-based questionnaires can be remarkably low, if any (Forsman and Varedian 2002). Also, with individual invitations to participate in a survey the response rate has been reported to fall to a level similar to postal questionnaires. Factors influencing the response rate include measures conducted in the recruitment phase as well as the design of the questionnaire. Soliciting and recruiting to acquire answers to web-based questionnaires can be done by telephone or e-mail, and research has shown that individual invitations have a positive influence on the response rate (Lozar Manfreda and Vehovar 2002). Problems with the measures of outcome rates vary; some interpret response rate as percentage of respondents among the target population while others prefer reporting the drop-out rate, and also problems measuring coverage, non-response, and estimation have been reported (Forsman and Varedian 2002).

A web-based questionnaire is more inexpensive than a postal questionnaire because soliciting the information about the questionnaire can be conducted by e-mail and the questionnaire itself resides on a web server. Furthermore, there is a variety of ways of designing the questionnaire and to have the responses directed automatically to a database.

4.4.2.2. Contents and layout of questionnaire

It is known that the response rate in questionnaires is lower than in interviews, and there will be many responses with insufficient information, which might cause bias. It is also known that in answering a questionnaire the respondents tend to exaggerate their behavior. However, if the respondent finds the study important, he or she is prone to answer precisely. Factors known to affect the response rate of a questionnaire are target group, topic of the study/survey, length of form, number of questions in the form, motivation in the covering letter, the layout of the form, and reward (Hirsjärvi et al. 2002, 53-191). In web-based questionnaires there are additional design issues, such as the respondent´s need to understand how questionnaires are answered and how computers and the Internet are used. Consistent use of graphics can be of help and visual stimulants can be used to break long questionnaires. Also, it is possible to construct a questionnaire progressing page by page or a scroll-down questionnaire where the whole questionnaire is in one scrollable page. However, the variety in computer hardware, connection speed, and software/browsers used in the target population limits the use of extensive graphics (Forsman and Varedian 2002).

4.5. Research data

Research data was needed to provide empirical material for assessing the research questions

and testing the hypotheses. The target group, the doctoral students enrolled in doctoral schools in the fields of science and technology, represented young and active researchers in fields where the availability of scholarly electronic services in general is good. As such, the target group was expected to be the most active and motivated user group of the electronic information services.

4.5.1. Data collection

The data collection phase started with the initial planning of the questionnaire followed by technical implementation and web design. After the pilot testing, revisions were made before execution. A copy of the questionnaire is found in Appendix 1.

4.5.1.1. The questionnaire

The web-based questionnaire was prepared by using the questionnaire generator prepared and managed by the Laboratory of Information Processing Science of the Helsinki University of Technology. Initially developed for collecting course feedback, the system can also be used for other types of questionnaires without cost. The questions were entered into the system according to the system requirements. The system collects the responses into a database that offers a preset query and some statistics about the collected data. For a statistical data analysis the collected data must be requested from the system and transferred to another computer. The data is sent as a Microsoft Excel file and delivered as an e-mail attachment.

Once the questions were in the system, the layout of the questionnaire web page was planned and executed, and the html-coded page transferred to the site at http://lib.hut.fi/Testi/PLDCkysely/ during November-December 2003. The technical functionality and accessibility of the questionnaire were tested in three different ways in late December 2003 and early January 2004:

1. Three information specialists of the Helsinki University of Technology Library answered the questionnaire from the workstations at the library. Two also tested the questionnaire from home computers that did not belong to the IP range of the university.
2. Ten of the fellow PLDC (Professional Licentiate Program in Digital Communication) students answered the questionnaire from their workstations in private enterprises, universities, and public institutions.
3. The accessibility of the questionnaire was also tested with software specialized in testing remote access.

One fellow PLDC student reported temporary difficulty while trying to access the questionnaire from his computer.

The questionnaire was tested for intelligibility and timed by the information specialists and PLDC students. The first group was thoroughly familiar with the objectivess of the questionnaire and offered comments that led to some modifications of wording. The second group was not at all familiar with the objectives of the questionnaire. Based on their comments, more explanatory texts were added to the questionnaire. Finally the supervisors of this study offered some useful comments in January-February 2004. A question was added and a few questions were modified based on these comments.

4.5.1.2. Implementation

The participants were recruited from the fifteen doctoral schools that are coordinated by the Helsinki University of Technology. Some 52% of the students in these doctoral schools came from universities other than the Helsinki University of Technology (Teknillisen korkeakoulun toimintakertomus ja tilinpäätöslaskelmat 2003, 71-72). The data was collected via a web-based questionnaire during March 11- 31, 2004.

Before the launch of the questionnaire the doctoral school coordinators or their secretaries were contacted by telephone and an agreement to approach the doctoral students was drawn. Three of the doctoral schools managed a list-based e-mail directory of their students and this allowed for approaching these participants directly. For the twelve other doctoral schools the request to participate in the study was routed through the respective coordinators and secretaries of the schools. Due to this routing the delivery of the message could not be verified.

The participants were contacted by an e-mail request where the purpose and background of the study were briefly presented both in Finnish and in English. In the message there was also a link to the web-based questionnaire. The first announcement was sent March 11th and the second March 24th 2004. The 22 students of the Chemical Sensors and Microanalytical Systems doctoral school were then approached directly as it had become apparent that the coordinator had not fulfilled his promise to route the request message on to the students.

4.5.1.3. Data and loss

The questionnaire was opened March 11th. By the end of the data collecting phase there were 144 responses altogether. Seven responses were omitted due to the lack of doctoral

Doctoral school	Reported problems after 1st announcement	Reported problems after 2nd announcement	Other
Functional Research in Medicine (FRM)	6 permanent fatal errors with list e-mail addresses	6 permanent fatal errors with list e-mail addresses	
Electrochemical Science and Technology of Polymers and Membranes Including Biomembranes (ESPOM)	Student reports no right to access the server from Helsinki University		
Industrial Engineering and Management (IEMDP)	Student reports no right to access the server from Barcelona		
Chemical Sensors and Microanalytical Systems (CHEMSEM)		Student reports no right to access the server from Helsinki University	Coordinator did not react to the messages at all. Direct mail to all 22 names and e-mails on website. Out of these 9 had Helsinki University e-mail address. Response ratio can therefore rise up to 38%.
Energy Technology (GSET)			Coordinator had forgotten to send forward the 1st announcement. There were 42 recipients listed in the message sent out of the 75 assumed to be enrolled. Response ratio can therefore rise up to 29%.

Table 4.1 The loss of the data during the data collection phase.

school information. The number of accepted responses was hence 137.

Despite the efforts in testing the questionnaire there was data loss due to technical errors. The problems reported when informing about the questionnaire also caused loss. Table 4.1 summarizes the data loss.

Reported problems that resulted in loss derive from inaccessibility and from lack of awareness as shown in Table 4.1. Students of chemistry at the Helsinki University and a student visiting another university abroad reported that they could not access the server of the questionnaire. Six students of medical physics had e-mail addresses that were disabled and therefore they never received the recruiting announcements. Finally, the coordinator forwarded only the second recruiting message to 42 out of the 75 students that were supposed to be enrolled in the doctoral school of energy technology.

4.6. Measures and their development

4.6.1. Background variables

The age and sex of the respondents were requested as background information. The respondents were also asked to identify the doctoral school in which they were enrolled and whether they pursued their studies on a full-time or part-time basis.

4.6.2. Measures to test hypothesis

The measures about brand value are all influenced and inspired by the recent marketing research literature summarized in previous chapters. As the web-based environment is still a relatively new concept, there are no established rules about how to measure and validate multi-item scales for satisfaction, value, perception, and loyalty in the electronic environment. There are four elements that form a strong brand, namely brand awareness, brand associations, perceived quality and brand loyalty. Because perceived quality is a form of brand association (Aaker and Joachimsthaler 2000, 38-39) the two were combined into one measure in addition to measures of brand awareness and brand loyalty. The measures about brand value were supplemented with a measure about the recurrence of exposure to the brand. Figure 4.1 found earlier in this chapter illustrates also the reciprocal relationships of the measures.

4.6.2.1. Measures of awareness

Altogether 20 different trademark logos are assessed. Of these, five are logos of additional services to scientific journal services and fifteen represent the actual electronic journal services. The five additional services are assessed with a nominal scale question "*Do you recognize this trademark?*" The answers can be given either 0=*yes* or 1=*no*. Two of the five services are services that enable linking from one service to another, two are search engines that focus on searching academically relevant web-based documents, and one is a recently renamed service that brings together a variety of resources in the field of applied physics. The answers are recoded so that the positive yes-answer receives the value 1 and negative no-answer the value 2.

The fifteen scientific journal services can be divided into two categories: journal collections based on journal issues and aggregate services where a reference database is supplemented

with links to article collections. Both of these services are assessed with a nominal-scale multiple-choice question of four choices with the following values: 1= *one recognizes the service trademark because one is currently a user of the service*, 2= *one recognizes the service trademark because one has seen advertisements or received direct mail about the service*, 3= *one has registered oneself as a personal user of the service (and receives personalized services and options)* , and 4= *one recognizes the service trademark but does not currently use the service*. If one does not recognize the service, the respondent is advised to move on to the next question. A cumulative variable is generated from these answers together with the recoded answers of the five additional services. The values for the measure are 1=*recognizes the trademark* and 2=*does not recognize the trademark*.

4.6.2.2. Measures of associations

Brand associations are measured by two measures, perceptions of importance of augmented services and associations with service characteristics of the fifteen recognized services. The associations are measured on a nominal scale by using a dichotomous variable where the given characteristics of a brand are rated either as 1=*strength* or 2=*weakness*. There are thirteen different characteristics that can be chosen as a strength or a weakness: overall quality of service, characteristics related to the technical operation of the service (service response time, ease of use, search speed, interface design, rate of product upgrades and/or enhancements, online customer help, and convenient access) and characteristics related to the contents of the service (unique contents, article delivery to desktop, links to full-text or between other services and products, and value for money).

The importance of augmented services is measured with one question. Each service is assessed with the scale and values of 1=*highly important*, 5=*not at all important*, 6=*don´t know*. The services are grouped according to their role in the service context: services directly supporting the core services, services that complement the core service and services that provide functional enhancements to the core service. The measure is constructed by forming an ordinal scale where perception values 1, 2 or 3 are "*important*" and values 4 and 5 "*not important*". Values 6=*don´t know* were omitted from the measure.

4.6.2.3. Measures of brand loyalty

The brand loyalty measure comprises overall satisfaction and two questions that assess the probability of continued use of the services and the probability of recommending the service to one´s friends and colleagues. The answers to the two questions are given on a five-point interval scale 1=*excellent probability*, 5=*very poor probability*, 6=*don´t know*.

Satisfaction is measured on a five-point interval scale. The overall satisfaction with the service in question is assessed with the scale and values of 1=*highly satisfied*, 5=*highly dissatisfied*, 6=*don´t know*. A cumulative variable is generated from the ratings about satisfaction separately for the two types of scientific journal services: journal collections based on journal issues, and aggregate services where a reference database is supplemented with links to article collections.

4.6.2.4. Measures of brand exposure

The exposure over time to the different electronic journal services is measured with two

questions on an ordinal scale. The frequency of use is assessed with the following values: 1=*daily*, 2=*several times a week*, 3=*once a week*, 4=*a couple of times a month*, 5=*more rarely*, and 6=*never used*. The years of experience are assessed with the following values: 1=*less than a year*, 2=*one to three years*, 3=*three to five years*, 4=*five years or more*, and 5=*never used*. A cumulative variable is generated from the answers to both questions separately.

4.7. Research process

There were a total of 137 responses in the final analysis. The variables of the nominal scales were recalculated in order to avoid small classes of less than ten. The cumulative variables were then formed and subsequently their reliability was assessed.

The frequency and experience of use, the intention to reuse, and the intention to advocate the service to others were cross-tabulated with background variables of sex and doctoral schools. The chi square test (X^2) was used to find differences between men and women. The p-values were interpreted as non-significant ($0.25 < p < 0.48$). Similarly, the chi square test (X^2) was used to assess the possible differences between the largest doctoral school (GETA, 31.4% responses) and the other doctoral schools. Again the p-values were interpreted as non-significant ($0.16 < p < 0.97$).

Missing values were not compensated for and therefore there are differences in the N-values across the analysis. The value for *"don´t know"* was omitted from all calculations. Also, the service named Highwire was omitted from the subsequent analysis because of the limited amount of recognition it received. Highwire service contains medical journals which may explain its poor recognition among doctoral students in the fields of science and technology.

The research results were presented as percentages of the responses in question. Mean values were calculated for overall satisfaction and for additional services. For the purpose of more illustrative figures and tables, transformations of scales and variables were performed. Statistical analysis with methods such as ANOVA and chi square test (X^2) was then performed for testing the hypothesis. The latter was performed to test hypothesis H2 about brand associations becoming more positive over time and the development of perceptions of selected service characteristics were analyzed. Also a part of hypothesis H3 about brand loyalty becoming stronger over time was tested with chi square test (X^2). The analysis scrutinized the relationship between the perceived overall satisfaction and the probability of revisits and/or advocacy for the services.

