Technology Innovation Management Review

April 2014

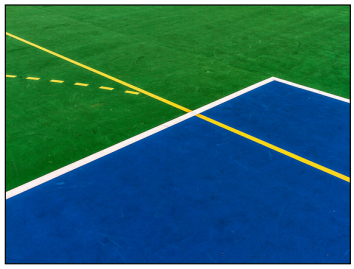

Image licensed under CC BY See-ming Lee

Service and Innovation

Welcome to the April 2014 issue of the *Technology Innovation Management Review*. This month's editorial theme is Service and Innovation. We welcome your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

Carleton UNIVERSITY

www.timreview.ca

Publisher

The *Technology Innovation Management Review* is a monthly publication of the Talent First Network.

ISSN

1927-0321

www.timreview.ca

Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the community sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

Contribute

Contribute to the TIM Review in the following ways:

- Read and comment on articles.
- Review the upcoming themes and tell us what topics you would like to see covered.
- Write an article for a future issue; see the author guidelines and editorial process for details.
- Recommend colleagues as authors or guest editors.
- Give feedback on the website or any other aspect of this publication.
- Sponsor or advertise in the TIM Review.
- Tell a friend or colleague about the TIM Review.

Please contact the Editor if you have any questions or comments: timreview.ca/contact

Editorial: Service and Innovation

Chris McPhee, Editor-in-Chief

Marja Toivonen, Risto Rajala, and Mika Westerlund, Guest Editors

From the Editor-in-Chief

Welcome to the April 2014 issue of the *Technology Innovation Management Review*, our first of two issues on the editorial theme of **Service and Innovation**. It is my pleasure to introduce the guest editors for our April and May issues, **Marja Toivonen** (VTT Technical Research Centre of Finland), **Risto Rajala** (Aalto University), and **Mika Westerlund** (Carleton University), who have brought together diverse authors to contribute 10 articles to this important topic.

The April issue contains the first five articles on Service and Innovation, plus a summary of a recent TIM Lecture on "The Business of Cybersecurity" presented by **David Grau**, Vice President and Head of Threat Response, Intelligence, and Defensive Technologies at TD Bank Group (td.com), and **Charles Kennedy**, VP Credit Card Technology.

Our June and July issues will be unthemed, and we welcome submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and growing technology companies. Please contact us (timreview.ca/contact) with article topics and submissions, suggestions for future themes, and any other feedback.

We hope you enjoy this issue of the TIM Review and will share your comments online.

Chris McPhee
Editor-in-Chief

From the Guest Editors

Services are dominating the present-day business landscape, both with their share in the overall economic output and with their role as pivotal sources of growth. The underlying reason driving services is the increasing significance of intangible assets (i.e., relationships, information, and knowledge) in inter-organizational value creation. Besides the growth taking place in service sectors, services are essential in advancing the development of industrial manufacturing. Many industrial firms deem the provision of services as a promising area for their future business, and they increasingly use services to support their core functions.

The theme of this issue (and the May 2014 issue that will follow it) is Service and Innovation – a topic having origins in the 1980s but putting forward many new perspectives. The topic derives from two main schools of thought: marketing and management on one hand, and general innovation studies on the other. Until recently, these two schools have developed apart from each other, but today we witness an increasing convergence between them. Moreover, synthesizing views are gaining ground, in many cases at the expense of old dichotomies: science push and demand pull are both seen as necessary drivers of development; technology and human resources are considered equally important as sources of competitive advantage; and providers and users are increasingly analyzed as co-creators of value.

The research into service development and innovation has become more versatile including, for instance, topics such as open innovation, the perspective of service systems, and the relationship between internationalization and innovation. We hope that the sample of articles in this first of two special issues of the TIM Review will play its part in promoting this development, which is important for both research and practice. The articles in this issue represent studies carried out mainly in European countries, but having linkages to other areas, such as the Middle East and China. Content-wise, the topics include many issues that are widely generalizable, irrespective of the geographical area.

Editorial: Service and Innovation

Chris McPhee, Marja Toivonen, Risto Rajala, and Mika Westerlund

In the first article, **Rabeh Morrar** from An-Najah National University in Nablus, Palestine, reviews the literature on service innovation. Given that service activities play an increasingly prominent role in all economic exchange, innovation in the service sector is of mounting importance for all economic actors. Also, they are imperative for entire societies. Building on the widely-used distinctions among service innovation activities introduced by Coombs and Miles in 2000 and Gallouij in 2010, the study depicts the specificities of assimilation, demarcation, and synthesis approaches to service innovation. Moreover, the article discusses the economic outcomes of different service innovation activities. In doing so, the study provides helpful guidance for understanding the progression of service innovation research.

In the second article, **Marit Engen** and **Inger Elisabeth Holen** from Lillehammer University College, Norway, combine three important viewpoints in innovation studies: R&D-based innovation, employee-driven innovation, and user-driven innovation. The role of users has aroused interest and is often linked with the role of grassroots employees as transmitters of user input in the innovating organization. Engen and Holen carry out an analysis of how the external and internal factors influence the service firms' ability to innovate and how these factors are linked to the novelty of innovation. They use survey data from the Norwegian service sector to show that R&D is important when pursuing radical innovations, and employee-based activities, such as collaboration in ideation, mainly promote incremental innovations. Knowledge gained from customers is important for both radical and incremental innovations.

The third article, by **Ville Eloranta** from Aalto University in Finland and **Juho-Ville Matveinen** from Diagonal, a service design agency in Finland, proposes a new approach to the customer intelligence discussion. It focuses on the utilization of social platforms for improved value-in-use in service operations. The authors define social platforms as adaptable digital service environments that enable the co-creation of value and the collection of value-in-use information through interactions within a service system. Also, the approach takes into account interactions among distinct service systems. The article builds on the prevailing body of scientific knowledge on value-in-use and social platforms and suggests a number of propositions to be taken into consideration in service innovation, and, in further research on value creation through services.

In the fourth article, **Nora Schütze** from Cottbus University of Technology in Germany investigates the effects of electronic word-of-mouth communication on the reach of local service providers' marketing activities. In the study, the penetration of electronic-word-of-mouth is simulated in an agent-based modelling of electronic word-of-mouth processes. The article discusses the important question whether local service providers can compete in the social media on an equal footing with their larger rivals. Although the large competitors seem to have an advantage, the analysis shows some promising findings for local service providers who may benefit from pursuing close connections by operating as locally as possible. Moreover, the study provides service marketers with practical advice about how to benefit from their electronic word-of-mouth activities.

In the last article, **Sen Bao** and **Marja Toivone**n from VTT Technical Research Centre of Finland focus on knowledge-intensive business services (KIBS). KIBS companies provide knowledge inputs to clients, and to perform this function, they have to continuously develop their own knowledge base. Today, the inter-linkages between internationalization and innovation are an important topic, and KIBS have a central role as transmitters of knowledge between global and local levels. In their article, Bao and Toivonen analyze the ways in which Western KIBS enter Chinese markets and position their business in their respective value chains. The study highlights the importance of local partners and the consideration of different value dimensions in the Chinese context: customer value (the balance between benefits and sacrifices), provider value (paybacks and brand value), and relationship value (trust, commitment, and loyalty).

We hope that you enjoy the issue and find some useful ideas for the further efforts in the research and application of service innovation and service business development.

Marja Toivonen, Risto Rajala, and Mika Westerlund
Guest Editors

Editorial: Service and Innovation

Chris McPhee, Marja Toivonen, Risto Rajala, and Mika Westerlund

About the Editors

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. Chris holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa and BScH and MSc degrees in Biology from Queen's University in Kingston. He has over 15 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

Marja Toivonen is Research Professor at VTT Technical Research Centre of Finland, her specialty being service innovation and service business models. She is also Adjunct Professor at Aalto University in Helsinki, Finland. Marja has written several articles on service-related topics and been an invited speaker in many international conferences focusing on these topics. She is a council member of the European Association for Research on Services (RESER), and she is a member of the European Union's 2013–2014 High-Level Expert Group on Business Services.

Risto Rajala, D.Sc. (Econ) is an Assistant Professor in the Department of Industrial Engineering and Management at Aalto University in Helsinki, Finland. Dr. Rajala holds a PhD in Information Systems Science from the Aalto University School of Business. His recent research has dealt with management of complex service systems, development of digital services, service innovation, and business model performance. Rajala's specialties include management of industrial services, collaborative service innovation, knowledge management, and design of digital services.

Mika Westerlund, D.Sc. (Econ) is an Assistant Professor at Carleton University's Sprott School of Business in Ottawa, Canada. He previously held positions as a Postdoctoral Scholar in the Haas School of Business at the University of California Berkeley and in the School of Economics at Aalto University. Mika earned his doctoral degree in Marketing from the Helsinki School of Economics. His doctoral research focused on software firms' business models and his current research interests include open and user innovation, business strategy, and management models in high-tech and service-intensive industries.

Citation: McPhee, C., Toivonen, M., Rajala, R., and Westerlund, M. Hudson. 2014. Editorial: Service and Innovation. *Technology Innovation Management Review*, 4(4): 3–5. http://timreview.ca/article/779

Keywords: service innovation, service business development, value creation, value chains, value-in-use, social platforms, word-of-mouth communication, service providers, knowledge-intensive business services, internationalization

Innovation in Services: A Literature Review

Rabeh Morrar

> *"The increasingly prominent role being played by service activities in productive systems have combined to make innovation in the service sector an issue of great importance."*
>
> Faiz Gallouj
> Professor of Economics

The article reviews the literature relevant to innovation in services, which has flourished since the 1990s. We discuss the definition of service and to what extent the characteristics of service output have influenced the conceptualization of innovation in services. Then, based on the literature review, we develop a conceptual framework for innovation in service sector, which classifies innovation in service sector into three main approaches: i) assimilation, where innovation in the service sector is assimilated from innovation in manufacturing sector; ii) demarcation, which differentiates innovation in service sector from the traditional conceptualization of innovation in manufacturing sector; and iii) synthesis, which aggregates both assimilation and demarcation approaches within a common conceptual framework. We discuss the relationship between innovation in services and economic performance using productivity and employment as two indicators of performance.

Introduction

Awareness of the importance of service innovation as an engine for the economic growth is a recent phenomenon. Previously, services were considered as non-innovative activities, or innovations in services were reduced to the adoption and use of technologies. The innovation literature was focused on the manufacturing sector, technological product development, and process innovation, and thus, innovation in services was addressed from a manufacturing perspective. Indeed, the corresponding literature "assimilated services within the consolidated framework used for manufacturing sectors and manufactured products" (Gallouj & Savona, 2009). The risk of such a bias towards manufacturing is the underestimation of innovation in services and its effects, because innovation in services includes invisible or hidden innovations that are not captured by the traditional indicators of innovation in the manufacturing sector.

However, the traditional approach has been increasingly challenged, mainly because the underestimation of the dynamics of the service sector was seen as inconsistent with the rise of the service economy, which now accounts for nearly 70% of gross domestic product and employment in member countries of the Organisation for Economic Co-operation and Development (OECD, 2005). Accordingly, the discussion about innovation in services should be extended beyond the traditional (technological) perspective.

A number of studies have shed light on the specificities of innovation in services beyond the traditional biased point of view, which constrained it to the adoption and use of technology (Gallouj & Weinstein 1997; Sundbo & Gallouj, 1999; Tether, 2005). These studies take into account the main characteristics of the service product – its intangibility, its co-production, and its co-terminality – which makes it efficient to define innovation in services.

The objective of this article is to review the extant literature on service innovation in order to identify and evaluate different models of the innovation process in services. The article also aims to show how the unresolved issues relative to the definition of service output have contributed to the underestimation of the per-

Innovation in Services: A Literature Review

Rabeh Morrar

formance of service innovation in terms of productivity and employment. First, the characteristics that are important for defining and measuring innovation in services are discussed. Next, the main theoretical perspective mobilized in the literature to account for innovation in services is presented. This discussion addresses the main theoretical inferences associated with each perspective accompanied with a survey of the most important pertinent application in each perspective. Finally, we discuss the relationship between innovation in services, including productivity and employment as indicators of economic performance.

Defining Service Output

The characteristics of services have largely been neglected by the innovation literature. There is a particular analytical problem of the definition of service output, which reflects on the definition of service innovation. When analyzing service innovation, scholars have merely analytical tools designed for manufacturing within the traditional technological view of innovation. This approach has led to the misunderstanding and the underestimation of innovation activities in services. Gallouj and Savona (2009) argue that it has also led to a wrong conclusion that innovation in services has a relatively small effect on economic performance in terms of productivity and value added, compared to innovation in manufacturing

Therefore, a clear definition of services and their characteristics is a key factor for the correct measuring of innovation output in services and the estimation of the real economic effect of services. However, “the study of services innovation immediately poses the question of how a ‘service’ should be defined” (DTI, 2007). Service production is an action, or a treatment protocol, that leads to a change of state, not the creation of a tangible good (Gallouj, 1998). Because of its fuzzy nature or intangibility, its heterogeneity and unstable character, a service is difficult to define, and therefore it is also difficult to measure its output and productivity (Melvin, 1995).

Arriving at a definition of a service is useful before discussing the problem of defining innovation in the service sector and measuring the productivity impact of innovation on services. However, there is no consensus today among economists about the theoretical characterization of service activities and their output (i.e., "services") (Gadrey, 2000). Therefore, this section of the article sets out to discuss, from a critical perspective, the most prominent arguments about the distinctions between goods and services, with a focus on the definition of services.

Early definitions of services were based on technical criteria derived from classical economists. Three main definitions were adopted by those favouring a technical characterization. The first definition, advanced by Smith (1776) and Say (1803), views a service as a product that is consumed in the instant of production. The second definition, pioneered by Singelmann (1974) and Fuchs (1968), takes the notion of co-production, in other words, the interaction between consumer and producer in producing services. The third approach describes services as non-storable and non-transportable, which distinguishes services from goods (Stanback, 1980).

Hill (1977) introduced the most widely cited definition of services: “a change in the condition of a person, or a good belonging to some economic unit, which is brought about as a result of the activity of some other economic unit, with the prior agreement of the former person or economic unit”. With this definition, Hill sought "to set forth a characterization of 'service situations' and of their outcomes that is both socio-technical and more synthetic" (Gadrey, 2000). Gadrey (2000) expanded Hill’s definition by putting forward what is known as the “service triangle”. In this view, “a service activity is an operation intended to bring about a change of state in a reality C that is owned or used by consumer B, the change being effected by service provider A at the request of B, and in many cases in collaboration with him / her, but without leading to the production of a good that can circulate in the economy independently of medium C”. In other words, Gadrey introduced services as a process or a set of processing operations that are implemented through interactions (i.e., the intervention of B on C, the intervention of A on C, and service relations or interactions) between three main elements: service provider, client, and a reality to be transformed. The medium C in Gadrey’s definition may be material objects (M), information (I), knowledge (K), or individuals (R). An important point in Gadrey’s definition compared to Hill’s is that the output cannot circulate economically and independently from C.

Inspired by Lancaster (1966) and Saviotti and Metcalfe (1984), Gallouj and Weinstein (1997) developed a conceptual framework for the provision of products (i.e., goods and services) that describe service output in terms of a set of characteristics and competences,

Innovation in Services: A Literature Review

Rabeh Morrar

which reflects both the internal structure of products and external properties. The delivery of services in this framework depends on the simultaneous mobilization of competences (from service provider and clients) and (tangible or intangible) technical characteristics. In a more detailed description, the service provision may require the interactions between four main vectors: service provider competencies [C], consumers' competencies [C*], tangible and intangible technical characteristics [T], and finally, the vector of characteristics of final service output [Y]. This framework has been used in a large extent to define innovation in service within the synthesis approach, which is discussed later in this article.

One of the most well-known conceptualizations of services in the last decade is the service-dominant logic by Vargo and Lusch (2004). Their approach was to redress the model of exchange in marketing, which had a dominant logic based on the exchange of "goods", which are mainly manufactured outputs. In the new marketing-dominant logic, service provision rather than goods is fundamental to economic exchange.

The main proposition of service-dominant logic is that:

"...organizations, markets, and society are fundamentally concerned with exchange of service – the applications of competences (knowledge and skills) for the benefit of a party. That is, service is exchanged for service; all firms are service firms; all markets are centered on the exchange of service, and all economies and societies are service based. Consequently, marketing thought and practice should be grounded in service logic, principles, and theories" (Lusch & Vargo, 2004).

Thus, the service-dominant logic highlights the role of producer and consumer in the production of a service (i.e., value is co-created).

In similar work, Grönroos (2006) makes a comparison between service logic and good logic. He found that service logic best fits the context of most goods-producing businesses today. Goods are one of several types of resources functioning in a service-like process, and it is this process that is the service that customers consume.

Four main criteria, commonly referred to as the "IHIP criteria", have been used to distinguish services from products: intangibility, heterogeneity, inseparability, and perishability (Fisk et al., 1993). Services are considered intangible because, unlike products, they cannot be perceived physically nor can the results be fully preconceived by the customer before delivery (Biege et al. 2013). In other words, service products and processes are characterized by a "fuzzy", information-rich, and intangible nature, which means that they are not embedded in material or physical structures. Heterogeneity describes the variability of the results when providing services. Inseparability refers to the simultaneous provision and consumption of services; the customer is a co-producer and has to be included in the processes of both providing and consuming a service. Finally, perishability refers to "the transitory nature of services since these cannot be kept, stored for later utilization, resold, or returned" (Biege et al. 2013).

As mentioned earlier, a clear definition of services promotes understanding of service innovation. Due to the IHIP criteria, the dichotomy, or classification, of innovation into product and process innovation is not easy to apply to services in comparison with that in the manufacturing sector. For example, inseparability or co-terminality blurs the dividing line between product and process innovation (Bitran & Pedrosa, 1998). And, it highlights the role of clients in service innovation. The client plays an important role in the development of new services (Kline & Rosenberg, 1986; De Brentani, 2001). In any service innovation, feedback provided through the consumers of services is an important source of incremental service innovation (Riedl et al., 2008). In manufacturing, conversely, the clients are independent of the production process; they are just users of final products, and they do not participate in the production and delivery of the product.

The intangibility of services confirms the key role that information technology plays in innovation activities in services (Sirilli & Evangelista, 1998). However, the intangibility of service products hinder the measurement of the service output. Some scholars (Gallouj & Weinstein, 1997; Windrum & Garcia-Goni, 2008) have tried to overcome the ill-defined nature of service outputs by developing a new approach that is applicable to both tangible and intangible products. This integrative approach is discussed later in this article.

The low levels of capital equipment used in many services indicate that the technological competences and physical capital that play a major role in the production of industrial goods are less consistent with the "fuzzy" or immaterial outputs of services. Service firms are considered to be rather highly dependent on competences embedded in human capital as a key competitive factor

Innovation in Services: A Literature Review

Rabeh Morrar

and strategic element in the organization and delivery of service products (Sirilli & Evangelista, 1998). Thus, services may need special innovation that is not dependent on physical artifacts or complex technological changes (i.e., formalized R&D) or modes in which training activities and organizational changes are central dimensions of the innovation process (Castellacci, 2006).

Conceptual Perspectives for Innovation in Service

Service innovation studies have tried to go beyond the manufacturing-based perspective (e.g., Gallouj; 2002; Gallouj & Weinstein 1997). They have sought to address the peculiarities of service activities in terms of innovation. In this view, the service-based approach (Gallouj, 1994) and integrative approach (Gallouj & Weinstein, 1997) are considered two prominent conceptualization frameworks that extend beyond the traditional perspective, which is represented by the assimilation approach. Table 1 summarizes the three conceptual approaches to innovation in services: assimilation, demarcation, and integration.

Assimilation

In the assimilation approach, innovation in services is perceived as fundamentally similar to innovation in manufacturing. This traditional approach to innovation in services only considers technological or visible modes of product and process innovation. It ignores other non-technological or invisible modes of innovation, which are likely to include several types of innovation-like "social innovations, organizational innovations, methodological innovations, marketing innovations, innovations involving intangible products or processes, etc." (Djellal & Gallouj, 2010b). Therefore, the assimilation approach underestimates innovation in service activities, which is characterized by its intangible (invisible) and information-based nature.