An ANOVA was performed to test hypothesis H1 about service awareness increasing over time and hypothesis H3 about brand loyalty. Overall satisfaction and intentions to revisit and / or advocate the services over time were analyzed and similarly the awareness of services over time was analyzed.

4.8. The reliability of research method and measures

The validity of this study is influenced by the reliability of the measures and measurements as well as by possible errors in the research arrangement. Validity is also influenced by the sample and its ability to represent the population (Yhteiskuntatieteellinen tietoarkisto). Reliability of research is about the repeatability of research results (Hirsjärvi et al. 2002, 213-215). Reliability is about the coherency of the measure over time and inside the measures. The stability of a measure over time can be assessed by conducting several subsequent tests over time among the same population. When a measure is composed of several items,

their internal coherency, i.e. that they measure the same thing needs to be assessed. This is important e.g. when cumulative variables are generated. The measures were tested for possible internal causal relationships and internal coherence. The validity of a measure is about how well the measure is capable of measuring the concept it is supposed to measure (Yhteiskuntatieteellinen tietoarkisto).

4.8.1. Reliability and validity of measures

For the purpose of this study brand recognition was chosen as the measure for brand awareness, and the trademark logo of a brand was chosen to serve as the cue to be identified. The internal validity of the measure was thus based on the operationalization of the Keller theory (Keller K.L. 1993).

The internal coherence was tested by comparing the average recognition rates. The chi square test (X^2) p-value 0.09 indicates there is no significant difference between the service types of journal collections based on journal issues, aggregate services where a reference database is supplemented with links to article collections, and additional services to scientific journal services.

Perceptions of attributes and benefits are created on the basis of direct experience with the service. People will only comment on what they regard as important (Keller K.L. 1993). For the purpose of this study associations about overall quality, ease of use, interface design, rate of product updates and/or enhancements, and online customer help were chosen. The reliability of the measure for internal coherence was tested with the chi square test (X^2). The p-values were between the range $0.18 < p < 0.45$ and interpreted as non-significant.

The loyalty measure was based on the operationalization of the issues put forward in recent literature (Keller K.L. 1993, Aaker and Joachimsthaler 2000). The measure consisted of three questions about satisfaction, the intention to revisit the services, and the intention to advocate the services. The latter two questions formed an internally reliable measure with Cronbach alfa of 0.89.

Perceptions of satisfaction were assessed with the chi square test (X^2). In order to be internally coherent, the satisfaction measure is divided according to the service type: aggregate services where a reference database is supplemented with links to article collections (p=0.98), and journal collections based on journal issues (p=0.06). The internal coherence of the journal collections measure is influenced by the fact that perceptions of two of the services, IEEE Xplore and ScienceDirect, amounted to 50% of all the perceptions of satisfaction.

The measure of brand exposure consisted of two questions, the frequency of use and the length of experience. The chi square test (X^2) for independency indicated there was no relationship between the two aspects (p= 0.124). The reliability of the measure can also be assessed by comparing the results concerning the frequency of use with results from the recent FinELib studies (Törmä 2003), where similar figures were reported.

4.8.2. Sample validity

	Male N=	Female N=	All N=
Number of respondents	100	37	137
Age average/median	29.4 / 28	28.6 / 28	29.2 / 28
Full time/part-time student	91 / 9	34 / 3	125 / 12

Table 4.2 Background information of the respondents.

The sample represents well the population in terms of gender and age distribution (Table 4.2). In the sample the nature of work is not, however, as balanced, and the part-time doctoral students are underrepresented. Hence the survey highlights the views of young, full-time doctoral students in the fields of science and technology.

The respondents were 73% male and 27% female. The figures are close to the respective ratios among those pursuing doctoral degrees in the fields of science and technology and enrolled in Finnish universities in 2003 (74.3% male and 25.7% female according to university statistics KOTA http://www.csc.fi/kota/kota.html). Only twelve of the respondents were part-time students and the remaining 125 (91%) respondents were all full-time students.

Part-time students often have difficulties in accessing remotely the electronic journals and databases which have been licensed to university campuses. The full-time doctoral students are in a better position to utilize the possibilities of the campus network.

As illustrated in Table 4.3, the following three doctoral schools had an overrepresentation in the sample: Electronics, Telecommunications and Automation (GETA), Energy Technology (GSET), and Pulp and Paper (IDPP). The doctoral schools of Industrial Engineering and Management (IEMDP), Engineering Mechanics (NGSEM), and Remote Sensing (GSRS) were underrepresented.

Doctoral School	Total estimated enrollment/ questionnaire respondents N	Percentage of full-time respondents of the estimated full-time enrollment %	Expected share of responses %	Received share of responses %
Electrochemical Science and Technology of Polymers and Membranes Including Biomembranes (ESPOM)	35/2	6	3	2
Electronics Manufacturing (GSEM)	36/7	25	3	5
Electronics, Telecommunication and Automation (GETA)	361/43	17	26	31
Energy Technology (GSET)	75/12	21	5	9
Functional Research in Medicine (FRM)	75/9	11	5	7
International Ph.D. Program in Pulp and Paper Science and Technology (IDPP)	37/9	26	3	7
Remote Sensing (GSRS)	81/2	3	6	2
Chemical Sensors and Microanalytical Systems (CHEMSEM)	22/5	31	2	4
Real Estate and Facilities Management (GSRFM)	47/6	21	3	4
Computational Methods in Information Technology (GSCMIT)	45/2	5	3	2
Computational Fluid Dynamics (GSCFD)	25/2	18	2	2
Material Physics (NGSMP)	192/16	10	14	12
System Analysis, Decision Making and Risk Management (GSADMRM)	67/8	41	5	6
Engineering Mechanics (NGSEM)	120/5	25	9	4
Industrial Engineering and Management (IEMDP)	200/9	67	14	7

Table 4.3 The doctoral schools coordinated by the Helsinki University of Technology, their overall estimated enrollment and respondents, received and expected responses.

As seen in Table 4.3, in the majority of doctoral schools the percentage of full-time respondents of the estimated full-time enrollment was over 20%. In the doctoral schools of Electrochemical Science and Technology of Polymers and Membranes Including Biomembranes (ESPOM), Remote Sensing (GSRS), and Computational Methods in Information Technology (GSCMIT) the respective ratio was less than 10 %.

Overall, it was problematic to calculate the response rate because of several factors. There are no explicit figures available about the number of part-time and full time students in the population. However, there is an estimate of all the doctoral students of the Helsinki University of Technology who are participating in the doctoral schools. According to the estimated figures, some 41% of the students subject to the questionnaire are part-time students (Teknillisen korkeakoulun toimintakertomus ja tilinpäätöslaskelmat 2003, 71-72). Given the estimated 1,418 students enrolled in doctoral schools coordinated by Helsinki University of Technology, the ratio of responses was poor, 10%. However, assuming that 41% of all the doctoral students (not only those registered at the coordinating university but in other participating universities as well) are enrolled part-time, the response ratio among full-time doctoral students can be approximated to be around 20%. Table 4.3 also illustrates the difficulty of assessing correctly the response ratio. When the full-time respondents in the sample are calculated against the estimated full-time enrollment, the response ratio for the doctoral school of Industrial Engineering and Management (IEMDP) rises remarkably to 67%.

In conjunction with the data collection process, the population size became even more blurred. Table 4.1 illustrated that for the doctoral schools of Energy Technology (GSET) and Chemical Sensors and Microanalytical Systems (CHEMSEM) the estimated enrollment did not equal the number of students found on the mailing list. Thus the number of students actually able to receive the request was lower than could be expected.

5. RESULTS

5.1. Use of scholarly electronic services

In general, the doctoral students are active users of scholarly electronic services. The majority of the respondents reported that they were using the services on a weekly basis. As Table 5.1 illustrates, 16% of the least experienced respondents were using the services daily and 62% on a weekly basis, and 22% reported using the services more rarely. Similar usage patterns were found among the moderately experienced and the most experienced respondents. The differences in the level of use of the services between those with longer experience and those with less experience did not prove statistically significant.

Length of experience / Frequency of use	Up to three years %	Three to five years %	Over five years %
Daily	16	14	23
On a weekly basis	62	69	54
More rarely	22	17	23
Total N=136[5] X^2 P=0.688	100 (N=45)	100 (N=65)	100 (N=26)

Table 5.1 Use of the scholarly information services.

Table 5.1 also illustrates that the majority of the respondents have been using the scholarly information services for over three years, i.e. from 2001 onwards. Interestingly enough, the services have only been available for a few years more than that.

Table 5.2 presents the use of scholarly information services by status of enrollment and by gender. The proportion of women among the most active daily users was somewhat higher than expected. Similarly, the number of female respondents among the novice users with up to three years of experience was somewhat higher than expected.

Gender and status of enrollment/ Frequency of use and length of experience		Male %	Female %	Full-time %	Part-time %
Frequency of use	Daily	64	36	100	0
	On a weekly basis	74	26	93	7
	More rarely	78	22	74	26
Length of experience	Up to three years	69	31	89	11
	Three to five years	75	25	98	2
	Over five years	73	23	77	23
Total N=136[5]		73	23	91	9

Table 5.2 Use of the scholarly information services by status of enrollment and by gender.

[5] One respondent was a part-time doctoral student who reported he used the services from his company´s Intranet. His response to the questions concerning the frequency of use and the length of experience was "*never used*".

As illustrated in Table 5.2, most of the respondents were enrolled as full-time students. However, the proportion of part-time students was higher among the most experienced respondents (23% part-time students) and among the least active respondents (26% part-time students). 98% of doctoral students who reported three to five years of experience with the scholarly information services were full-time students.

Scholarly information services are used for several tasks, as illustrated in Tables 5.3 and 5.4. All respondents used scholarly information services for research purposes. This was expected because the respondents were all enrolled in doctoral schools and thereby preparing their doctoral dissertations. However, the reported length of experience and the frequency of use revealed differences among the doctoral students.

Length of experience / Task	Up to three years %	Three to five years %	Over five years %
Research purposes	100	100	100
To keep up in the field of interest	49	72	69
To solve an individual problem in everyday work	40	54	50
Teaching purposes	11	14	31
Total N=136 X^2 p=0.514	(N=45)	(N=65)	(N=26)

Table 5.3 Length of experience and the use of scholarly information services for different tasks.

Students with more experience reported using the electronic services more widely in their activities than the most novice users (Table 5.3). To keep up with one´s field of interest was the second important function that the journal services fulfilled, and for the more experienced user the services were also used for problem-solving purposes. Table 5.3 also reveals that one third of the most experienced doctoral students had found the services useful for teaching purposes. Only 11% of the novice users and 14% of doctoral students with three to five years of experience reported using the services for teaching purposes.

Frequency of use/ Task	Daily %	On a weekly basis %	More rarely %
Research purposes	100	100	100
To keep up in the field of interest	82	66	44
To solve an individual problem in everyday work	68	52	22
Teaching purposes	32	15	7
Total N=136 X^2 p=0.295	(N=22)	(N=87)	(N=27)

Table 5.4 Frequency of use and the use of scholarly information services for different tasks.

In Table 5.4 the frequency of use is cross-tabulated with the different tasks. Those who used the services most frequently were also most active in incorporating the services into their other activities. Over 80% of these daily users were using the services to keep up-to-date, close to 70% to solve problems, and one third to support their teaching activities.

However, neither the length of experience (Table 5.3) nor the frequency of use (Table 5.4) provided statistically significant results in explaining the use of scholarly information services in different tasks.

5.2. Awareness of brands

The surveyed fifteen journal services can be divided into two major categories according to their core service.

1. Journal (magazine) collections based on journal issues including several large commercial publishers (1a) and a number of non-profit publishers (1b) in Table 5.5.

Service trademark	Type	Recognition is based on use of the service	Recognition is based on advertisements or direct mail about the service	Recognition is based on personal registration as a user	Recognition but no current use	Percentage of respondents (n=137) who recognize the service trademark. Duplicate choices by the same respondent have been omitted[6]
Science	1b	N=11	N=1	N=3	N=22	26%
nature.com the world's best science on your desktop	1a	N=15	N=6	N=3	N=26	35%
SCIENCE DIRECT	1a	N=91	N=2	N=19	N=11	82%
InterScience	1a	N=18	N=1	N=3	N=15	26%
SpringerLink	1a	N=25	N=3	N=3	N=13	30%
Emerald	1a	N=13	N=1	N=3	N=4	15%
HighWire	1b	N=1	0	0	N=2	2%
PORTAL	1b	N=14	0	N=1	N=6	15%
ACS PUBLICATIONS HIGH QUALITY HIGH IMPACT	1b	N=15	0	N=3	N=7	17%
IEEE Xplore RELEASE 2.1	1b	N=61	N=1	N=5	N=6	50%
ProQuest	2a	N=15	N=1	0	N=2	13%
EBSCO HOST Research Databases	2a	N=23	N=1	N=1	N=6	23%
ISI Web of KNOWLEDGE	2a	N=34	N=8	N=4	N=12	39%
Ei Engineering Village 2	2a	N=9	0	N=2	N=10	15%
SciFinder SCHOLAR	2b	N=18	N=1	N=1	N=8	20%

Table 5.5 Recognition of service trademarks and reasons of doing so.

[6] Typically one may recognize the trademark because he/she uses the service but one has also registered oneself as a personal user.

2. Aggregate services where a reference database is often supplemented with links to article collections by both commercial producers (2a) and a non-profit producer (2b) in Table 5.5.

The reasons for recognition of services can be many. In the questionnaire the respondents were given the following four possibilities: respondent recognizes the service trademark because he/she uses the service, respondent recognizes the service trademark because he/she has seen advertisements or received direct mail about the service, respondent has registered him/herself as a personal user of the service whereby receives personalized services and options, or respondent recognizes the service trademark but does not currently use the service. Also, the overall percentage of respondents who recognize the individual service trademarks, is calculated and presented in Table 5.5.

Furthermore, the brand logo of five associated services was presented and the respondents were asked whether they recognized the logo or not. Two of the five associated services are services that enable linking from one service to another, two are search engines that focus on searching academically relevant web-based documents, and one is a recently renamed service that brings together a variety of resources in the field of applied physics.

All respondents recognized at least one service. The summary of services is presented in Appendix 2.

In general the brand awareness of commercial producers was greater than that of the non-profit organizations. The average recognition ratio for the commercial brands was 31% and respectively 26% for the non-profit brands (excluding the service Highwire, which was omitted from the subsequent analysis of results[7]). This can be explained by the fact that the society publishers target their service to a more selected audience, and to a narrower subject field. Therefore the service is of less interest to others. On the other hand, the marketing of the commercial producers may be more aggressive and lead to a stronger brand awareness.

The overall average recognition ratio 17% of the associated services presented in Table 5.6 was lower than the average of the commercial and non-profit services presented in Table 5.5. The most widely recognized associated service in Table 5.6 was Citeseer, a service in the field of computer science that links and cites freely available web-based documents. Scitation was launched in January 2004 and it replaced the existing service WebSpirs (http://scitation.aip.org/newlook.jsp). Scitation, which provided its users with enhanced functionality and a new interface design, was available for preview already during autumn 2003.

Service trademark	Service function	Recognition
	enables linking from one service to another	14% (19) of the respondents (N=132) recognized this trademark logo.
SCIRUS for scientific information	search engine that focuses in searching academically relevant web-based documents	19% (25) of the respondents (N=132) recognized this trademark logo
ChemPort	enables linking from one service to another	10% (13) of the respondents (N=131) recognized this trademark logo
Scitation	brings together a variety of resources in the field of applied physics (previously named SpinWeb)	13% (18) of the respondents (N=133) recognized this trademark logo
CiteSeer.IST Scientific Literature Digital Library	search engine that focuses in searching academically relevant web-based documents in computer science	31% (41) of the respondents (N=133) recognized this trademark logo

Table 5.6 Recognition of service trademarks.

[7] Highwire service contains medical journals which may explain its poor recognition among doctoral students in the fields of science and technology.

On the whole, the recognition of brand names and service trademarks seems rather modest. There are two exceptions, the other being the leading brand among the commercial publishers in the fields of science, technology and medicine, and the other a very large society publisher. A noteworthy detail in this respect is the fact that the leading brand became available for the Finnish university campuses in 2001, only three years prior to this study.

When asked about what other web-based services containing scientific journal and/or reference databases or search engines they used, the respondents recalled a number of services such as other journal or aggregate services, homepages of individual journals, organic chemistry properties databases, pre-print servers such as Ideas.repec.org and lanl.arXiv.org, other free resources such as Medline and PubMed, and mobile technology –specific services such as UMTS forum and 3GPP archive. They also named library catalogues, such as the union catalogue LINDA, and standard and patent services. Search engines such as Google, Altavista, and Lycos were mentioned.

By and large the respondents were quite satisfied with all the services they recognized. In Figure 5.1 the overall satisfaction level to different services is presented.

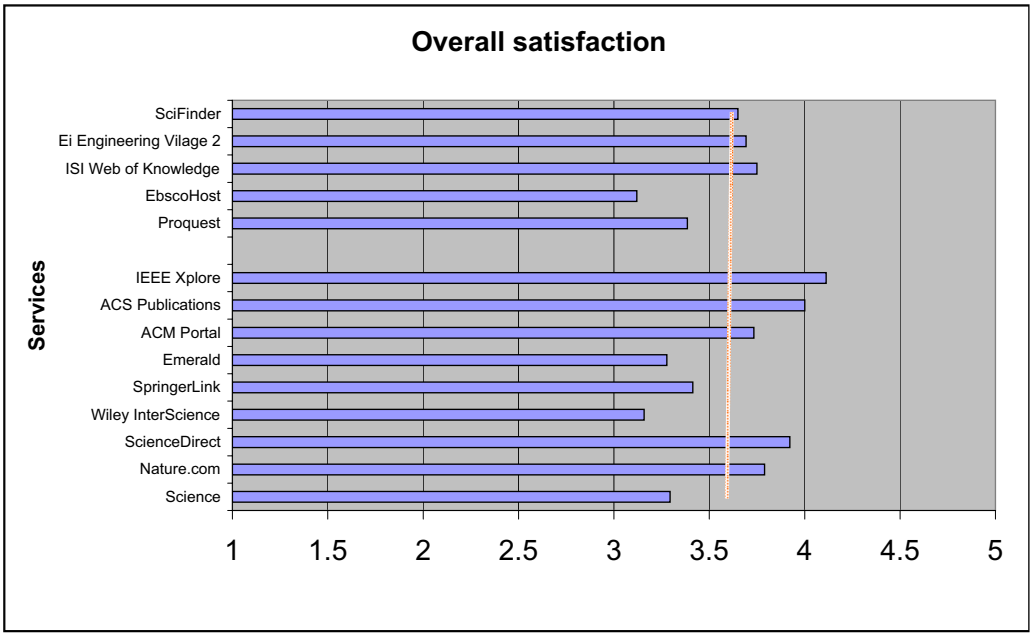

Figure 5.1 Overall average satisfaction of different services on a scale where 1 is highly dissatisfied and 5 is highly satisfied. The mean 3.59 is illustrated with a linear.

The mean satisfaction was 3.59 on a scale from 1 to 5, where 5 represented highly satisfied. In terms of satisfaction, four non-profit and four commercial brands were found above the mean: IEEE Xplore, ACS Publications, ACM Portal, and SciFinder of the non-profit producers, and ScienceDirect, Nature.com, ISI Web of Knowledge, and Ei Engineering Village of the commercial producers. The average recognition ratio for the named services was 34% (from Table 5.5), whereas the average recognition ratio for the services that fell below the mean satisfaction was 22%.

Those who recognized the brand were asked to define how they first came to pay attention to the service. One was able to choose more than one source of information and the responses are presented in Figure 5.2. The most often mentioned sources of information about the services were links from library websites (40%), colleagues (17%), and search engines (11%). Links from other websites (7%) were another important source of initial information. Some 8% could not remember how the service was first found. Recommendations from professors (6%) or library staff (5%) had also acted as a catalyst to pay attention to the services. Communication received via catalogues or brochures was mentioned in 3%, whereas e-mail campaign, conference exhibition, and society membership were each mentioned in 1% of the responses.

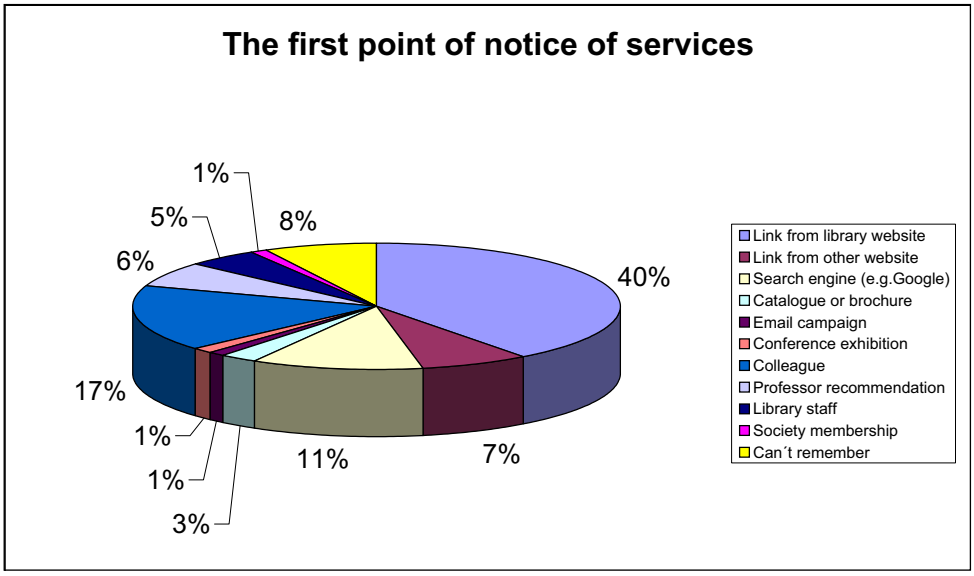

Figure 5.2 Summary of the first point of notice of different services. N=634.

In summary, web-based sources seem to be the most important source of initial information. Library websites, other websites, and search engines added up to 58% of all the answers. Personal connections, such as colleagues, professors, and library staff comprised 28% of the answers. Advertisements in the form of catalogues and brochures, e-mail campaigns, conference exhibitions, and society membership added up to 6%.

First point of notice when service recognition was not based on current use	%
Link from library website	21
Search engine (e.g. Google)	20
Link from other website	10
Can´t remember	19
Colleague	15
Library staff	6
Catalogue or brochure	6
Other	4
Total N=136	101

Table 5.7 First point of notice when service recognition was not based on current use. Summary of responses.

Those respondents who did not currently use the service were more apt to forget the source of initial information about the services as illustrated in Table 5.7. As seen in Table 5.7, the web-based sources are the most important source of initial information also when service recognition was not based on current use, adding up to 51% of the answers. Here personal contacts, such as colleagues and library staff were mentioned by 21% of the respondents. The sources of the first point of notice seem to be similar among the respondents who use the services (Figure 5.2) and among the respondents whose recognition of the services was not based on current use (Table 5.7).

As indicated in Figure 5.2 and Table 5.7, colleagues were an important source of information about scholarly information services. The respondents were also asked how likely they were to recommend these services further to their own friends and colleagues.

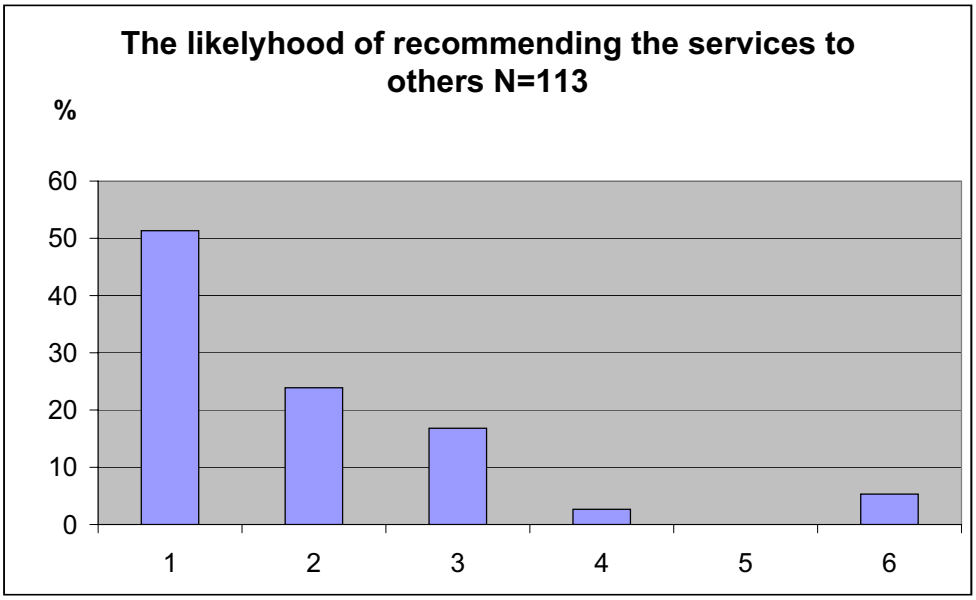

Figure 5.3 The likelihood (on a scale from 1 to 5) of recommending services to friends and colleagues. (1=*excellent probability*, 5=*very poor probability*, 6= *don´t know*).

Figure 5.3 presents the likelihood of recommending the services to others. Over 50% of the respondents rated the probability of their recommending scholarly information services to others as excellent.

5.4. Personal registration and intentions to continue to use the service

Over 90% of the respondents estimated that there was a high probability that they would continue using the services. This can be explained by the fact that doing doctoral research is a long-term process where information acquisition is not a sporadic, but a continuous activity.