The theoretical and empirical works favoring an assimilation approach are the most numerous. Within this perspective, Barras' reverse product lifecycle (Barras, 1986) is one of the most prominent works devoted to the adoption of information and communication technologies in service activities and their effects on innovation. The reverse product lifecycle, in contrast to the tradi-

Table 1. Conceptual perspective for innovation in services

Theoretical Perspective	Assimilation	Demarcation	Integration
Type of innovation	• technological	• non-technological	• complex • architectural
Characteristics of innovation	• equates or reduces innovation in services to the adoption and use of technology • considers technological or visible modes of product and process innovation	• leads to new typologies for innovation in services: non-technological types of innovation such organizational innovation, ad-hoc innovation, and marketing innovation	• shows convergence between manufactured goods and services in regards of innovation • includes technological and non-technological innovation
Innovation framework	• attempts to assimilate services within the consolidated framework used for manufacturing sectors and manufactured products	• attempts to develop a specific framework for service innovation, while attempting to highlight all the specificities in service product and production processes	• attempts to develop a common conceptual framework, able to account for an enlarged view of innovation that is applicable to any tangible or intangible product • proposes a new taxonomy of innovation in services based on a new definition of product

Innovation in Services: A Literature Review

Rabeh Morrar

tional product lifecycle model (Abernathy & Utterback, 1975), starts with the introduction of incremental process innovations that aim to improve the efficiency of the service produced. In the second phase, more radical process innovations are implemented to improve the quality of services. In the final phase, new product innovations are produced.

Another important illustration of the assimilation approach is provided by the construction of new evolutionary taxonomies for innovation in services, which emphasize different trajectories for different groups of activities according to their technological intensive aspect (Evangelista, 2000; Miozzo & Soete, 2001; Soete & Miozzo, 1989). Soete and Miozzo's taxonomy (1989) distinguishes the following trajectories: supplier-dominated, scale-intensive, science-based, information intensive, and specialized suppliers.

Innovation systems and networks are also other important concepts for discussing the innovation activities in an interactive and dynamic process (Edquist 1997; Lundvall, 1992; Manley, 2002; Nelson, 1993). These innovation networks also reflect a technology bias when they address service innovation.

Demarcation

The demarcation approach considers that it is inappropriate to study service innovation activities by only mobilizing conceptual and empirical tools that are mainly developed for technical-based activities (e.g., R&D, patents, and accumulation of capital). In Gallouj and Savona's (2009) natural lifecycle of theoretical concern, the assimilation approach represents the maturity phase.

The demarcation perspective seeks to consider any specific characteristics of the nature and modes of organization of innovation in services (Gallouj & Savona, 2009), and it emphasizes the importance of service trajectories, taking into account the characteristics of service output (i.e., immateriality, interactivity, and co-production). It focuses on non-technological (service-based) and invisible innovation output (e.g., service customization, problem solving, new solutions, new methods, and new organizational structures). These innovation activities contribute to the economic development.

The demarcation approach leads to the production of new typologies for innovation in services; these typologies are innovation indicators dedicated to services that include non-technological types of innovation such as organizational innovation, ad-hoc innovation, and marketing innovation. For example, Gadrey and Gallouj (1998) developed a new topology for consultancy that breaks down the product/process technological taxonomy for service innovation and includes three service specific types of innovation: ad-hoc innovation, new-expertise fields of innovation, and formalization innovation. McCabe (2000) has focused on organizational innovation (e.g., work organizations and standardized methods of management control) in financial services. In similar work, Van der Aa and Elfring (2002) developed a taxonomy of three modes of organization innovation: multi-unit organizations, new combinations of services, and customers as co-producers.

Integration

The integrative, or synthesizing, approach aggregates both the assimilation and demarcation approaches within a common conceptual framework that enlarges the view of innovation. This new perspective encompasses both services and goods and technological and non-technological modes of innovation (Gallouj & Savona, 2009; Gallouj & Windrum, 2009). It represents the emerging and expanding phase of the natural lifecycle of theoretical development in the service innovation discussion. The most important contribution in the integrative approach is provided by Gallouj and Weinstein (1997), who apply a characteristics-based representation to the product. As mentioned earlier, in such a representation, the product is represented by four main vectors, and "innovation can be defined accordingly as the changes affecting one or more elements of one or more vectors of characteristics (both technical and service) or of competences" (Gallouj & Savona, 2009).

The importance of the synthesis framework is also associated with the fact that the boundaries between goods and services have become blurred. This framework is motivated by the convergence between service and manufacturing, where the distinction between innovation in services and manufacturing is becoming more difficult due to the service dynamic and innovation blurring. In this new context, two main changes are taking place: manufacturing is becoming more like services and services are becoming more like manufacturing. In the former case, manufacturing firms produce more service products related to the main industrial products, and therefore, higher portions of their turnovers are becoming achieved through selling services (Howells, 2006). This process is summed up as the "servitization" of the manufacturing

Innovation in Services: A Literature Review

Rabeh Morrar

industry (Quinn et al., 1990). In the latter case, services firms become more innovative and greater parts of their innovative output are reflected by the traditional technological innovation in manufacturing. In other words, "services become more manufacturing-like in innovation" (Howells, 2006). Therefore, the synthesis framework is required to "redefine the product in such a way that it offers a relatively solid framework to generalize a theory of innovation for material and immaterial product" (Gallouj & Savona, 2009). The synthesis approach "highlights the increasing complex and multidimensional character of modern services and manufacturing, including the increasing bundling of services and manufacturing into solutions'' (Salter & Tether, 2006).

The integrative approach is broadly used in the recent literature of innovation in services. In recent years, most of the conceptual frameworks and empirical tests addressing innovation in services apply an integrative approach in which both technological and non-technological innovation are emphasized (Gebauer, 2008; Hipp et al., 2000; Tidd, 2006; Ulaga & Reinartz, 2011).

Service Innovation and Economic Performance

In a service economy, defining and identifying the whole range of innovation is not easy, and it requires us to go beyond the assimilation, technology-biased perspective. Anyhow, in services as in manufacturing, innovation is a major source of economic performance. However, the link between innovation in services and economic variables such as productivity should be clarified. Indeed, in the service economy, the innovation gap is associated with a performance gap.

Innovations in services and productivity

Conceptually, there is no specific answer to the question of the degree and sign of the relationship between innovation in services and productivity, but it is related to the service specificities that "influence the definition and measurement of productivity" (Djellal & Gallouj, 2009).

The use of a technological or industrial approach for measuring innovation activities in services will lead to the under-estimation of both innovation and economic performance. And, it will lead to two gaps: an innovation gap and a performance gap (Djellal & Gallouj, 2010a). According to Djellal and Gallouj (2010b), "the innovation gap indicates that our economies contain invisible or hidden innovations that are not captured by the traditional indicators of innovation, while the performance gap is reflected in an underestimation of the efforts directed towards improving performance (or certain forms of performance) in those economies".

Measuring the productivity of immaterial and non technology-based services might need different methods from those employed to measure the productivity of material and technical activities in the manufacturing sector. For example, Biege and colleagues (2013) denoted that characteristic features of services were detected as reasons for the gap in measuring productivity in services. In addition to IHIP, Biege underlined four requirements when measuring productivity in services:

1. The innovativeness of the output has to be included to adequately measure productivity in knowledge-intensive business services. Innovativeness is measured by differentiating "services new to the company" from "services new to the market".

2. The "internal output of a service process has to be included to adequately measure service productivity.

3. Input figures in productivity measurement concepts for innovative services have to include interactive inputs that are not expressed by provider's and customer's inputs, especially time and cost induced by interactive loops in service processes mainly in knowledge-intensive business services.

4. Knowledge, competencies, and skills are central resources in many services, and they should be included in a productivity measurement concept.

Corsten (1994) measured service productivity based on an approach from production theory, which consists of factor combinations between inputs and corresponding outputs. In other words, service productivity is measured using multiple stages of a service delivery process.

Johnston and Jones (2004) proposed two perspectives for measuring service productivity: i) operational productivity, which is measured by the ratio of operational outputs to inputs of a period of time, and ii) customer productivity, which is measured by the ratio of customer output, such as experience and outcome, to value-to-customer inputs, such as time, effort, and costs.

Effect of service innovation on employment

The relationship between innovation and employment has been the subject of abundant literature. This de-

Innovation in Services: A Literature Review

Rabeh Morrar

bate originated in manufacturing sector to analyze the effect of technological change on employment (Freeman & Soete, 1987; Hicks,1973; Pasinetti, 1981). In this context, two counter-arguments are put forth. The first argument anticipates a reduction in employment due to technological advancement. The second argument assumes that market-compensation mechanisms are able to overcome the negative effect on employment caused by labour-saving process innovation (Vivarelli, 2007; Vivarelli & Pianta, 2000).

In services, the technological trajectories are not the main form of innovation. Innovation activities include other non-technological elements. Therefore, the product/process dichotomy in the analysis of the effect on employment is not always consistent with service sector. The employment debate in the manufacturing sector is unlikely to sufficiently explain the effect on employment by non-technological forms of innovation in services. For example, new market strategies make important changes to consumer preferences and increase the market demands for new services, which in turn affect the employment rate. In addition, some of the compensation mechanisms (e.g., lower prices, new investments, and new machines) in manufacturing industries cannot always be applied directly to services. For example, because of the immateriality and co-productivity of many service outputs, it is not always easy to fix their prices and measure their intangible investment. In many services, there is an overlap between types of innovation, and it is not easy to disentangle them and distinguish labour-saving from labour-using effects.

Consequently, new methodological and conceptual frameworks might be needed to explain the employment effect of immaterial and invisible activities beyond the product/process dichotomy. New proxies are needed, provided that they are developed on the basis of the industrial sector, such as R&D and patents. In addition, new compensation and contradictory mechanisms need to be envisaged. These new mechanisms must challenge the manufacturing sector's traditional views that product innovation has a labour-using effect and that process innovation has a labour-saving effect.

Conclusion

In this article, the literature on innovation in services was reviewed using the assimilation-differentiation-integration framework. In addition to the discussion of the service concept, we emphasized the importance of both demarcation and integrative approaches as important tools to focus on non-technological aspects of service innovation, which were previously ignored due to the application of an assimilation view for innovation in service sectors. Also, recent studies show the integrative approach is found to be the most promising and comprehensive theoretical perspective that is employed to discuss innovation in service sectors. The relationship between innovation in services and economic performance were discussed using productivity and employment as two important indicators for economic performance.

This article has sought to provide an extensive and multifaceted review of the research on innovation in services over the last two decades. Its aim is to generate more achievable policy implications for how innovation in the service sector should be discussed in an integrative approach in order to reveal the vital role that innovation in services might play in modern economies. This literature review opens further discussion about new issues in innovation in services, such as innovation networks in services – mainly public-private innovation networks, social innovation, and entrepreneurship in the service sector.

About the Author

Rabeh Morrar is an Assistant Professor of Innovation Economics at An-Najah National University in Nablus, Palestine. Rabeh's doctoral dissertation from Lille 1 University in France focused on public-private innovation networks in the service sector, and his current research is focused on innovation in the service sector, R&D management, and technology management. Rabeh is also CEO of BEST, a small business in Palestine that provides innovation solutions and training.

References

Barras, R. 1986. Towards a Theory of Innovation in Services. *Research Policy*, 15(4): 161–173. http://dx.doi.org/10.1016/0048-7333(86)90012-0

Biege, S., Lay, G., Zanker, C., & Schmall, T. 2013. Challenges of Measuring Service Productivity in Innovative, Knowledge-Intensive Business Services. *The Service Industries Journal*, 33(3-4): 378–391. http://dx.doi.org/10.1080/02642069.2013.747514

Bitran, G. & Pedrosa, L. 1998. A Structured Product Development Perspective for Service Operations. *European Management Journal*, 16(2): 169–189. http://dx.doi.org/10.1016/S0263-2373(97)00086-8

Innovation in Services: A Literature Review

Rabeh Morrar

Castellacci, F. 2006. *Innovation and the International Competitiveness of Manufacturing and Service Industries.* Brussels: DIME Network of Excellence.

De Brentani, U. 2001. Innovative Versus Incremental New Business Services: Different Keys for Achieving Success. *Journal of Product Innovation Management,* 18(3): 169–187. http://dx.doi.org/10.1111/1540-5885.1830169

Djellal, F. & Gallouj, F. 2009. *Measuring and Improving Productivity in Services: Issues, Strategies and Challenges.* Cheltenham, UK: Edward Elgar Publishing.

Djellal, F. & Gallouj, F. 2010a. The Innovation Gap and the Performance Gap in the Service Economies: A Problem for Public Policy. In F. Gallouj & F. Djellal (Eds.), *The Handbook of Innovation and Services*: 653–676. Cheltenham, UK: Edward Elgar Publishing.

Djellal, F. & Gallouj, F. 2010b. Services, Innovation and Performance: General Presentation. *Journal of Innovation Economics & Management,* 5(1): 5–5. http://dx.doi.org/10.3917/jie.005.0005

DTI. 2007. Innovation in Services. Occasional Paper No. 9. London: Department of Trade and Industry.

Edquist, C. 2012. *Systems of Innovation: Technologies, Institutions and Organizations.* London: Routledge.

Evangelista, R. 2000. Sectoral Patterns of Technological Change in Services. *Economics of Innovation and New Technology,* 9(3): 183–222. http://dx.doi.org/10.1080/10438590000000008

Fisk, R. P., Brown, S. W., & Bitner, M. J. 1993. Tracking the Evolution of the Services Marketing Literature. *Journal of Retailing,* 69(1): 61–103. http://dx.doi/org/10.1016/S0022-4359(05)80004-1

Freeman, C. P. & Soete, L. 1987. *Technical Change and Full Employment.* New York: Blackwell Publishers.

Fuchs, V. R. 1968. *The Service Economy.* New York: Columbia University Press.

Gadrey, J. 2000. The Characterization of Goods and Services: An Alternative Approach. *Review of Income and Wealth,* 46(3): 369–387. http://dx.doi.org/10.1111/j.1475-4991.2000.tb00848.x

Gadrey, J. & Gallouj, F. 1998. The Provider-Customer Interface in Business and Professional Services. *The Service Industries Journal,* 18(2): 01–15. http://dx.doi.org/10.1080/02642069800000016

Gallouj, F. 1994. *Économie de l'innovation dans les services.* Paris: L'Harmattan.

Gallouj, F. 1998. Innovating in Reverse: Services and the Reverse Product Cycle. *European Journal of Innovation Management,* 1(3): 123–138. http://dx.doi.org/10.1108/14601069810230207

Gallouj, F. 2002. *Innovation in the Service Economy: The New Wealth of Nations.* Cheltenham, UK: Edward Elgar Publishing.

Gallouj, F. & Savona, M. 2009. Innovation in Services: A Review of the Debate and a Research Agenda. *Journal of Evolutionary Economics,* 19(2): 149–172. http://dx.doi.org/10.1007/s00191-008-0126-4

Gallouj, F. & Weinstein, O. 1997. Innovation in Services. *Research Policy,* 26(4–5): 537–556. http://dx.doi.org/10.1016/S0048-7333(97)00030-9

Gallouj, F. & Windrum, P. 2009. Services and Services Innovation. *Journal of Evolutionary Economics,* 19(2): 141–148. http://dx.doi.org/10.1007/s00191-008-0123-7

Gebauer, H. 2008. Identifying Service Strategies in Product Manufacturing Companies by Exploring Environment–Strategy Configurations. *Industrial Marketing Management,* 37(3): 278–291. http://dx.doi.org/10.1016/j.indmarman.2007.05.018

Grönroos, C. 2006. Adopting a Service Logic for Marketing. *Marketing Theory,* 6(3): 317–333. http://dx.doi.org/0.1177/1470593106066794

Hicks, J. R. 1987. *Capital and Time: A Neo-Austrian Theory.* Oxford University Press.

Hill, T. P. 1977. On Goods and Services. *Review of Income and Wealth,* 23(4): 315–338. http://dx.doi.org/10.1111/j.1475-4991.1977.tb00021.x

Hipp, C., Tether, B. S., & Miles, I. 2000. The Incidence and Effects of Innovation in Services: Evidence from Germany. International *Journal of Innovation Management,* 4(4): 417–453. http://dx.doi.org/10.1142/S1363919600000226

Howells, J. 2006. Intermediation and the Role of Intermediaries in Innovation. *Research Policy,* 35(5): 715–728. http://dx.doi.org/10.1016/j.respol.2006.03.005

Johnston, R. & Jones, P. 2004. Service Productivity: Towards Understanding the Relationship between Operational and Customer Productivity. *International Journal of Productivity and Performance Management,* 53(3): 201–213. http://dx.doi.org/10.1108/17410400410523756

Kline, S. J. & Rosenberg, N. 1986. An Overview of Innovation. In R. Landau & N. Rosenberg (Eds.), *The Positive Sum Strategy: Harnessing Technology for Economic Growth:* 275–305. Washington, D.C.: National Academy Press.

Lancaster, K. J. 1966. A New Approach to Consumer Theory. *Journal of Political Economy,* 74(2): 132–157. http://www.jstor.org/stable/1828835

Lundvall, B.-Å. 1992. *National Systems of Innovation: Towards a Theory of Innovation and Interactive learning.* London: Pinter Publishers.

Lusch, R. F. & Vargo, S. L. 2014. *Service-Dominant Logic: Premises, Perspectives, Possibilities.* Cambridge University Press.

Manley, K. 2007. The Systems Approach to Innovation Studies. *Australasian Journal of Information Systems,* 9(2): 91–102. http://dx.doi.org/10.3127/ajis.v9i2.196

Mccabe, D. 2000. The Swings and Roundabouts of Innovating for Quality in UK Financial Services. *The Service Industries Journal,* 20(4): 01–20. http://dx.doi.org/10.1080/02642060000000043

Melvin, J. R. 1995. History and Measurement in the Service Sector: A Review. *Review of Income and Wealth,* 41(4): 481–494. http://dx.doi.org/10.1111/j.1475-4991.1995.tb00140.x

Miozzo, M. & Soete, L. 2001. Internationalization of Services - A Technological Perspective. *Technological Forecasting and Social Change,* 67(2): 159–185. http://dx.doi.org/10.1016/S0040-1625(00)00091-3

Nelson, R. 1993. *National Innovation Systems: A Comparative Analysis.* Oxford University Press.

Innovation in Services: A Literature Review

Rabeh Morrar

OECD. 2005. *Growth in Services: Fostering Employment, Productivity and Innovation.* Paris: Organisation for Economic Co-operation and Development.

Pasinetti, L. L. 1983. *Structural Change and Economic Growth: A Theoretical Essay on the Dynamics of the Wealth of Nations.* Cambridge University Press.

Quinn, J. B., Doorley, T. L., & Paquette, P. C. 1990. Technology in Services: Rethinking Strategic Focus. *MIT Sloan Management Review,* 1990(Winter).

Riedl, C., Böhmann, T., Rosemann, M., & Krcmar, H. 2008. Quality Aspects in Service Ecosystems: Areas for Exploitation and Exploration. *Proceedings of the 10th International Conference on Electronic Commerce:* 19.1–19.7. New York: Association for Computing Machinery (ACM). http://dx.doi.org/10.1145/1409540.1409566

Salter, A. & Tether, B. S. 2006. Innovation in Services: Through the Looking Glass of Innovation Studies. Background paper for the AIM Grand Challenge on Service Science, Oxford.

Saviotti, P. P. & Metcalfe, J. S. 1984. A Theoretical Approach to the Construction of Technological Output Indicators. *Research Policy,* 13(3): 141–151. http://dx.doi.org/10.1016/0048-7333(84)90022-2

Say, J. B. 1855. *A Treatise on Political Economy; Or the Production, Distribution, and Consumption of Wealth.* Philadelphia: Lippincott, Grambo & Co.

Singelmann, J. 1978. The Sectoral Transformation of the Labor Force in Seven Industrialized Countries, 1920-1970. *American Journal of Sociology,* 83(5): 1224–1234. http://www.jstor.org/stable/2778192

Sirilli, G. & Evangelista, R. 1998. Technological Innovation in Services and Manufacturing: Results from Italian Surveys. *Research Policy,* 27(9): 881–899. http://dx.doi.org/10.1016/S0048-7333(98)00084-5

Smith, A. & Skinner, A. 1982. *The Wealth of Nations: Books I-III.* London; New York: Penguin Classics.

Soete, L. & Miozzo, M. 1989. *Trade and Development in Services: A Technological Perspective.* Maastricht, The Netherlands: Maastricht Economic Research Institute on Innovation and Technology.

Stanback, T. M. J. 1979. *Understanding the Service Economy.* Johns Hopkins University Press.

Suchitra, P. 2013. Building Multi-Skills Based Talent Management. *IOSR Journal of Business and Management,* 15(2): 1–3. http://dx.doi.org/10.9790/487X-1520103

Sundbo, J. & Gallouj, F. 1999. *Innovation in Services in Seven European Countries: The Result of Work Package 3-4 of the SI4S Project.* Roskilde, Denmark: Forskningsrapport / Center for Servicestudier, Roskilde Universitetscenter.

Tether, B. S. 2005. Do Services Innovate (Differently)? Insights from the European Innobarometer Survey. *Industry & Innovation,* 12(2): 153–184. http://dx.doi.org/10.1080/13662710500087891

Tidd, J. 2006. *Innovation Models.* London: Imperial College London.