It is possible for the users to generate a personal profile in a scholarly information service and thereby receive personalized services such as alerting notices. It is also possible to use registration as a tool to record one´s own preferences and thus build a personalized interface to the service. In the registration process the user identifies oneself to the service provider, who is thereafter enabled to gather data on the personal interests and preferences of the user.

Twenty-three respondents recognized the services because they had registered themselves as personal users of one or more of the fifteen services in question. This amounts to 17% of all the respondents. Among the registered users the proportion of women was somewhat higher than in the sample population. However, their median age, frequency of use and length of experience did not differ from the overall average of the responses.

5.5. Additional services

Additional Service Type	Highly important 5 %	Important 4 %	Somewhat important 3 %	Less important 2 %	Not at all important 1 %	Don´t know 6 %
Links from cited reference to full-text	56.7	33.6	7.5	0.0	1.5	0.7
Preview of accepted articles	24.4	38.5	20.7	8.9	1.5	5.9
Supplementary research materials	17.0	34.1	33.3	5.9	1.5	8.1
Links to other services with similar content	14.1	26.7	37.0	13.3	5.9	3.0
Links to educational materials	13.3	35.6	25.9	18.5	4.4	2.2
Alerting services	12.6	15.6	24.4	21.5	12.6	13.3
Ability to purchase non-subscribed individual articles	8.9	25.9	20.0	23.0	16.3	5.9
Calendar of events	8.9	19.3	29.6	23.7	11.9	6.7
Forwarding material to a colleague	5.9	15.6	22.2	31.9	22.2	2.2
Discussion forums	5.2	15.6	21.5	31.1	17.0	9.6
Job announcements and career services	4.4	20.7	25.2	26.7	18.5	4.4
Personalization possibilities	3.7	18.5	26.7	24.4	14.1	12.6
Online shopping of related materials	2.2	12.6	20.7	35.6	24.4	4.4
News services	1.5	23.0	28.9	28.9	8.9	8.9
Links to buyer´s guides relevant to the field	0.0	11.9	17.9	35.8	23.1	11.2

Table 5.8 The importance of additional services on a scale from 1 to 5 (1=*highly important*, 5=*not at all important*, 6=*don´t know*). N=135.[8]

The additional services that supplement the journal articles in the scholarly information services are features that can only exist in the digital media. They are the value-added service to the core service, i.e. the journal articles. In Table 5.8 the perception of the importance of these additional services is presented. There were 15 different additional services, and the respondents were asked to grade their importance. There was an option to respond as "*Don´t know*". Roughly 10% of the respondents chose the option "*Don´t know*" when grading the following additional services: Alerting services, discussion forums, personalization possibilities, and links to buyer´s guides relevant to the field. It may be that

[8] The original question was "*Additional services that supplement plain journal articles and references are becoming common in scholarly information services. These additional services are often named differently in different contexts but they do, however, perform similar functions. Please grade the importance of the following functions from your point of view in a scale from 1-5.* (1 *highly important*, 5 *not at all important*)". Verbal descriptions about perceived importance are added to table 5.7 to enhance readability.

these services were unfamiliar to the respondents. Curiously enough, 54% of the respondents did not find forwarding material to a colleague important. This may be explained by the fact that the respondents were all doctoral students who – as junior researchers – do not necessarily have a large network of colleagues. Another explanation might be competition among the doctoral candidates that hinders sharing of information. Online shopping of related materials was also perceived as not important by the majority of the respondents.

As illustrated in Table 5.8, the majority of the respondents perceived the ability to link from cited reference to full-text as highly important. When the additional services are grouped according to the role they play in conjunction with the core service, the articles, the services directly supporting the core seem to have been perceived as most important. These supporting additional services include, in addition to the links from cited reference to full-text, supplementary research materials and the ability to preview accepted articles. Also links to other services with similar content were found important by the respondents.

The differences between different additional services are, however, perhaps more clearly illustrated in the following Figure 5.4 where responses of grades from 1 to 3 are grouped as "*Important*". Respectively, responses of grades 4 and 5 are grouped as "*Not important*", and responses of *don´t know* are excluded. Thus it can be seen in Figure 5.4. that all but four additional services were regarded as important by the respondents.

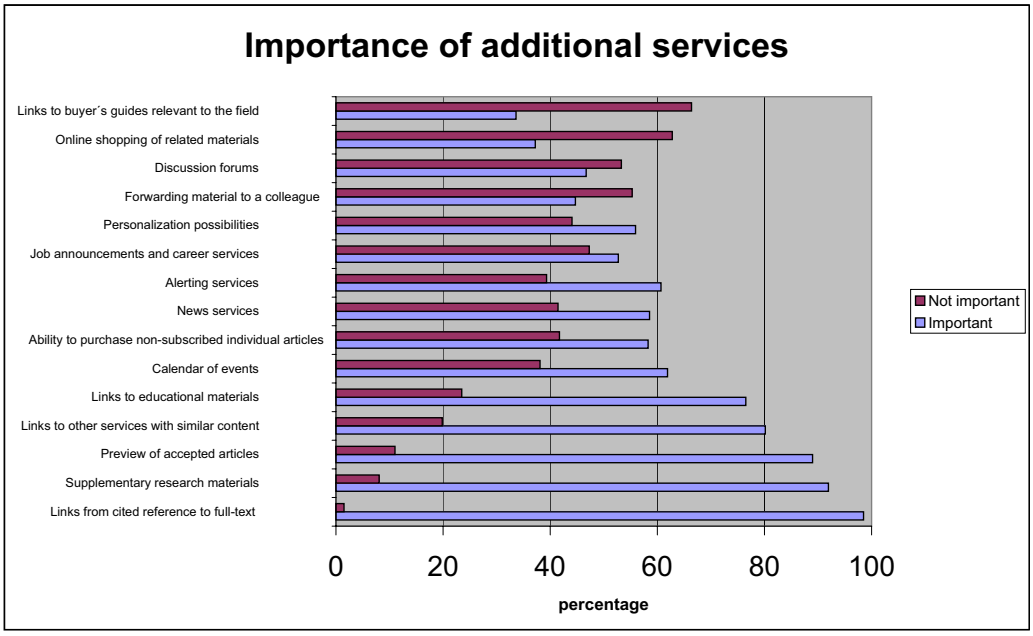

Figure 5.4 The importance of different additional services as a percentage of all responses excluding the category of "*don´t know*".

As mentioned earlier, the additional services can be grouped as supporting, complementary and functional services according to the role they play in conjunction with the core service, the articles. Figure 5.4 clearly illustrates that the services directly supporting the core, i.e. links from cited reference to full-text, supplementary research materials, and the ability to preview accepted articles are perceived by the respondents as the most important additional services. Of the additional services which serve as complementary to the core service, links to other services with similar content, links to educational materials, calendar of events,

and news services were perceived as important by the majority of the respondents. Of the functional services the ability to purchase non-subscribed individual articles and alerting services were perceived as important. The respondents who had registered themselves with a service regarded alerting services as more important than those not registered (p=0.000). Thus one may assume the alerting services could have been the motivation for registering in the first place.

There is an interesting contradiction between views about the costs of the services. In spite of the fact that the ability to purchase non-subscribed individual articles was rated as important by 35% (Table 5.8) of the respondents, only a few (13%) of the respondents were willing to pay personally for the use of scholarly information services (Table 5.9). The remaining 87% stated they would not pay, and roughly half of these believed they would get the information through their own channels.

Willingness to personally pay for the use of scholarly information services	%
Would not pay	42
Would not pay but would get the information through own channels	45
Would pay 5 euros max. per article or search session	8
Would pay 5 to 10 euros per article or search session	1
The cost would not matter	4
Total N=137	100

Table 5.9 The willingness of respondents to personally pay for the use of scholarly information services.

The explanation of the reluctance to personally pay for the services, as illustrated in Table 5.9, may be that the services are regarded as part of the infrastructure provided by the universities. The majority of the respondents were full-time students who study and work in the campus.

5.6. The perceived strengths and weaknesses of services

Those who recognized the services were also asked to identify the characteristics they felt to be strengths or weaknesses of the given service[9] . In Figures 5.5 and 5.6 a summary of the responses is presented. The perceptions of strengths and weaknesses are different in the two types of services (type 1 and 2 in Table 5.5) and that is why the summaries are generated separately.

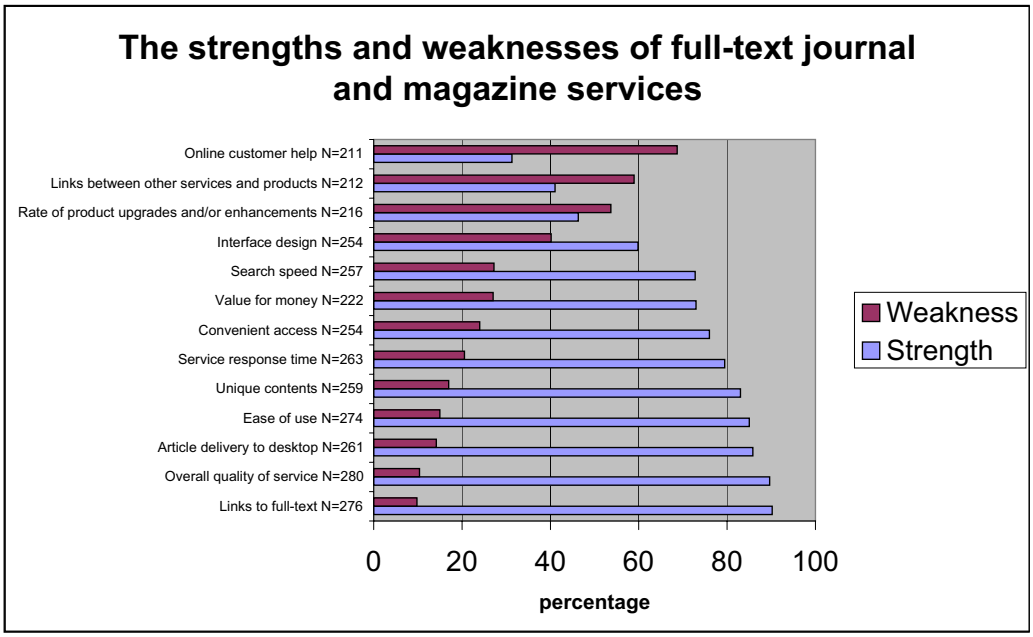

Figure 5.5 Summary of perceptions of full-text journal and magazine services as percentage of perceptions by characteristics.

As seen in Figure 5.5, over 80% of the responses rated the following characteristics as strengths of the full-text journal and magazine services: links to full-text, overall quality of service, article delivery to desktop, ease of use, and unique contents. On the other hand, more than half of the responses rated online customer help, links between other services and products, and rate of product upgrades and/or enhancements as weaknesses of full-text journal and magazine services.

[9] The question was *The strengths and weaknesses of this service. Please rate the given characteristics as a strength (+) or a weakness (-).*

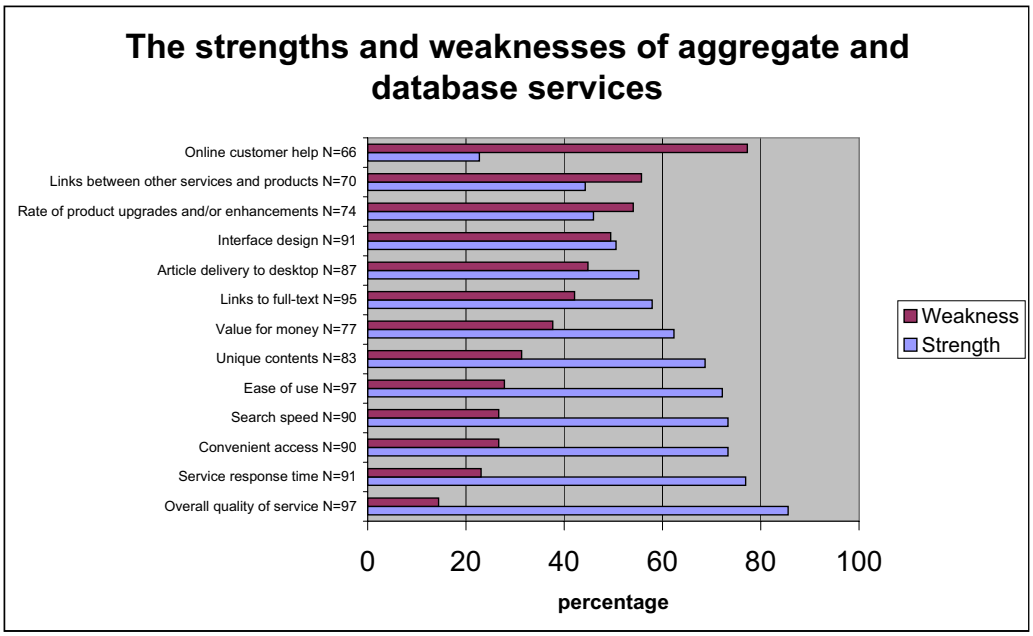

Figure 5.6 Summary of perceptions of aggregate and reference database services as percentage of perceptions by characteristics.

Overall quality of service was rated as strength of aggregate and database services by over 85% of the responses (Figure 5.6). Over 70% of the responses also rated service response time, convenient access, search speed, and ease of use as strengths. Online customer help was rated as a weakness by 77% of the responses and also links between other services and products and the rate of product upgrades and/or enhancements were rated more as weaknesses than strengths of the aggregate and database services. Interestingly enough, interface design was perceived as much as a strength as a weakness.

The summaries presented in Figures 5.5 and 5.6 reveal that there is consensus about the weaknesses of the scholarly information services. Online customer help, links between other services and products, and rate of product upgrades and/or enhancements were characteristics most often rated as weaknesses. The strengths of full-text journal and magazine services were seen as related to the contents whereas the strength of the aggregate and database services were the functional aspects such as speed of search, convenient access and service response time. In both service types, overall quality and ease of use were perceived as strengths.

There was convincing evidence that certain characteristics, when perceived as weaknesses, have a relationship with the perceived satisfaction. For full-text journal and magazine services, if overall service quality, links to full-text, article delivery to desktop, convenient access, or value for money was perceived as a weakness, the respective satisfaction fell below average ($p=0.000$). Similarly, for aggregate and database services, when overall service quality, ease of use, response time, or value for money was perceived as a weakness, the perceived satisfaction fell below average ($p=0.004$).

5.7. Testing the hypothesis

In assessing the research question, *how quickly do young researchers become aware of, adopt and possibly become loyal to electronic information services*, the exposure over time, both in terms of frequency of use and length of experience was measured against elements of brand value.

5.7.1. First assumption

In Figure 5.7 the results about the relationships between awareness and exposure over time are presented. From the research data it can be concluded that awareness of electronic scholarly information services increases with the frequency of use (p=0.000). Among the respondents the daily users recognized significantly more service trademarks than did the less frequent users.

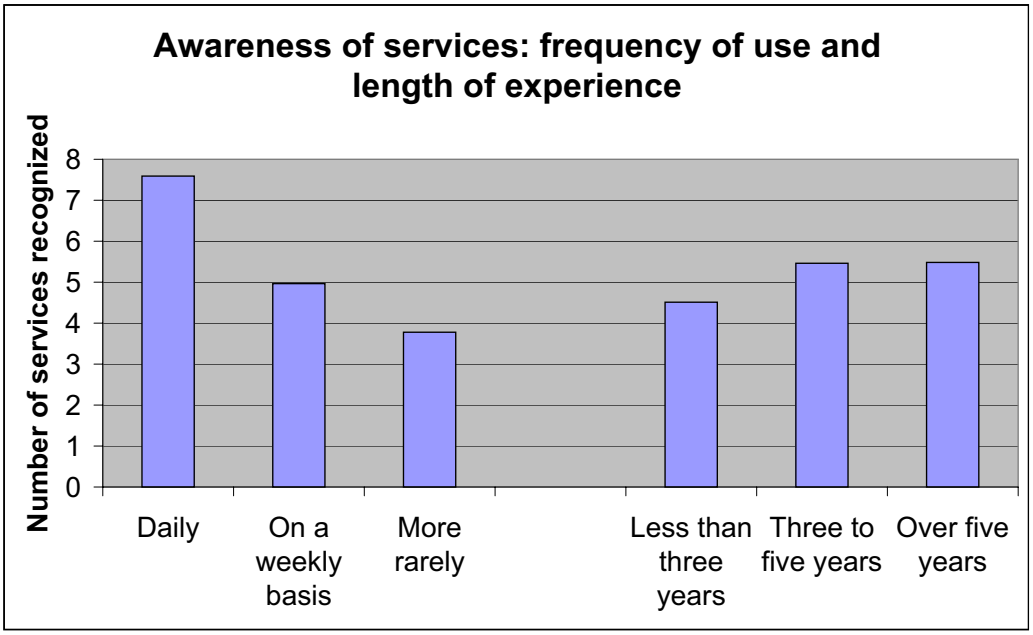

Figure 5.7 The awareness of services over time.

The average number of recognized services seemed higher for those with longer experience with the services but there was not enough evidence (p=0.32) to support this conclusion. The *H1 Brand awareness about services increases over time* is therefore at least partly supported.

5.7.2. Second assumption

The second hypothesis was tested with associations about strengths, perceptions of overall service quality and importance of the added services. A few service characteristics were perceived either more as weaknesses than strengths, or the perceptions were divided equally between strengths and weaknesses (Figures 5.5 and 5.6). These features were interface design, rate of product updates and/or enhancements, links between other services and products, and online customer help. To see if these associations are changed over time, they were cross-tabulated with the variables of frequency of use and length of experience.

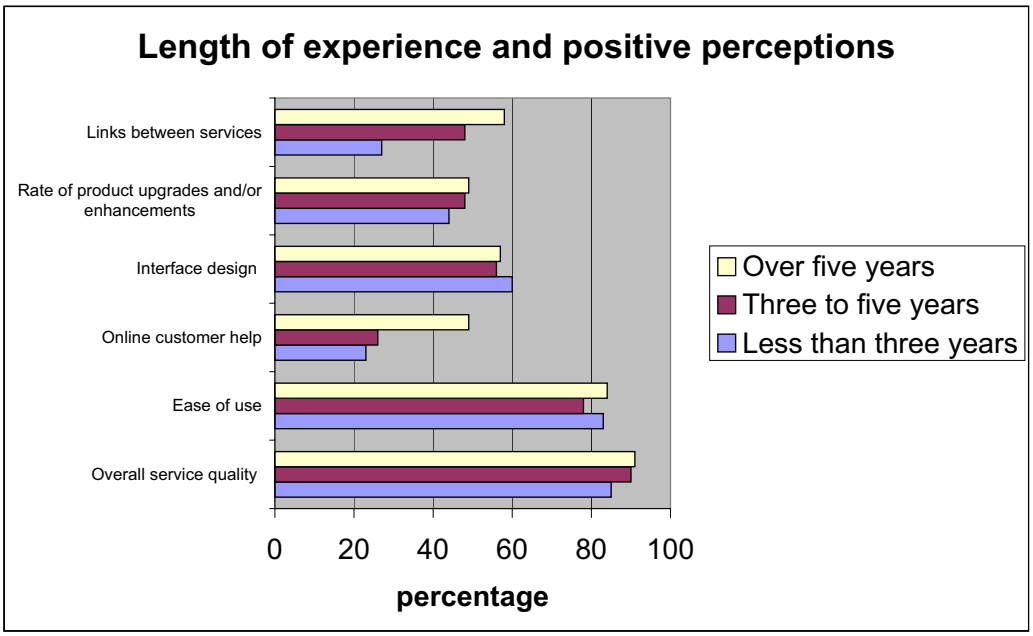

Figure 5.8 Length of experience and the positive perceptions (associations perceived as strength) as a percentage of the total perception (strength or weakness) in the given association category. The tables from which figure data was derived are presented in Appendix 3.

There was convincing evidence that associations with online customer help (p=0.002) change with experience (Figure 5.8). The most novice users perceived online customer help as the least positive and among the more experienced respondents it generated more positive perceptions. Similarly, there was convincing evidence that associations with linking between other services and products are related to experience (Figure 5.8, p=0.000). The more experience with services one has, the more positive perceptions there are of links between services.

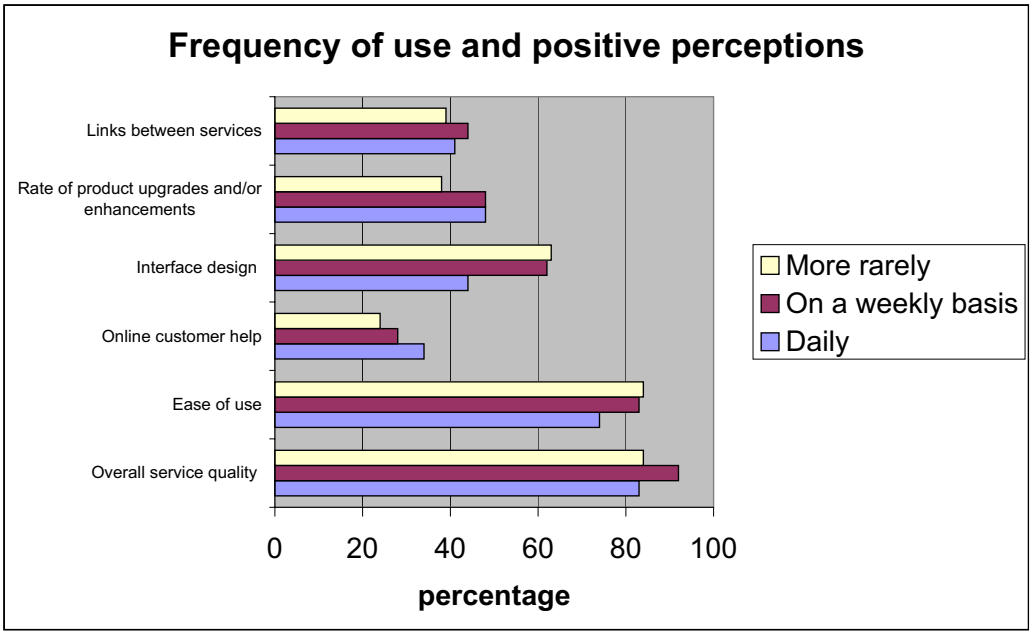

Figure 5.9 Frequency of use and the positive perceptions (associations perceived as strength) as a percentage of the total perception (strength or weakness) in the given association category. The tables from which figure data was derived are presented in Appendix 3.

As illustrated in Figure 5.9. frequency of use has an influence in the positive perceptions. There was convincing evidence that positive associations towards interface design depend on the frequency of use (p=0.007). Similarly, there was strong evidence (p=0.03) that the associations with overall service quality depend on the frequency of use (Figure 5.9). Interestingly enough, the most positive associations were held by those who used the services on a weekly basis. Also, there was weak evidence (p=0.12) about the relationship between ease of use and the frequency of use (Figure 5.9).

When the perceived importance of augmented services was measured over time, only the perception of personalization capability was found to be influenced by the length of experience. There was convincing evidence (p=0.006) that respondents with three to five years of experience perceived the feature more important than the two other groups. This may be explained by the fact that 98% of the respondents with moderate experience were full-time researchers (Table 5.2), with an interest in keeping up in their field of interest (Table 5.3).

In summary, hypothesis *H2 Brand associations become more positive over time* was supported by a few associations. The length of experience affected, as expected, two perceptions, online customer help and cross-linking of services. Contradictory to the hypothesis, the frequency of use affected the perceptions of interface design in a negative way, the more frequently one used the services, the less positive it was found. Also, the overall service quality was perceived equally positively by the most frequent users and by those using the services most infrequently. However, the most positive perception of the overall service quality was held by respondents using services on a weekly basis.

5.7.3. Third assumption

The third hypothesis *H3 Brand loyalty becomes stronger over time* was tested by analyzing the intentions to reuse the services and recommend the services to one´s friends and colleagues.

There was convincing evidence that the frequency of use and intention to advocate have a relationship (0.000), as illustrated in Figure 5.10. Respondents using the services on a weekly basis, who had also perceived the overall service quality as the most positive (Figure 5.9) found the probability of advocating for the services significantly higher than those using the services either more frequently or more rarely.

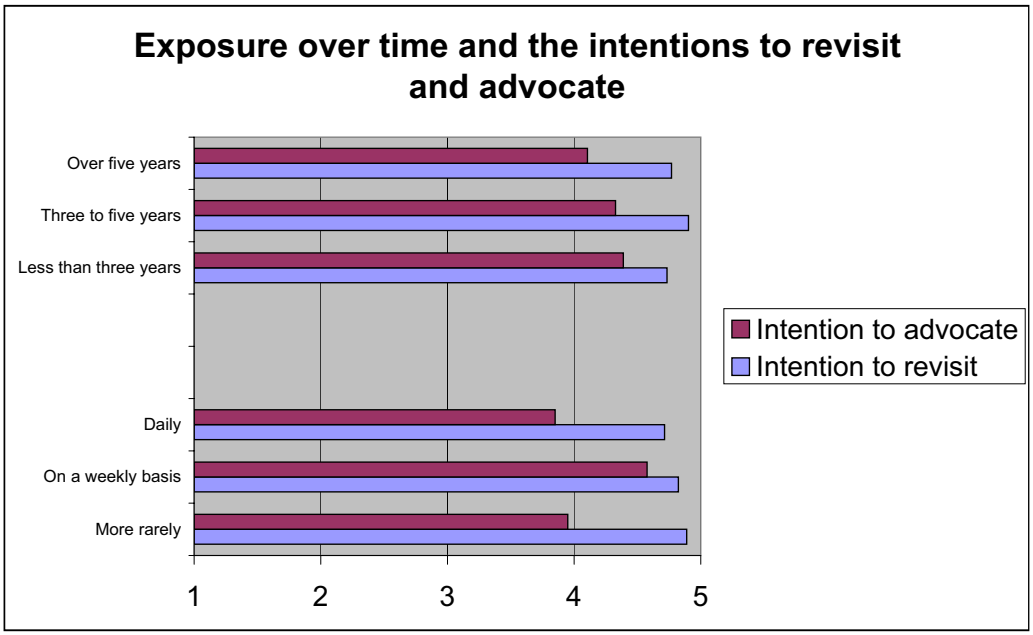

Figure 5.10 Exposure to electronic journal services and the intentions to revisit and advocate on a scale from 1 to 5, where 5 represents *an excellent probability*.