Ulaga, W. & Reinartz, W. J. 2011. Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully. *Journal of Marketing,* 75(6): 5–23. http://dx.doi.org/10.1509/jm.09.0395

Utterback, J. M. & Abernathy, W. J. 1975. A Dynamic Model of Process and Product Innovation. *Omega,* 3(6): 639–656. http://dx.doi.org/10.1016/0305-0483(75)90068-7

Van der Aa, W., & Elfring, T. 2002. Realizing Innovation in Services. *Scandinavian Journal of Management,* 18(2): 155–171. http://dx.doi.org/10.1016/S0956-5221(00)00040-3

Vargo, S. L. & Lusch, R. F. 2004. Evolving to a New Dominant Logic for Marketing. *Journal of Marketing,* 68(1): 1–17. http://www.jstor.org/stable/30161971

Vivarelli, M. 2007. Innovation and Employment: A Survey. Discussion Paper No. 2621:22. Institute for the Study of Labor.

Vivarelli, M. & Pianta, M. 2000. *The Employment Impact of Innovation: Evidence and Policy.* London: Routledge.

Windrum, P. & García-Goñi, M. 2008. A Neo-Schumpeterian Model of Health Services Innovation. *Research Policy,* 37(4): 649–672. http://dx.doi.org/10.1016/j.respol.2007.12.011

Citation: Morrar, R. 2014. Innovation in Services: A Literature Review. *Technology Innovation Management Review,* 4(4): 6–14. http://timreview.ca/article/780

Keywords: innovation, service innovation, assimilation approach, demarcation approach, synthesis approach, economic performance

Radical Versus Incremental Innovation: The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

> *"A manager is responsible for the application and performance of knowledge."*
>
> Peter Drucker (1909–2005)
> Author and Management Consultant

Today, innovation often takes place using open practices and relies on many sources for knowledge and information. The purpose of this article is to study how different knowledge-based antecedents influence the ability of service organizations to innovate. Using data about the Norwegian service sector from the 2010 Community Innovation Survey, we examined how three types of competence, namely R&D activities, employee-based activities, and customer-related activities, influence the propensity of firms to introduce radical or incremental innovations. The results show that R&D-based competence is important for service firms when pursuing radical innovations, whereas employee-based activities such as idea collaboration are only found to influence incremental innovations. The use of customer information was found to be an important driver for both radical and incremental innovations. The findings points to managerial challenges in creating and balancing the types of competence needed, depending on type of innovation targeted by an organization.

Introduction

Studies of service innovation have increased along with the growth of the service sector, and they have emerged from being marginal and neglected to achieve recognition as an important field to study (Miles, 2000). Until recently, this research field has to a great extent been divided between two contrasting approaches: demarcation and assimilation (Coombs & Miles, 2000). The demarcation approach assumes that services as different from goods, and it is in need of its own theoretical framework to fully understand the concept and process of innovation in services. The assimilation approach, on the other hand, sees innovation (whether it is goods or services) within the same framework of understanding (Coombs & Miles, 2000; Drejer, 2004). However, these two traditions are the subject of ongoing debate, and a third perspective – the synthesis approach – has been suggested in the literature. The purpose of the synthesis approach is to create both a theoretical and an empirical approach to innovation that is able to capture all economic activities – both services and industrial activities – without favouring one over the other (Drejer, 2004). Therefore, the synthesis approach focuses on the need to study service innovation from a perspective that include the central aspects of service production at the same time, not just reflecting the manufacturing-service dichotomy (Drejer, 2004; Ordanini & Parasuraman, 2011). The perspective assumes similar underlying mechanism of innovation, though acknowledging that the importance of the dimensions may vary depending on context, both between and within the sectors (Nijssen et al., 2006). Given that the study of service innovation is still considered to be in a relatively early stage of development (Drejer, 2004), this article aims to gain more knowledge on innovation activities within the service sector. However, the study will be based on a model that is in line with Drejer (2004) and includes elements that are assumed to be of relevance regardless of industries, and thus aims to contribute to the synthesis approach.

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

According to Hult, Hurley, and Knight (2004), a firm's capacity to innovate is among the most important factors that impact its performance. Yet, little is known about the drivers of innovativeness in general (Hult et al., 2004), and empirical findings are both limited and inconclusive regarding the antecedents to innovation in services in particular (e.g., Ordanini & Parasuraman, 2011). In this article, a framework that includes antecedents to innovation and how they influence the capacities of service firms to innovate is proposed and tested. More precisely, building on the existing literature, we have identified three forms of competence (e.g., knowledge and skills) that are related to innovation activities of firms: i) R&D-based competence; ii) employee-based competence; and iii) customer-based competence. Furthermore, we distinguish between innovations based on their degree of novelty, and we examine how the different competences influence the propensity of service firms to introduce innovations that can be considered as being either radical or incremental.

The article makes two main contributions. First, the study suggests that different types of competence have varying influence over the ability of firms to introduce radical versus incremental innovations. Thus, managing the innovation process requires knowledge about how to balance the competences and exploit them differently depending on the innovation objective. Second, the findings indicate that R&D activities, although often described as being more relevant to innovation in manufacturing, are an important determinant to radical innovation in service firms.

The article is structured as follows. First, we introduce the theoretical background for the framework developed for the study. Second, we present the model and the research hypotheses, followed by the research method. Finally, we report and discuss the results, including their implications for management.

Theoretical Background

All definitions of innovation include the development and implementation of something new (de Jong & Vermeulen, 2003). An ongoing debate in the literature is the question of the degree of novelty and how "novel: should be understood. The concepts of radical (or discontinuous) innovation and incremental innovation can be seen as representing opposite ends of a novelty spectrum (de Brentani, 2001). Radical change was defined by Tushman and Romanelli (1985) as "processes of reorientation wherein patterns of consistency are fundamentally reordered." Although there are other definitions of the concept, the common feature is the effect of the change on the resources or technology in the organization. Incremental innovation, representing the other end of the spectrum, is characterized as a change that implies small adaptions to the status quo (Tushman & Romanelli, 1985), and it is often described as a step-by-step process.

Innovations in services are commonly characterized as being incremental (Sundbo & Gallouj, 2000). The innovations are often connected to the service process, and the development of the ideas is thus partly intertwined with the organizational structures and processes in the company. However, although the innovation is characterized as evolutionary in nature, the sum of the changes may well require major reallocation of resources or technology, and consequently be towards the radical end of the novelty spectrum. Hence, there is a need to separate how ideas and innovations emerge from their actual outcomes (e.g., Toivonen & Tuominen, 2009), recognizing that diverse innovation processes may lead to the implementation of ideas ranging from incremental to radical changes. The line of separation between when an innovation is categorized as incremental versus radical can be unclear. However, incremental innovations are typically represented by, for example, minor adaptions to the existing service concept or service delivery process, whereas radical innovations often imply changes that have a significant impact on a market, for example, changing the structure of the market or creating a new market.

Antecedents to innovation

Innovations depend on multiple factors that influence the process from idea generation through development to implementation. Sundbo and Gallouj (2000) describe it as an interactive process, depending on both external and internal factors. According to these authors, innovation in service firms is primarily driven by internal forces, which are defined as: i) the management and strategy of the firm; ii) employees at all levels of the firm; and iii) R&D departments – with the first two seen as the main factors. The external forces are divided into trajectories and actors. The former refers to ideas and logic that are diffused through social systems, whereas the latter corresponds to key market actors such as customers, suppliers, and competitors, with customers usually being identified as the most crucial.

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

The two internal factors – i) employees and management and ii) strategy – are emphasized as the most important in the innovation process (Sundbo & Gallouj, 2000). Managers need to be able to balance and lead the process while ensuring that the innovations fit within the chosen strategy. The importance of incorporating employees' knowledge in service innovation is also consistent with the literature (de Brentani, 2001; Ordanini & Parasuraman, 2011). Employees gain valuable knowledge from the interaction with customers through their mutual participation in the service delivery process.

Along with the internal drivers, innovation processes are said to depend on external knowledge, in particular customer-related knowledge. The customers play an active part in the service delivery process, and the value of gaining customer knowledge is well established in the literature, both for the general performance of organizations and for innovations in particular (Matthing et al., 2004; Slater & Narver, 2000). In recent literature, customers have been defined as co-creators of value (e.g., Vargo & Lusch, 2008), and a current research topic is how customers can play a more active part in the innovation processes of firms (e.g., Edvardsson et al., 2010).

Research Framework and Hypotheses

Based on the background above, we developed a research framework that incorporates three types of competence that are described in the literature as highly relevant antecedents to innovation. These antecedents are presumed to affect the ability of service firms to introduce innovations along the spectrum of novelty. Notwithstanding the continuous nature of this spectrum, following Mention (2011), we classified novelty into one of two categories: *radical innovations*, which have a high degree of novelty, and *incremental innovations*, which have a low degree of novelty. The framework is illustrated in Figure 1, and the rationale and hypotheses for the model are addressed next.

R&D-based competence

According to Sundbo and Gallouj (2000), a model describing a typical pattern for innovation in services is relying on employees acting as corporate entrepreneurs influenced by management to regulate and control this internal entrepreneurial process. In their model, traditional R&D departments play less important roles as drivers of innovation. However, their study also showed that the pattern of innovation in services varies within the sector, depending on the line of business. Although R&D-based knowledge is generally more relevant to manufacturing (e.g., Tether, 2005), recent studies found that R&D investments and activities are also important in service firms (Leiponen, 2012; Trigo, 2013). In view of the somewhat inconsistent findings regarding R&D, R&D-based knowledge and its potential influence on innovation are considered worthy of further investigation. Hence, we have included the investigation of this aspect as part of this study. Because R&D departments are rarely found in service firms (Sundbo & Gallouj, 2000), we divided R&D-related knowledge according to wheth-