No evidence of a relationship between the length of experience and the intention to revisit and advocate for the services was found (Figure 5.10). Interestingly enough, the respondents with three to five years of experience had found the personalization capabilities significantly more important than the most experienced or the least experienced respondents (see chapter 5.7.2). As seen in Figure 5.10, these respondents with moderate experience seemed also somewhat more inclined to revisit the services.

There was no evidence that the weekly users would have been significantly more satisfied with the services even if the perceived average level of satisfaction was somewhat higher in this group than among the other groups. This is illustrated in Figure 5.11. Nor was there evidence that the length of experience could be linked with satisfaction even if the figures in journal and magazine services may point to that direction.

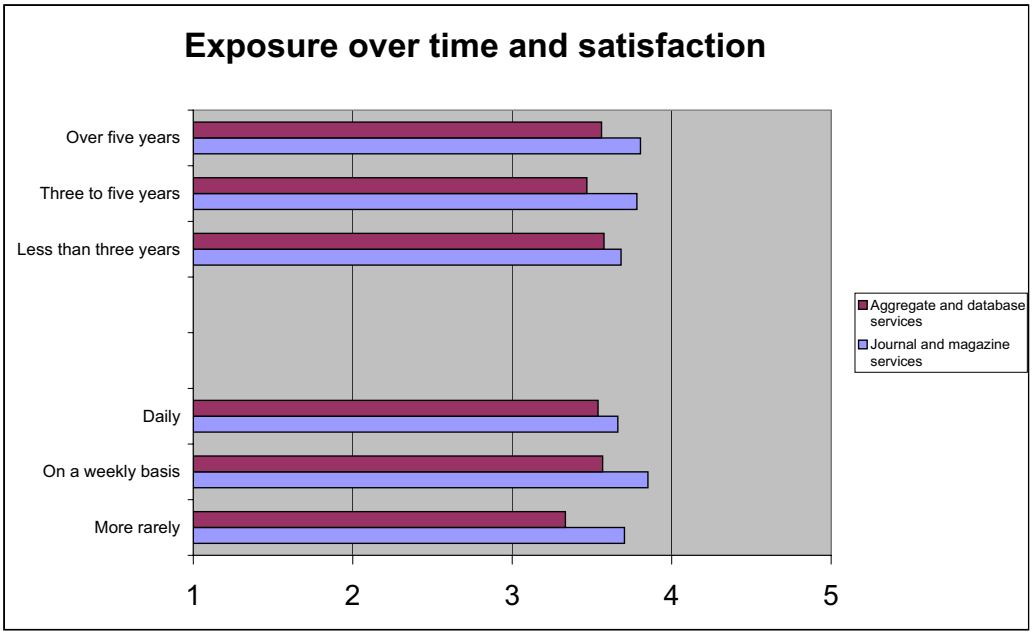

Figure 5.11 Exposure to services and perceived average satisfaction of different services on a scale from 1 to 5, where 5 represents *highly satisfied*.

In Table 5.10 the overall satisfaction and the probability of reuse or recommendation of the services to one´s friends and colleagues is cross-tabulated. Satisfaction did not prove to have a relationship with intention to revisit the services. Even the most dissatisfied respondents rated their probability of reusing the services as close to excellent.

		Highly satisfied	Moderately satisfied	Not satisfied	
Intention to revisit	Full-text journal and magazine services	5.0	4.8	4.8	X^2 p-value = 0.478
	Aggregate and database services	5.0	4.8	4.9	X^2 p-value = 0.65
Intention to advocate	Full-text journal and magazine services	4.8	4.4	3.9	X^2 p-value = 0.002
	Aggregate and database services	5.0	4.3	4.0	X^2 p-value = 0.011

Table 5.10 Perceived overall satisfaction and the probability to reuse or recommend the services to one´s friends and colleagues on a scale where 5 represents *an excellent probability.*

As illustrated in Table 5.10, there was convincing evidence that the intention to advocate for the service is linked with the perception of satisfaction (p=0.002 for journal collections and p=0.011 for aggregate and reference database services).

6. CONCLUSION

6.1. Summary of results

To summarize results, young researchers in science and technology are aware of brands and the frequency of use increases the number of recognized service brands. Websites and search engines, and personal contacts are important sources for finding out about the services. In general they find the brand quality good and are quite satisfied with the services. Young researchers find services that directly support the core service as most important additional service and their associations towards the brands tend to become more positive over time. However, the most satisfied users are researchers who use the services on a weekly basis whereas the expectations of the most frequent users of services are not necessarily met.

6.1.1. Taking notice of the services

The results of the study indicate that library websites together with colleagues are an important source of initial information about the electronic scholarly information services. The awareness of service brands increases significantly with the frequency of use. In earlier studies current frequency of use has been found significant in predicting the use of electronic resources (Chen and Hitt 2002, Lu and Lin 2002, van Riel et al. 2001).

The doctoral students who responded to the questionnaire were active users of the services. The results are very similar to the 2002 FinElib study conducted by Törmä (Törmä 2003) except for the non-use of the services. Törmä reported 18% of respondents not using the services whereas in this study all respondents stated they use the services. However, this is in line with the trend of ascending usage detected from earlier studies Cochenour and Moothart, Hewitson, King et al. and Speier et al. (Cochenour and Moothart 2003; Hewitson 2002; King et al. 2003; Speier et al. 1999).

The results of the study show that the most frequent users were also most active in incorporating the use of electronic journal services into their other activities such as keeping up-to-date, problem solving, and teaching (Table 5.3). Törmä and Vakkari state that availability of materials is a strong predictor for use in research and teaching (Törmä and Vakkari 2004). In this study, however, in addition to research, materials were more often used for problem solving and keeping up-to-date rather than teaching. This indicates that availability alone is not sufficient to predict use in different tasks. In this study the more experienced users seemed to be more inclined to adopt the services to a broad range of tasks but there was not enough statistical evidence for a conclusion (Table 5.3).

The scholarly information services, i.e. the web-based services which contain scientific journals and/or reference databases are generally perceived as a part of the university infrastructure. This was evidenced by the fact that only 13 % of the respondents were willing to consider personally paying for the services. At the same time, however, over 50% of the respondents found it at least somewhat important that there should be the ability to purchase non-subscribed individual articles. The divergent opinions reflect the documented concerns of publishers about service pricing issues as well as the expectations about the emerging pay-per-view access method (Oppenheim et al. 2000; Assumptions versus reality 2001; Keller A. 2001; Regazzi 2004).

6.1.2. Importance of augmented services

Those augmented services that support the core service directly were perceived to be important whereas services that offer functional support or are of complementary nature were perceived as less important. This finding is parallel with the notion that the modes of information seeking relate to the need for the core material (Schröder 1991, Leckie, et al 1996). This finding also indicates that the concept of core service may be expanding to cover not only the scientific articles but services closely linked with the articles. This scenario is supported by the findings of Kortelainen about the use of the FinElib services (Kortelainen 2004), where the services including these features were used more heavily than services lacking the features. Kortelainen´s proposal about the complexity of the aggregate services was at least partly supported by this study. In this study, the positive perceptions of ease of use were stronger for the full-text journal and magazine services than for the aggregate and database services.

In this study, the additional services that directly supported the core service were perceived to be more important than complementary or functional services. The complementary services may, however, become more important over time. The value of links between other services and products was found to increase significantly with experience and therefore in the future they may well be part of the expected service. Providing such augmentations can be beyond the economic abilities of some non-profit publishers (Bérard 2002).

The ability to personalize the services was found to be significantly more important among those users with moderate, three to five years of experience with the services. Earlier Chen and Hitt had found that personalization did not reduce intentions to switch to another service provider (Chen and Hitt 2002). This study, however, very tentatively suggests that there might be a relationship between the perceived importance of personalization and customer retention.

6.1.3. Brand value

Availability and awareness are prerequisites for successful information seeking activities. Information sources are selected based on previous experience and perceptions of trustworthiness, ease of use, timeliness, relative cost-effectiveness, quality, and accessibility (Leckie et al 1996; Savolainen 2000, 73-109). The results of this study show that perceptions of these factors change over time.

Chen and Hitt proposed that ease of use does not strengthen intention to stay in a relationship with the service provider (Chen and Hitt 2002). However, satisfaction is crucial for brand loyalty (Oliver 1999, Singh 2004). In this study it was found that negative perceptions of ease of use had a relationship to satisfaction. There was strong evidence that when ease of use was perceived as a weakness of a service, the respective perceived satisfaction deviated significantly from the average. A similar relationship was also found in respect to perceptions of overall service quality, value for money, and convenience of use. Furthermore, among the full-text journal and magazine services a corresponding relationship was found between satisfaction and links to full-text and article delivery to desktop. In addition, among the aggregate and database services there was an equal relationship between satisfaction and service response time.

The majority of respondents to this study shared, however, a positive perception of the service characteristics mentioned above. Overall service quality together with ease of use was the most often perceived strength of scholarly information services.

Expectations may well explain why those using the services on a weekly basis were more

apt to advocate the services. They found the overall service quality higher and perceived satisfaction higher than others. A more frequent customer of a service would be expected to have higher expectations of quality (Johnson and Mathews 1997). Expectations are not necessarily met by the most frequent users, whereas those using the services on a weekly basis may have more realistic expectations based on their not-so-frequent yet recent encounters.

Expectations of interface design seemed also be unrealistic as interface design was perceived least positive by the most frequent users. Previously interface design has been found to influence satisfaction and future use (Lu and Lin 2001; Van Riel et al. 2001). The results of this study, however, did not show evidence of such a relationship between interface design and satisfaction.

Overall satisfaction has previously been found significant in predicting the use of electronic resources (Chen and Hitt 2002; Lu and Lin 2002; van Riel et al. 2001). In this study, satisfaction with the services was found to influence intention to advocate the services. The more satisfied the respondent was with the services, the more likely he or she was to recommend the services to others. There was a clear overall inclination to continue using the electronic scholarly information services among the respondents of this study. The intention to revisit the services was not affected by satisfaction, frequency of use, or length of experience. Interestingly enough, respondents perceiving poor satisfaction graded their likelihood of revisiting the services as good. This tolerance of dissatisfaction indicates a loyalty state that is independent of satisfaction (Oliver 1999).

The associations with online customer help reflect the needs of assistance encountered during a service transaction. The fact that the large majority of respondents perceived online customer help as weakness illustrates the insufficiency of current online help. Previously it has been found that inadequate skills may lead to barriers for use of electronic journals (Hewitson 2002; Talja and Maula 2003). On the other hand, the results of this study provided evidence that perceptions of online customer help are significantly changed with experience. This is in line with Mahé´s proposition that electronic journals are becoming mundane (Mahé 2004).

6.2. Evaluation

The starting point in choosing the research method was the need to capture the most active users of scholarly electronic services. In this respect, the web-based questionnaire has benefits the traditional mail or phone questionnaire does not have because it approaches the respondents in the same environment in which they work. However, the validity of the research is affected by the lack of exact knowledge of the population.

It is known that with small samples it is difficult to produce statistically significant results because they rarely reach the commonly accepted level of significance. The difficulty to show p-values of less than 0.05 may mistakenly lead to a situation where the null hypothesis of no relationship is accepted, even if a relationship does exist. This problem can be at least partly overcome by looking at the effect sizes[10]. If the effect size is large and the significance level is large, this type of error might have occurred. Similarly, where the effect size is small, there is a small p-value at a small significance level, statistical significance could be mistakenly thought to have practical importance even if it does not (Kramer and Rosenthal 1999, 59-79).

Research validity is also dependent on the questions themselves and the ability of

[10] Applicable equation: size of effect x size of study = test of significance.

respondents to understand the questions correctly, and on whether the questions are good to begin with. The PLDC program students who tested the questionnaire raised doubts about the general knowledge of scholarly information services. This was because they, as part-time students in fields other than science and technology, were not at all familiar with the services presented in the questionnaire. Consequently this test group was not in a position to pinpoint difficult or nondescript questions because of this unfamiliarity. In retrospect the PLDC students were therefore not necessarily the best choice for a test group. However, only one respondent commented that answering a question regarding strengths and weaknesses of services had been difficult.

The length of the questionnaire may have affected the validity of the research. The more services one recognized, the more questions there were. The respondents may not have had enough time, i.e. he or she may have become bored with the length of the questionnaire before reaching the end. Also, it is unknown how many respondents abandoned the questionnaire before completing and submitting it.