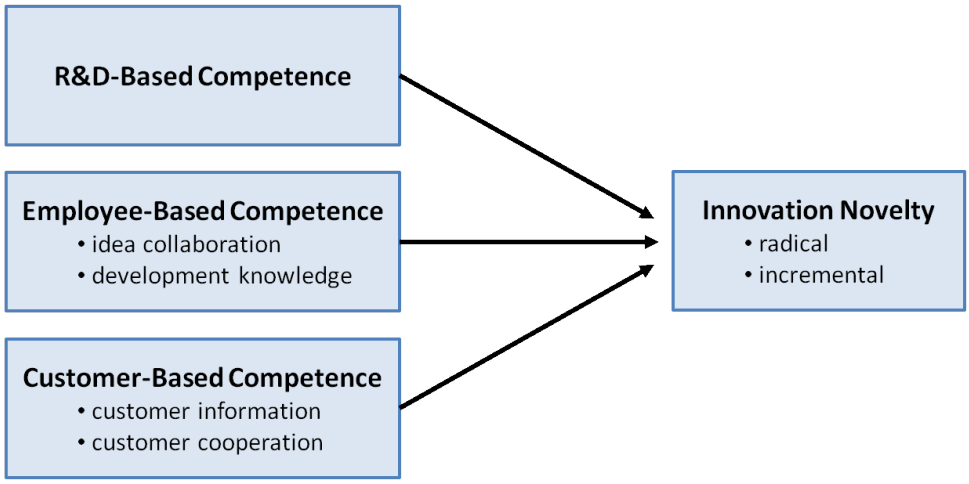

Figure 1. Research framework of determinants of innovation and novelty

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

er it originated from an in-house department or was externally acquired. In line with the study of Nijssen, Hillebrand, Vermeulen, and Kemp (2006), who found that R&D strength influenced the degree of novelty of new services, we defined the following hypothesis:

Hypothesis 1a: *Internal R&D-based competence is positively related to firms introducing radical innovations.*

Hypothesis 1b: *External-R&D based competence is positively related to firms introducing radical innovations.*

Employee-based competence

Several studies have found that the involvement of employees in the innovation processes is important for successful innovation (de Brentani, 2001; Ordanini & Parasuraman, 2011; Sundbo, 2008). The employees interact with customers and so are in positions to learn from customers. Thus, they may come up with new ideas, and employees' creative ideas are known to be important in organizational innovation (Zhou & Woodman, 2003). However, employees' knowledge and ideas need to be transferred within the organization if they are to be adopted by management, so interaction between individuals is thought to be important for successful innovation. Hence, management would be wise to facilitate a work environment for employees to interact and collaborate (e.g., Shalley & Gilson, 2004). According to Gwinner, Bitner, Brown, and Kumar (2005), employees can continuously adapt and customize the services provided, thereby creating innovations through evolutionary change. Ordanini and Parasuraman (2011) also found employee collaboration to contribute to innovation radicalness, hence:

Hypothesis 2a: *Employee idea collaboration is positively related to firms introducing radical innovations.*

Hypothesis 2b: *Employee idea collaboration is positively related to firms introducing incremental innovations.*

The innovation process is knowledge intensive, and the need for skilled employees is not limited to the R&D function (Leiponen, 2005). The innovation process in service organizations is often characterized as being a broad process, wherein many individuals and departments of the organization are involved. The employees may need to acquire new knowledge in order to participate in the development and implementation of the ideas. Thus, management needs to ensure that the employees have the skills necessary to fulfil these tasks. The concept of development knowledge is applied in the study by referring to the competence building of employees related to the innovation activities of the firm. Hence;

Hypothesis 3a: *Development-based knowledge is positively related to firms introducing radical innovations.*

Hypothesis 3b: *Development-based knowledge is positively related to firms introducing incremental innovations.*

Customer-based competence

Customer-related knowledge plays an important role in the innovation processes of firms. However, it has also been argued that firms should, to some extent, view customers as partners in the innovation process (Alam & Perry, 2002; Edvardsson et al., 2010). Consequently, customer-based competence can be divided according to how the knowledge is created, either by gaining information from the customers or by collaborating with them.

Although customers are conceptualized as significant for innovation, previous studies have yielded inconclusive results about the effects of their contributions. Ordanini and Parasuraman (2011) found that collaboration with customers enhanced the capacity of firms to generate new ideas, but did not affect the degree of radicalness of the innovations. On the other hand, Mention (2011) found a positive relationship between using customer-based information and novelty of innovations but no effect from co-operating with the customers on novelty. In view of this uncertainty, we formulated the following hypotheses:

Hypothesis 4a: *Use of customer-based information is positively related to firms introducing radical innovations.*

Hypothesis 4b: *Use of customer-based information is positively related to firms introducing incremental innovations.*

Hypothesis 5a: *Customer-based co-operation is positively related to firms introducing radical innovations.*

Hypothesis 5b: *Customer-based co-operation is positively related to firms introducing incremental innovations.*

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

Method

The study is based on data from the 2010 Community Innovation Survey (CIS, 2010), which was conducted in Norway for the years 2008 to 2010. The data were collected by Statistics Norway. The CIS originated in the early 1990s as an initiative of the Organisation for Economic Co-operation and Development (OECD; oecd.org), and it resulted in the development of an innovation manual that became known as the Oslo Manual (OECD, 2005). The statistical unit in the CIS survey is the firm or enterprise.

The study was based on cross-sectional data. The original sample included 3330 Norwegian service firms. However, organizations with fewer than 10 employees answered a less extensive questionnaire, which was not adequate for our purposes, and so have been omitted. Thus the results will be biased towards the larger firms. The final sample consisted of 2636 firms.

The data were analyzed using a multinomial regression (see Appendix 1). The dependent variable in our study is innovation novelty (see Figure 1). This variable is defined as having three possible outcomes: i) radical innovation, ii) incremental innovation, or iii) no innovation. By including the firms that reported not having introduced any innovations during the timespan of the survey, we are able to study the differences not just from incremental to radical, but also what distinguishes firms engaging in innovation from those who do not.

The independent variables were defined as R&D-based competence, employee-based competence, and customer-based competence. For details concerning model variables, descriptive statistics and results, see Appendix 1.

Results

Each of the three types of competence was used by the firms in the group reporting no innovations at all in the period, but to a lesser extent for all types than firms in the other two categories. The results also showed that firms introducing radical innovations used customer information as a source to a greater extent than the incremental innovators. Likewise, cooperation with customers was far more common in firms engaged in radical innovation than among the incremental innovators and non-innovators.

Out of the ten hypotheses, eight were confirmed. The regression results (see Appendix 1) show that R&D-based competence, both internal and external, increased the probability of a service firm introducing novel innovations, thereby confirming Hypotheses 1a and 1b. Hypotheses 2a and 2b reflected the view that idea collaboration would influence innovations at both extremes of the innovation novelty spectrum. However, only incremental innovation was found to benefit from idea collaboration among employees, thus, Hypothesis 2a is not supported. Hypotheses 3a and 3b, which relate to how employees throughout the organization need knowledge to contribute to the development and implementation of innovations, were shown to influence both incremental and radical innovations, thus confirming both hypotheses. Regarding customer competence, Hypotheses 4a and 4b were fully supported. The use of customer-based information increased the probability of introducing both incremental and radical innovations. Cooperation with customers only seems to influence firms introducing radical innovation, thus supporting Hypothesis 5a; however, the hypothesized relationship to incremental innovation was not significant.

The model controlled for firm size (i.e., number of employees) and export orientation. The coefficients for firm size were not significant, whereas export orientation reduced the probability of not implementing innovations at all.

Discussion and Conclusions

This study has focused on how antecedents to innovation, here identified as R&D, employee and, customer-based competence, influence the capacities of service firms to innovate, including both ends of the novelty continuum: radical versus incremental innovation. The study does not address whether the innovation activities and the extent of innovativeness, as is measured here, are based on a firm's strategic decision. That is, a firm might strategically decide not to use resources to engage in innovation whether radical or incremental. This study merely discusses the type of competences that influence innovation and novelty, and not the possible reasons why firms choose not to innovate.

Our findings contribute to our understanding of innovation in services in several ways. First, our findings raise some questions about the assumption that innovations in service firms rarely depend on R&D (e.g., Sundbo & Gallouj, 2000). The findings indicate that R&D-related knowledge is an important driving force for service organizations when developing radical changes, thus confirming recent research on service firms' reliance on

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

R&D knowledge (Leiponen, 2012). The results contribute to the synthesis approach in innovation literature, which upholds the need for studying service innovation from a perspective that includes elements assumed to be of relevance regardless of industry (e.g., Drejer, 2004).

Second, the results confirm the general notion in the service innovation literature that skilled employees make important contributions to the innovation capacity of organizations. However, the findings also add to the ambiguity regarding the effects of employees collaborating on innovation. Collaboration was expected to influence both the extent and novelty of innovations, but was found to be significant only for incremental innovation. It may be that the measure of collaboration in idea generation we used in this study is more reflective of exploitation of knowledge and therefore leads to incremental changes, rather than reflecting increased knowledge that can contribute to radical change.

Finally, the findings confirm the importance of using customer information when innovating. In line with previous studies (e.g., Evangelista, 2006) customer-related information was found to influence both radical and incremental innovation. However, collaboration with customers was found to effect only radical change. It may be that incremental innovation is largely driven by internal processes and knowledge held by employees.

In summary, the results indicate that there are differences in how various kinds of competence influence the ability of firms to introduce radical versus incremental innovations. R&D-based knowledge appears to be more important when pursuing changes with a high degree of novelty, whereas employee-related competences, as in idea collaboration, play a larger role in incremental changes. The findings all points to managerial challenges in creating and balancing the competences needed.

Managerial implications

From a practical perspective, the results obtained imply that the processes leading to radical versus incremental innovations rely on different kinds of competence. To align with a chosen strategy for innovation, managers need to understand what knowledge to invest in and what ways of generating ideas to pursue. The results suggest that R&D-based knowledge is not as relevant for developing incremental innovation, as it is when developing and implementing radical changes, here defined as new to the market for services. Furthermore, the results suggest that the R&D-based knowledge does not need to originate from a firm's own departments, because such knowledge can also be externally acquired. Consequently, managers of service firms should consider how a more systematic approach to the R&D-based knowledge may benefit their innovation efforts if radical changes are the goal.

The results also point to the role of employees in the innovation processes. Ensuring that employees throughout the organization have the knowledge necessary to contribute to the innovation process and to implement the change is related to both ends of the novelty scale. Given that innovations in services often extend across departments, it is important that management invest in the employees' knowledge in general, to broaden the knowledge base within firm.

Finally, the results confirm the importance of the ability of firms to continuously collect and use information from customers in order to contribute to, and facilitate, the innovation effort. New services must be developed in response to customers' needs if they are to succeed, and it is important that managers have systems in place to continuously collect market information and disseminate it within the organization as part of knowledge sharing. Moreover, managers should also find ways to engage in collaborating activities with customers when pursuing radical innovations. It seems that customers may be able not only to evaluate present service offers, but they can also contribute with more radical ideas for new services. Thus, creating ways to cooperate better with customers may be essential to the capacity of the firm to innovate.

To conclude, innovations in service firms will benefit from the use of knowledge from a diversity of sources, internally and externally, making it important for managers to have a strategy that balances the type of competences, as well as the ability to exploit them in pursuit of different innovation objectives.

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

About the Authors

Marit Engen is an Assistant Professor at Lillehammer University College, Norway, where she is also a PhD student at The Centre for Innovation in Services. Her research project focuses on the management of employee-driven service innovation with a particular focus on idea creation in frontline employees and how ideas from the front end are absorbed into the innovation processes in service organizations. She holds an MSc in Marketing from Buskerud and Vestfold University College, Norway, with a specialization in knowledge management. She has worked as an advisor in the tourism sector for several years and has broad experience from projects in both the private and public sectors.

Inger Elisabeth Holen is a PhD student in the field of public and private service innovation at the Centre of Innovation in Services at Lillehammer University College, Norway. Her research has a special focus on linkages between innovation activity and business performance in service firms, but also on how public policy can stimulate innovation. She holds an MSc in Business and Economics from the BI Norwegian Business School in Oslo, Norway. She is also a co-owner of a milk-producing farm and has experience from agriculture and business consulting, and she has worked with a variety of entrepreneurs as well as established companies.

References

Alam, I. & Perry, C. 2002. A Customer-Oriented New Service Development Process. *Journal of Services Marketing,* 16(6): 515-534.
http://dx.doi.org/10.1108/08876040210443391

Coombs, R. & Miles, I. 2000. Innovation, Measurement and Services: The New Problematique. In M. J. S. & I. Miles (Eds.), *Innovation Systems in the Service Economy:* 83-102. Boston: Kluwer.

CIS. 2010. Community Information Survey. European Commission Eurostat. April 1, 2014:
http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/cis

de Brentani, U. 2001. Innovative Versus Incremental New Business Services: Different Keys for Achieving Success. *Journal of Product Innovation Management,* 18: 169-187.
http://dx.doi.org/10.1111/1540-5885.1830169

de Jong, J. P. J. & Vermeulen, P. A. M. 2003. Organizing Successful New Service Development: A Literature Review. *Management Decision*, 41(9): 844.
http://dx.doi.org/10.1108/00251740310491706

Drejer, I. 2004. Identifying Innovation in Surveys of Services: A Schumpeterian Perspective. *Research Policy,* 33(3): 551-562.
http://dx.doi.org/10.1016/j.respol.2003.07.004

Edvardsson, B., Gustafsson, A., Kristensson, P., & Witell, L. 2010. Customer Integration in Service Innovation. In F. Gallouj & F. Djellal (Eds.), *The Handbook of Innovation and Services: a Multi-Disciplinary Perspective.* Cheltenham: Edward Elgar.

Evangelista, R. 2006. Innovation in the European Service Industries. *Science & Public Policy,* 33(9): 653-668.

Gwinner, K. P., Bitner, M. J., Brown, S. W., & Kumar, A. 2005. Service Customization Through Employee Adaptiveness. *Journal of Service Research*, 8(2): 131-148.
http://dx.doi.org/10.1177/1094670505279699

Hult, G. T. M., Hurley, R. F., & Knight, G. A. 2004. Innovativeness: Its Antecedents and Impact on Business Performance. *Industrial Marketing Management,* 33(5): 429-438.
http://dx.doi.org/10.1016/j.indmarman.2003.08.015

Leiponen, A. 2005. Skills and Innovation. International *Journal of Industrial Organization,* 23(5–6): 303-323.
http://dx.doi.org/10.1016/j.ijindorg.2005.03.005

Leiponen, A. 2012. The Benefits of R&D and Breadth in Innovation Strategies: A Comparison of Finnish Service and Manufacturing Firms. *Industrial and Corporate Change,* 21(5): 1255-1281.
http://dx.doi.org/10.1093/icc/dts022

Long, S. J. & Freese, J. 2006. Regression Models for Categorical Dependent Variables Using Stata. Texas: Stata Press.

Matthing, J., Sandén, B., & Edvardsson, B. 2004. New Service Development Learning from and with Customers. *International Journal of Service Industry Management,* 15(5): 479-498.
http://dx.doi.org/10.1108/09564230410564948

Mention, A.-L. 2011. Co-operation and Co-opetition as Open Innovation Practices in the Service Sector: Which Influence on Innovation Novelty? *Technovation,* 31(1): 44-53.
http://dx.doi.org/10.1016/j.technovation.2010.08.002

Miles, I. 2000. Services Innovation: Coming of Age in the Knowledge-Based Economy. *International Journal of Innovation Management,* 4(4): 371-389.
http://dx.doi.org/10.1142/s1363919600000202

Nijssen, E. J., Hillebrand, B., Vermeulen, P. A. M., & Kemp, R. G. M. 2006. Exploring Product and Service Innovation Similarities and Differences. *International Journal of Research in Marketing,* 23(3): 241-251.
http://dx.doi.org/10.1016/j.ijresmar.2006.02.001

OECD. 2005. *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data,* third ed. Paris: OECD.

Ordanini, A. & Parasuraman, A. 2011. Service Innovation Viewed Through a Service-Dominant Logic Lens: A Conceptual Framework and Empirical Analysis. *Journal of Service Research,* 14(1): 3-23.
http://dx.doi.org/10.1177/1094670510385332

Schumpeter, J. A. 1934. *The Theory of Economic Development. Cambridge,* MA: Harvard University Press.

Shalley, C. E. & Gilson, L. L. 2004. What Leaders Need to Know: A Review of Social and Contextual Factors That Can Foster or Hinder Creativity. *The Leadership Quarterly,* 15(1): 33-53.
http://dx.doi.org/10.1016/j.leaqua.2003.12.004

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

Slater, S. F. & Narver, J. C. 2000. The Positive Effect of a Market Orientation on Business Profitability: A Balanced Replication. *Journal of Business Research,* 48(1): 69-73. http://dx.doi.org/10.1016/S0148-2963(98)00077-0

Sundbo, J. 2008. Innovation and Involvement in Services. In L. Fuglsang (Ed.), *Innovation and the Creative Prosess. Towards Innovation with Care.* Cheltenham, UK: Edward Elgar.

Sundbo, J. & Gallouj, F. 2000. Innovation as a Loosely Coupled System in Services. *International Journal of Services Technology and Management,* 1(1): 15-36.

Tether, B. S. 2005. Do Services Innovate (Differently)? Insights from the European Innobarometer Survey. *Industry & Innovation,* 12: 153-184. http://dx.doi.org/10.1080/02642060902749492

Toivonen, M. & Tuominen, T. 2009. Emergence of Innovations in Services. *The Service Industries Journal,* 29(7): 887 - 902. http://dx.doi.org/10.1080/02642060902749492

Trigo, A. 2013. The Nature of Innovation in R&D- and Non-R&D-Intensive Service Firms: Evidence from Firm-Level Latent Class Analysis. *Industry and Innovation,* 20(1): 48-68. http://dx.doi.org/10.1080/13662716.2013.761380

Tushman, M. L. & Romanelli, E. 1985. Organizational Evolution: A Metamorphosis Model of Convergence and Reorientation. In L. L. Cummings & M. B. Staw (Eds.), *Research in Organizational Behavior,* 7: 171-222). Greenwich, CT: JAI press.

Vargo, L. S. & Lusch, F. R. 2008. Service-Dominant Logic: Continuing the Evolution. *Journal of the Academy of Marketing Science,* 36: 1-10. http://dx.doi.org/10.1007/s11747-007-0069-6

Zhou, J. & Woodman, R. W. 2003. Managers' Recognition of Emplyees' Creative Ideas: A Social-Cognitive Model. In V. L. Shavinina (Ed.), *The International Handbook on Innovation.* Oxford: Elsevier.

Appendix 1: About the Research

The categories of innovation in the CIS survey were based on Schumpeter's (1934) original categories of product, process, organizational, and marketing innovation. The different categories were coded as binary (yes/no). The survey did not use the notions of radical or incremental innovation. The questions were framed to discover whether the product or process innovations were new to the market or new to the firm. According to de Brentani (2001), the degree of novelty can be defined using these two categories, where "new to the market" describes a higher degree of innovativeness compared to "new to the firm". Hence, we defined the group of radical innovators to consist of the firms that had introduced a product or service new to the market or a process innovation new to the market in the period from 2008 to 2010, whereas the group of incremental innovators consists of the firms that had introduced products, services, or processes, or that had been engaged in organizational or market innovation only new to the firm, in the same period. A similar categorization of innovation novelty has been used on CIS data by other researchers (e.g., Mention, 2011). The last group of non-innovators consists of the firms that had reported no innovation at all in the three-year period.

A description of the dependent and independents variables and how they are modelled is shown in Table 1.

Both internal R&D and external R&D were included as separate, binary variables in the model as measures of R&D-based competence.

Employee-based competence was evaluated with two measures. First, development-based knowledge was handled with a binary variable reflecting whether or not the firm had engaged in competence building for the purpose of developing or implementing new or enhanced products or processes. Second, we modelled employee collaboration via two binary variables, one capturing the firm's successful use of idea-brainstorming groups, and the other measuring the use of interdisciplinary work groups intended to stimulate new ideas.

Customer-based competence was modelled with a variable for the use of information and cooperation. The original survey scale on information use ranged from 0 for no use to 3 for great importance. To avoid an interval scale interpretation of an ordinal scale, the scale was reduced to a binary scale for the analysis with the value 1 for high or medium importance and 0 for low importance or no use. The customer-based cooperation was also measured using a binary scale.

In addition to the variables directly connected to the firm's innovation activities, two control variables were included: i) firm size, in terms of the number of employees, and ii) export orientation.

Model specification

Even though the outcomes of our dependent variable, innovation novelty, could be seen as ordered in degree of newness, the "distances" between the categories are not likely to be equal. Thus, the assumption of parallel regressions could be violated, so that ordinal regression will not be the appropriate choice (e.g., Long & Freese,

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

2006). The Wald-test gives a p-value of 0,000 as evidence for rejecting the null hypothesis that the coefficients are equal across the categories of innovators. A second alternative is estimation of binary logistic regressions for all comparisons among the alternatives of the dependent variable, but a problem of doing so is that each binary logit is based on a different sample. Although our main interest is in the differences between service firms engaged in incremental and radical innovation respectively, we also want to compare the innovative firms with the firms that have not introduced innovations at all. Hence, we used multinomial logit regression to estimate the model, specifying firms engaged in incremental innovation as the base category.

Table 2 presents descriptive statistics for our model variables. The sample distribution on the dependent variable is 19.5% of the service firms introducing radical innovations and 22.2% using incremental innovations, which leaves 58.3% of the firms with no innovations at all between the years 2008 and 2010.