6.3. Future directions

The survey data demonstrated that the brand value, the differential effect of the brand name, can be positively affected over time. The quest for differentiation in a system, where services are defined in relation to other services, leads to a constant change where the best innovations are soon copied by others, and the mere core service is no longer sufficient. Expectations must be exceeded in order to distinguish the service from all the others. In the product development cycle some of the additional services will become expected services, and some will fade and make way for new innovations. The core product will incorporate some of the expected services. The results of this study tentatively show that the services directly linked with the current core product are now becoming an essential part of the journal services. Because of the constantly evolving nature of services, neither the core benefit nor the core product can remain permanent or stable.

For an individual to change the routines of his or her information seeking, the substitute must surpass expectations. Here the well-known brands have an advantage in attracting attention due to greater levels of visibility. Routines that individuals have developed in their information seeking are formed with experience where subjective projections about required time, money and effort are present. Because the tendency to seek information from others decreases with experience, there is more reliance on the accumulated self-assessed knowledge gained during previous encounters. This study suggests that perceptions change over time and that the service expectations rise accordingly. The survey data also illustrated that length of experience generates demands for service development: convenient access between similar services became more valuable with time.

Customer retention is crucial for intangible services. Here the survey data confirmed that there are two notable aspects counteracting one another. On the one hand, perceived overall service quality strengthens the relationship between the consumer and the service provider. On the other hand, ease of use lessens the influence of acquired knowledge as a relationship driver. Ease of use is an acknowledged factor in the way journal services and their advanced features are used and similarly quality is an important attribute attached to the journals and related services.

When scientific journal contents, the articles, are made available through a service incorporating several journals and additional services, the service brand works as an umbrella for all the contents, extending the attributes and values attached to the brand to the contents of the whole service. This may affect those seeking an outlet for their research

output and certainly offers an additional device for those responsible for soliciting and marketing the contents of the services.

More research generates more research output and outlets. As time spent in reading is not growing concurrently with the numbers of articles being read, the time spent per read item is subsequently becoming shorter. The increasing numbers of research results are published in a growing number of scientific journals, and increasingly publishing is conducted in electronic format. Given the growth in the numbers of researchers and thus the amount of research, the need to distinguish oneself from the masses becomes a necessity.

Today preprint archives, institutional repositories, and self-archiving initiatives are gaining ground as means of providing open access to scientific and scholarly literature. Therefore alternative versions of the literature are becoming common. Versions of a peer-review journal article can, for example, be found as a pre-print and a post-print, a manuscript, and as a technical report. Consequently this development magnifies the growth of scientific information that is made available via the Internet. Therefore the distinguishing elements of branding will become even more important.

The established journal publishers and reference database producers have already successfully branded their services. In a situation where similar information is available through several outlets, a strong brand has an advantage when consumers make their choices. Provided that decisions between multiple choices must be made in haste, a recognized sign of value, the brand name, can indeed be of assistance. In this respect the alternative resources, such as preprint archives and institutional repositories, need to obtain similar brand value in order to be competitive on the market. The availability and awareness of these services will influence the way they are first accepted. Their ease of use and the attributes attached to them will be equally important; the services need to be branded.

The network effect in this scenario will boost the number of services that take advantage of or add value to the original services. These new services will no doubt also include services specializing in handling financial matters and mechanisms of pay-per-view will develop. Scalability in the network environment allows information to be priced dynamically because the cost of reproducing additional copies is almost non-existent. High-demand information can be priced differently from low-demand information. Furthermore, the imaginary added value embedded in brand names can be transformed into pecuniary advantage.

The survey data illustrated the importance of linking between services and the unwillingness of users to personally pay for the services. It can be interpreted as a manifestation of the free flow and free access of scientific information. These representations of values are, however, not necessarily present in the information seeking part of research work. There, mundane matters are important and work needs to be conducted with efficiency, and the branded scholarly information services are intended to be integrated into the research process. Research work comprises several activities whereby the services need to assess different aspects of research work and demonstrate utility. When the branded services are found useful and easy to use the integration can be conscious and purposeful. The process is more subconscious when the researchers – as part of their own research community – conform to the values and norms of the community. The shared meanings about the services as well as the personal subjective associations will play an important role when making a choice.

Given the evolving nature of scholarly information services there is a plethora of issues calling for further research. Brands are an important phenomenon in the network environment. This study has demonstrated that scientific information brands cohere with the lives of researchers. Applying consumer research methodologies can therefore also be fruitful in the context of information seeking.

Comparison studies between competing brands in scholarly information services can provide answers to questions why consumers choose a certain brand. For example, when a search engine such as Google Scholar offers links to alternative versions of an article, on what grounds do researchers make their choice? Descriptive brand attributes are also interesting from a brand loyalty perspective. Furthermore, the transformation of additional services from an augmented product into a core product is important. It would be interesting to know how selection criteria, and expectations of scholarly information services evolve over the course of a research career. Do undergraduate and graduate students apply different criteria from their teachers and professors?

These empirical studies can be conducted following the established practices of marketing research such as interviews, focus groups, panels, and surveys. Also experiments and simulations conducted in laboratory settings can provide information about the brand selection, and transaction log analysis can provide numerical data about the preferences of researchers. Qualitative research methods, such as interviews could be very fruitful in assessing what are the underlying motivations and attitudes of researchers towards their brands. Longitudinal studies are also needed to provide information about how expectations of branded scholarly information services change over the course of a research career.

The results of this study are limited to the fields of science and technology. It would also be interesting to know if the results of this study are applicable in other disciplines, where different customs, traditions and cultures direct the information seeking processes.

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APPENDIXES

APPENDIX 1. QUESTIONNAIRE
APPENDIX 2. SUMMARY OF ASSESSED SERVICES
APPENDIX 3. PERCEPTIONS OVER TIME

Dear Doctoral Student,

During the past five years the Finnish university libraries have acquired a good number of scientific reference databases and scholarly journals in digital format. These scholarly information services are accessible on university campuses via site licenses. Today the services include a variety of enhancements - additional services - to supplement the plain journal articles and reference databases. The aim of the following survey is to get the views and feedback of young researchers concerning these continuously evolving services. The survey questionnaire is easy to answer, you need to evaluate only those services you´re familiar with.

The survey is part of an academic licentiate thesis within the national university network of communication studies. The responsible researcher is M.Sc. Irma Pasanen. Please feel free to contact her tel. 09-451 4125, e-mail irma.pasanen@hut.fi for any questions you may have concerning this survey.

A request to answer this questionnaire has been sent to the doctoral students enrolled in the graduate schools coordinated by the Helsinki University of Technology. The doctoral students represent a user group most likely to be an active user of these services in the next five years and therefore it would be very important that you answer this questionnaire. Your views will help to develop the library services. All answers are handled confidentially.

Answering the questionnaire takes about 10-15 minutes of your time. Please fill in the questionnaire at your earliest convenience and no later than by March 31st.

Thank you in advance for your help.

Please note that throughout the questionnaire

the radio button ◉ indicates you are to select only one of the given choices and

the checkbox ☑ lets you check all the choices that apply.

Survey of Scholarly Information Services

1. How often do you use scholarly information services (i.e. web-based services which contain scientific journals and/or reference databases)?

Daily	Several times a week	Once a week	A couple of times a month	More rarely	Never used
○	○	○	○	○	○

2. How long have you been using scholarly information services?

Less than a year	One to under three years	Three to under five years	Five years or more	Never used
○	○	○	○	○

3. For what purpose do you use scholarly information services (i.e. web-based services which contain scientific journals and/or reference databases)?

☐ To keep up in my fields of interest

☐ For my research work

☐ To solve an individual problem in my everyday work

☐ For teaching purposes

☐ Other, please specify

4. If you do not use scholarly information services, please list your top three reasons for not using.

5. Please grade the probability that you will continue/start using scholarly information services in the near future. (1 excellent probability, 5 very poor probability)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

6. Would you be willing to pay personally for the use of scholarly information services (i.e. web-based services which contain scientific journals and/or reference databases)?

I would not pay	I would not pay but I would get the information through my own channels	I would pay 5 euros max. per article or search session	I would pay 5 to 10 euros per article or search session	If I really need a piece of information the cost does not matter
☐	☐	☐	☐	☐

7. Additional services that supplement plain journal articles and references are becoming common in the scholarly information services. These additional services are often named differently in different contexts but they do, however, perform similar functions. Please grade the importance of the following functions from your point of view in a scale from 1-5. (1 highly important, 5 not at all important)

	1	2	3	4	5	Don´t know
Alerting services	☐	☐	☐	☐	☐	☐
Preview of accepted articles	☐	☐	☐	☐	☐	☐
Calendar of events	☐	☐	☐	☐	☐	☐
Job announcements and career services	☐	☐	☐	☐	☐	☐
News services	☐	☐	☐	☐	☐	☐
Links to educational materials	☐	☐	☐	☐	☐	☐
Online shopping of related materials	☐	☐	☐	☐	☐	☐
Ability to purchase non-subscribed individual articles with a credit card or other online means	☐	☐	☐	☐	☐	☐
Links to buyer´s guides relevant to the field	☐	☐	☐	☐	☐	☐
Personalization possibilities	☐	☐	☐	☐	☐	☐
Links from cited reference to full-text	☐	☐	☐	☐	☐	☐
Supplementary research materials	☐	☐	☐	☐	☐	☐
Discussion forums	☐	☐	☐	☐	☐	☐
Links to other services with similar content	☐	☐	☐	☐	☐	☐
Forwarding material to a colleague	☐	☐	☐	☐	☐	☐

8. Do you recognize the following trade marks (logos)?

	Yes	No
crossref CROSSREF.ORG THE CITATION LINKING BACKBONE	☐	☐
Scitation	☐	☐
SCIRUS for scientific information only	☐	☐
ChemPort℠ Connecting You to Full-Text Documents on the Web!	☐	☐
CiteSeer Scientific Literature Digital Library	☐	☐

In the following questions the service trade marks of 15 different scholarly information services are presented.

Please note that the questions are divided into four parts (a., b., c., and d.). Please evaluate only those services you recognize.

9

ISI Web of KNOWLEDGE℠

9 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements/received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

9 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

9c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

ISI Web of KNOWLEDGE℠	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

9 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

10

10 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

10 b. How did you first pay attention this service?

☐ Link from library website

☐ Link from other website

- ☐ Search engine (e.g. Google)
- ☐ Catalogue or brochure
- ☐ Email campaign
- ☐ Conference exhibition
- ☐ Colleague
- ☐ Professor recommendation
- ☐ Library staff
- ☐ Society membership
- ☐ Can´t remember

10 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

Copyright @ 2003 American Chemical Society ACS PUBLICATIONS HIGH QUALITY. HIGH IMPACT.	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

10 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

11

Science

11 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

- ☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

11 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

11 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

Science	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

11 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know

12

Engineering Village 2

12 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

- ☐ I recognize the service trade mark because I use the service
- ☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service
- ☐ I have registered myself as personal user of the service (and receive personalized services and options)
- ☐ I recognize the service trade mark but I do not currently use the service

12 b. How did you first pay attention to this service?

- ☐ Link from library website
- ☐ Link from other website
- ☐ Search engine (e.g. Google)
- ☐ Catalogue or brochure
- ☐ Email campaign
- ☐ Conference exhibition
- ☐ Colleague
- ☐ Professor recommendation
- ☐ Library staff
- ☐ Society membership
- ☐ Can´t remember

12 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

Engineering Village 2	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐

Value for money	☐	☐
Links between other services and products	☐	☐

12 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

13

nature.com
the world's best science on your desktop

13 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

13 b. How did you first pay attention this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

13 c.The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

nature.com the world's best science on your desktop	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐

Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

13 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

14

ProQuest®

14 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

14 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

14 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

ProQuest®	+	-
Overall quality of service	☐	☐
Service response time	☐	☐

Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

14 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

15

ELSEVIER SCIENCE DIRECT

15 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

15 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

15 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

SCIENCE DIRECT	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

15 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

16

16 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

16 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

- ☐ Search engine (e.g. Google)
- ☐ Catalogue or brochure
- ☐ Email campaign
- ☐ Conference exhibition
- ☐ Colleague
- ☐ Professor recommendation
- ☐ Library staff
- ☐ Society membership
- ☐ Can´t remember

16 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

HighWire	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

16 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

17

EBSCO HOST Research Databases

17 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

17 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

17 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

EBSCO HOST Research Databases	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

17 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

18

18 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

18 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

18 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐

Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

18 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

19

19 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

- ☐ I recognize the service trade mark because I use the service
- ☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service
- ☐ I have registered myself as personal user of the service (and receive personalized services and options)
- ☐ I recognize the service trade mark but I do not currently use the service

19 b. How did you first pay attention this service?

- ☐ Link from library website
- ☐ Link from other website
- ☐ Search engine (e.g. Google)
- ☐ Catalogue or brochure
- ☐ Email campaign
- ☐ Conference exhibition
- ☐ Colleague
- ☐ Professor recommendation
- ☐ Library staff
- ☐ Society membership
- ☐ Can´t remember

19 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

	+	-
Overall quality of service	☐	☐

Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

19 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

20

20 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

20 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

20 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

Emerald	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

20 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

21

PORTAL

21 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

21 b. How did you first pay attention to this service?

- ☐ Link from library website
- ☐ Link from other website
- ☐ Search engine (e.g. Google)
- ☐ Catalogue or brochure
- ☐ Email campaign
- ☐ Conference exhibition
- ☐ Colleague
- ☐ Professor recommendation
- ☐ Library staff
- ☐ Society membership
- ☐ Can´t remember

21 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

PORTAL	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐
Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

21 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

22

22 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

- ☐ I recognize the service trade mark because I use the service
- ☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service
- ☐ I have registered myself as personal user of the service (and receive personalized services and options)
- ☐ I recognize the service trade mark but I do not currently use the service

22 b. How did you first pay attention to this service?

- ☐ Link from library website
- ☐ Link from other website
- ☐ Search engine (e.g. Google)
- ☐ Catalogue or brochure
- ☐ Email campaign
- ☐ Conference exhibition
- ☐ Colleague
- ☐ Professor recommendation
- ☐ Library staff
- ☐ Society membership
- ☐ Can´t remember

22 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

	+	-
Overall quality of service	☐	☐
Service response time	☐	☐
Ease of use	☐	☐
Unique contents	☐	☐
Article delivery to my desktop	☐	☐
Links to full-text	☐	☐
Search speed	☐	☐
Interface design	☐	☐
Rate of product upgrades and/or enhancements	☐	☐
Online customer help	☐	☐

Convenient access	☐	☐
Value for money	☐	☐
Links between other services and products	☐	☐

22 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know
☐	☐	☐	☐	☐	☐

23

IEEE Xplore® RELEASE 1.5

23 a. Do you recognize this service?
(if you do not recognize the logo, please move on to the next question)

☐ I recognize the service trade mark because I use the service

☐ I recognize the service trade mark because I´ve seen advertisements or received direct mail concerning the service

☐ I have registered myself as personal user of the service (and receive personalized services and options)

☐ I recognize the service trade mark but I do not currently use the service

23 b. How did you first pay attention to this service?

☐ Link from library website

☐ Link from other website

☐ Search engine (e.g. Google)

☐ Catalogue or brochure

☐ Email campaign

☐ Conference exhibition

☐ Colleague

☐ Professor recommendation

☐ Library staff

☐ Society membership

☐ Can´t remember

23 c. The strengths and weaknesses of this service.
Please rate the given characteristic as a strength (+) or a weakness (-).

IEEE Xplore® RELEASE 1.5	+	-
Overall quality of service	☐	☐
Service response time	☐	☐

Unique contents		
Article delivery to my desktop		
Links to full-text		
Search speed		
Interface design		
Rate of product upgrades and/or enhancements		
Online customer help		
Convenient access		
Value for money		
Links between other services and products		

23 d. Please grade your overall satisfaction of this service.
(1 highly satisfied, 5 highly dissatisfied)

1	2	3	4	5	Don´t know

24. What other scholarly information services (i.e. web-based services which contain scientific journals and/or reference databases) or search engines do you usually use in your research work?

25. Please grade the probability that you will recommend those scholarly information services you use to your friends and colleagues.
(1 excellent probability, 5 very poor probability)

1	2	3	4	5	Don´t know

26. Please offer any comments or suggestions you may have regarding the services or this questionnaire.

Some background information

27. Your gender

○ male ○ female

28. Your age

<20
20
21
22
23
24

29. Are you a full-time researcher?

◉ yes ○ no

30. In what graduate school are you enrolled?

Electrochemical Science and Technology of Polymers and Membranes including Biomembranes (ESPOM)
Graduate School in Electronics, Telecommunications and Automation (GETA)
Graduate School in Electronics Manufacturing
Graduate School in Energy Technology
Functional Research in Medicine
International Doctoral Programme in Pulp and Paper Science and Technology
Graduate School in Remote Sensing
Chemical Sensors and Microanalytical Systems (CHEMSEM)
The Graduate School in Real Estate and Facilities Management
Graduate School in Computational Methods of Information Technology
Graduate School in Computational Fluid Dynamics
National Graduate School in Material Physics
Graduate School in System Analysis, Decision Making and Risk Management
National Graduate School in Engineering Mechanics
Industrial Engineering and Management Doctoral Programme in Finland

Submit

Thanks for your participation!

Service trade mark	Trademark registration information	Description of the core service
Science	United States Patent and Trademark Office. Trademark. Service Mark Registration Number 2204617 Registration Date November 17, 1998	Science Magazine by the American Association for the Advancement of Science. One of the most prestige general science journals. http://www.scienceonline.org/
nature.com the world's best science on your desktop	United States Patent and Trademark Office. Trademark. Service Mark application Serial Number 75348155 Filing Date August 27, 1997	Includes 22 journals by Nature Publishing Group. Journals include general science journals that are among the most prestige general science journals. www.nature.com
ELSEVIER SCIENCE DIRECT	United States Patent and Trademark Office. Service Mark Registration Number 2226808 Registration Date February 23, 1999	Includes over 1200 peer reviewed academic journals by Elsevier in the fields of chemistry, physics, engineering, environmental sciences, mathematics, economics etc. http://www.sciencedirect.com/
InterScience	United States Patent and Trademark Office. Service Mark Registration Number 2349838 Registration Date May 16, 2000	Contains some 300 journals published by John Wiley et Sons in fields such as business, finance & management, chemistry, computer science, earth science, education, engineering, law, life and medical sciences, mathematics and statistics, physics, and psychology. www.interscience.wiley.com
[SpringerLink]	United States Patent and Trademark Office. Trademark. Service Mark application Serial Number 76509654 Filing Date April 25, 2003	Contains some 430 journals published by Springer Verlag in fields such as mathematics, physics, chemistry, life- and medical sciences, environmental and geo sciences, engineering, computer science and economics http://link.springer.de/forum.htm
Emerald	United States Patent and Trademark Office. Trademark. Service Mark application Serial Number 78354788 Filing Date January 21, 2004	Contains over 110 electronic journals on economics, management, information studies and engineering. http://www.emerald-library.com
HighWire	United States Patent and Trademark Office. Service Mark application Serial Number 78313499 Filing Date October 14, 2003	Contains 29 journals in medical sciences. http://highwire.stanford.edu
PORTAL	United States Patent and Trademark Office. Service Mark Registration Number 1837163 Registration Date May 17, 1994	The portal includes bibliographic information, abstracts, reviews, and full-texts from journals, magazines and proceedings published by the Association of Computing Machinery ACM in the fields of computing and telecommunication www.acm.org/dl
ACS PUBLICATIONS	United States Patent and Trademark Office. Trademark. Service Mark Registration Number 1481565 Registration Date March 22, 1988	About 25 full-text journals on biochemistry, chemistry, chemical engineering, chemical industry, food chemistry, environmental technology and energy published by American Chemical Society. http://pubs.acs.org/

IEEE Xplore	United States Patent and Trademark Office. Service Mark Registration Number 2595086 Registration Date July 16, 2002	Covers publications from IEEE and IEE including journals, conference proceedings and standards. The main topics are computer sciences, telecommunication, electrical engineering, biomedicine and energy. http://www.ieee.org/ieeexplore/
ProQuest	United States Patent and Trademark Office. Service Mark Registration Number 2751655 Registration Date August 19, 2003	Proquest service hosts ABI/INFORM reference database that provides in-depth coverage informative indexing and substantive abstracts to articles from more than 1,000 leading business and management publications. More than half of the top sources are available in full text. http://www.umi.com/pqdauto
EBSCO HOST Research Databases	United States Patent and Trademark Office. Service Mark Registration Number 2017905 Registration Date November 19, 1996	EBSCO features full-text for over 1,000 journal titles supplemented with abstracts and indexing information from over 3,100 journals from a wide range of academic areas. http://www.epnet.com/academic/ehost.asp
ISI Web of KNOWLEDGE SM	United States Patent and Trademark Office. Service Mark Registration Number 2743528 Registration Date July 29, 2003	A multidisciplinary database covering over 8000 journals in all fields of science. Bibliographic information of the articles and also cited reference lists. Possible to search for articles that cite a known author or work. Includes links to articles in full text. Includes Science Citation Index Expanded, Social Sciences Index and Arts and Humanities Citation Index. http://www.isinet.com/isi/
Ei Engineering Village 2	United States Patent and Trademark Office. Service Mark of Compendex Registration Number 0922959 Registration Date October 26, 1971	Ei Engineering Village includes Compendex (1970-) database that contains references to articles, reports and conference proceedings etc. Covers technology and applied sciences, also industrial economics, work psychology and marketing. Website Abstracts is a directory of web-sites related to technology. US Patent Office (1976-) includes more than 6 mill. full text patents. Industry Specs and Standards (Techstreet) contains standards and technical specifications (abstracts). http://www.engineeringvillage2.org
SciFinder SCHOLAR	United States Patent and Trademark Office. Trademark. Service Mark Registration Number 2712735 Registration Date May 6, 2003	Comprehensive chemical and related scientific information including: journal articles and patents together in one source, substance data chemical reactions, chemical regulatory data, chemical suppliers, biomedical literature. http://www.cas.org/SCIFINDER/SCHOLAR/index.html
crossref CROSSREF.ORG THE CITATION LINKING BACKBONE	United States Patent and Trademark Office. Service Mark Registration Number 2542452 Registration Date February 26, 2002	Service that provides reference citation links to scholarly and research materials published by others. www.crossref.org/
SCIRUS for scientific information only	United States Patent and Trademark Office. Service Mark Registration Number 2654351 Registration Date November 26, 2002	Search engine that searches from scientific / academic websites only. www.scirus.com

ChemPort℠ Connecting You to Full-Text Documents on the Web!	United States Patent and Trademark Office. Service Mark Registration Number 2388183 Registration Date September 19, 2000	Linking service providing links between research journals, publications and related information in the fields of chemistry and other scientific disciplines. www.chemport.org/
Scitation	United States Patent and Trademark Office. Service Mark application Serial Number 76517443 Filing Date May 27, 2003	Services provided via a global computer information network in the field of physics. www.scitation.org/
CiteSeer Scientific Literature Digital Library	United States Patent and Trademark Office. Trademark. Service Mark Registration Number 2643168 Registration Date October 29, 2002	Computer services, namely providing collection, compilation, organization and analysis of citations or references to literary works on databases and local, wide area and global computer networks. citeseer.ist.psu.edu/

	Length of experience %			Frequency of use %		
Overall service quality	Less than three years	Three to five years	Over five years	Daily	On a weekly basis	More rarely
Positive perception (strength)	85	90	91	83	92	84
Negative perception (weakness)	15	10	9	17	8	16
Total N=388	100 (N=114)	100 (N=195)	100 (N=79)	100 (N=98)	100 (N=247)	100 (N=44)
	P=0.33			P=0.030		

Table A 1. Perceptions of overall service quality over time

	Length of experience %			Frequency of use %		
Ease of use	Less than three years	Three to five years	Over five years	Daily	On a weekly basis	More rarely
Positive perception (strength)	83	78	84	74	83	84
Negative perception (weakness)	17	22	16	26	17	16
Total N=384	100 (N=113)	100 (N=190)	100 (N=81)	100 (N=100)	100 (N=241)	100 (N=43)
	P=0.44			P=0.12		

Table A 2. Perceptions of ease of use over time

	Length of experience %			Frequency of use %		
Online customer help	Less than three years	Three to five years	Over five years	Daily	On a weekly basis	More rarely
Positive perception (strength)	23	26	49	34	28	24
Negative perception (weakness)	77	74	51	66	72	76
Total N=285	100 (N=86)	100 (N=148)	100 (N=51)	100 (N=83)	100 (N=169)	100 (N=33)
	P=0.002			P=0.50		

Table A 3. Perceptions of online customer help over time

	Length of experience %			Frequency of use %		
Interface design	Less than three years	Three to five years	Over five years	Daily	On a weekly basis	More rarely
Positive perception (strength)	60	56	57	43	62	63
Negative perception (weakness)	40	44	43	57	38	37
Total N=353	100 (N=104)	100 (N=179)	100 (N=70)	100 (N=92)	100 (N=220)	100 (N=41)
	P=0.72			P=0.007		

Table A 4. Perceptions of interface design over time

	Length of experience %			Frequency of use %		
Rate of product upgrades and/or enhancements	Less than three years	Three to five years	Over five years	Daily	On a weekly basis	More rarely
Positive perception (strength)	44	48	49	48	48	38
Negative perception (weakness)	56	52	51	52	52	62
Total N=296	100 (N=91)	100 (N=154)	100 (N=51)	100 (N=83)	100 (N=189)	100 (N=34)
	P=0.79			P=0.56		

Table A 5. Perceptions of rate of product upgrades and/or enhancements over time

	Length of experience %			Frequency of use %		
Links between services	Less than three years	Three to five years	Over five years	Daily	On a weekly basis	More rarely
Positive perception (strength)	27	48	58	41	44	39
Negative perception (weakness)	73	52	42	59	56	61
Total N=290	100 (N=88)	100 (N=152)	100 (N=50)	100 (N=81)	100 (N=173)	100 (N=36)
	P=0.000			P=0.80		

Table A 6. Perceptions of links between services over time

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