Regression results

The parameter estimates of the multinomial regression model are presented in Table 3. The overall accuracy of the model is relatively good (pseudo R^2 = 0.3433). Because incremental innovation is defined as the base category, the reported coefficients in Table 3 for radical innovation and no innovation are both estimated in comparison to incremental innovations. The discussion of the results below Table 3 is however presented in line with the hypotheses, referring to expected outcome on radical and incremental innovation.

Table 1. Description of the variables included in the model

Variable Type	Description	Range
Dependent	*Innovation novelty* (0= no innovation, 1=incremental innovation only, 2= radical innovation)	0–2
Independent	*R&D-based competence*	
	Internal R&D (1 if used internal R&D, 0 otherwise)	0–1
	External R&D (1 if used externally acquired R&D, 0 otherwise)	0–1
	Employee-based competence	
	Idea collaboration (1 if used brainstorming/interdisciplinary work groups, 0 otherwise)	0–1
	Development knowledge (1 if used internal competence building, 0 otherwise)	0–1
	Customer-based competence	
	Customer-based information sources (1 if used, 0 otherwise)	0–1
	Customer-based co-operation (1 if used, 0 otherwise)	0–1
Control	Export orientation (1 if firm was exporting, 0 otherwise)	0–1
	Size (number of employees)	10–16700

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

Table 2. Descriptive statistics for model variables

Variable	No Innovation	Incremental Innovation	Radical Innovation
Number of firms	1537	586	513
% of firms in each group	58.3	22.2	19.5
R&D-based competence (% with use within each group)			
Internal R&D	5.7	29.0	76.4
External R&D	1.8	11.1	33.9
Employee-based competence			
Idea collaboration	24.2	68.3	82.5
Development knowledge	2.5	29.5	69.2
Customer-based competence			
Customer-based information sources	22.0	69.6	90.6
Customer-based cooperation	0.9	5.5	22.0
Control variables:			
Export orientation	28.7	43.1	58.1
Number of employees (mean/std.dev)	92/215.59	160/788.45	120/350.57

The Importance of Key Competences in Service Firms

Marit Engen and Inger Elisabeth Holen

Table 3. Multinomial regression: type of innovation by independent variables

	Radical Innovation	No Innovation
R&D-based competence		
Internal R&D	1.335 (0.173)***	-0.248 (0.192)
External R&D	0.441 (0.185)*	-0.302 (0.283)
Employee-based competence		
Idea collaboration	-0.043 (0.174)	-1.176 (0.122)***
Development knowledge	0.806 (0.157)***	-1.735 (0.211)***
Customer-based competence		
Customer-based information sources	0.512 (0.204)*	-1.306 (0.125)***
Customer based cooperation	0.582 (0.231)*	0.234 (0.374)
Control variables		
Export orientation	-0.025 (0.146)	-0.270 (0.121)*
Number of employees	-0.000 (0.000)	-0.000 (0.000)
Constant	-1.747 (0.201)***	2.440 (0.104)***
Pseudo R^2	0.3433	
Number of observations	2636	

Note: Unstandardized multinomial regression coefficients, robust standard errors in parentheses.
Significant at * p<0.05, ** p<0.01, *** p< 0.001. Incremental innovation is the base category.

Citation: Engen, M. & Holen, I. E. 2014. Radical Versus Incremental Innovation: The Importance of Key Competences in Service Firms. *Technology Innovation Management Review*, 4(4): 15–25. http://timreview.ca/article/781

Keywords: innovation, services, competences, innovation novelty, community innovation survey

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

> *"The new services insight is to observe customers in their environment, not yours, from an anthropological or behavioral point of view."*
>
> Henry Chesbrough
> Organizational theorist

This article proposes a new approach for assessing the value derived from using a service offering (i.e., value-in-use) through the utilization of "social platforms." We define a social platform as an adaptable digital service environment that enables the co-creation of value through social interactions with other service systems. By reviewing the relevant literature, detailed propositions are built based on the integration of theoretical concepts, thereby combining the literature on service-dominant logic, platforms, and social media. The primary argument of the article is that embedding social platforms in a company's services may result in more efficient retrieval and understanding of customer insights, better management of customer intelligence, and ultimately higher value-in-use.

Introduction

Recent discussion on the concept of customer value has turned the interest from exchange value toward the value derived from using an offering (e.g., Bowman & Ambrosini, 2000). The primary reason is the rise of the service economy, and the discussion is most evidently present in the research stream of service-dominant logic (Vargo & Lusch, 2004, 2008). It sees all exchange as service exchange – and intangibles such as skills, information, and knowledge as higher in importance than traditional tangible goods. The stream takes a dramatic stand in its fundamental propositions and only acknowledges the existence of value-in-use. The argument is based on the strategic-level relevance of the predominant role of interactivity, connectivity, and ongoing relationships in value creation (Lusch et al., 2007).

The use of various social media and collaboration tools has gained increasing attention in solving issues related to customer information (Albors et al., 2008; Kärkkäinen et al., 2012; Peppler & Solomou, 2011). These tools are commonly viewed as part of digital platforms (e.g., Kietzmann et al., 2011). From the company perspective, the tools allow access to information on the actions performed with products and services and how customers perceive the offerings in their own social contexts. Research on the influence of social media on customer co-creation (i.e., active, creative, and social collaboration between actors such as suppliers and customers) suggests that the relationship among the co-creating customers as well as the relationship between the suppliers and the customers is highly affected by the increasing use of such social media technologies (Piller et al., 2012; Rishika et al., 2013).

The social media tools may offer interesting possibilities in assessing the value-in-use information, and companies are not yet using the tools to their full potential. We consider the reason behind this issue to be related to the fact that social media is commonly interpreted in isolation and viewed with too narrow a focus. As stated, the social media technologies are seen to be a part of digital platforms. However, the research focuses primarily on the social media technologies themselves, and excludes the rich scholarly knowledge on platforms.

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

Therefore, we integrate the concepts of platform and social media and define the combination as a more abstract concept called a "social platform". In social platforms, social media is merely an enabling technology and usage logic, not a solution itself. Furthermore, we propose that social platforms are, in fact, service systems themselves and that their practical applications could benefit considerably from integrating the service-dominant logic's systemic approach to "value-in-use" with the platform literature.

This article limits itself to elaborating on the concept of value-in-use, as service-dominant logic interprets it, and how firms can enhance the assessment of value-in-use information with social platforms. Thus, this article builds theoretical bridges between the literature streams of service-dominant logic, platforms, and social media by integrating them in order to produce new knowledge. The boundary object for the integration is the concept of value-in-use.

For practitioners, the article provides insights on why and how to connect social platforms to services. We argue that social platforms are not merely bidirectional communication tools, which they are often regarded as, or simple additions to products. We propose that social platforms should, instead, be embedded in the services and used to operate and orchestrate them.

The structure of this article is as follows. First, the theoretical concepts of value-in-use and social platforms are presented, after which the theoretical concepts are integrated and three propositions formed. Finally, examples of social platforms are presented and future research directions are suggested.

Assessing Value-in-Use

The concept of customer value is perhaps the most overused and misused term in the marketing and management sciences, and there are many overlapping categorizations and perceptions of the concept (e.g., Khalifa, 2004). Hence, the focus of this article is to concentrate solely on the concept of value-in-use (i.e., value not from exchange but from using an offering) defined by the research stream of service-dominant logic (Vargo & Lusch, 2004). Although value-in-use is widely recognized, it is noteworthy how silent the leading scholars remain on the practical assessment methods of the phenomenon. In the literature, there seems to be a lack of well-defined and established methods to understand and to assess value-in-use (e.g., Grönroos, 2008; Ostrom et al., 2010). This observation is of special importance, because the scholars have identified that existing quality and satisfaction assessment methods do not fully meet all demands of the value-in-use concept and that there is a need for new tools (e.g., Macdonald et al., 2011). In following subsections, we present three theory-anchored requirements for those new methods.

Further extending the scope of assessment for value-in-use toward customers' actions

One of the fundamental premises of the service-dominant logic is that value is realized only when the customers actually use the offerings and that suppliers can merely offer value propositions (Vargo & Lusch, 2004, 2008). This premise implies that, to acquire improved value-in-use information, the supplier must move further toward the customer and support the value-creation process more effectively. The leading authors agree that there is a need to extend the scope of service offering and value assessment to the customers' own consumption and usage processes (e.g., Ballantyne & Varey, 2006; Grönroos, 2006; Payne et al., 2008). More specifically, suppliers must not only monitor and track value creation at the intersections of the supplier-customer processes but extend and even embed the marketing operations inside the customers' own internal value-generating operations (Grönroos, 2006). In essence, supporting the customer and facilitating the service usage is crucial (Grönroos, 2008).

Due to the growing embeddedness of the suppliers' actions and the heightened importance of interaction between all stakeholders involved in value creation (Ballantyne & Varey, 2006), the focus enlargement also stresses the relevance of acquiring not only customer-specific but also relation-specific knowledge from all events occurring between the value co-creation parties (Ballantyne, 2004). In this process, the suppliers and customers become inseparable and learning from the interaction is important (Matthing et al., 2004). In addition, as these events form complex and volatile paths over time, it is important to take a longitudinal perspective to the development of value-in-use (Ballantyne, 2004; Macdonald et al., 2011).

The importance of individual customer value-in-use insights

The service-dominant logic literature stresses the high context-specificity of value-in-use; it is seen as a very individual experience, perceived via each customer's personal perspective (Vargo & Lusch, 2004; 2008). Thus, the generalizations of value-in-use aiming to "get a big picture" may not yield the desired outcome: value-in-

use must be addressed as a subjectively judged (Grönroos & Ravald, 2011), individual-level, context-sensitive concept.

According to scholars on the original service-dominant logic writings, the word *context* implies, in this case, the outcome, purpose, and objective that are achieved through the service (Vargo & Lusch, 2004). These factors are unique to each customer and moderated by situational filters (Sandström et al., 2008). This view emphasizes the need for gaining deep and personal – even tacit – insights about the interactions to understand further the value-in-use and the antecedents of value-creation activities (Ballantyne & Varey, 2006). The context sensitivity also implies that all possible usage contexts cannot be always known in advance. The suppliers must therefore assess value-in-use with methods that adapt to unanticipated usage scenarios and situations.

The need for a networked approach for value-in-use
Value-in-use is not perceived by the customer in isolation but with the omniscient perspectives of the entire ecosystem (Chandler & Vargo, 2011). The dyadic co-creation between the supplier and customer appears to not to be enough, because the value of the service often depends on the offerings of other – possibly unknown – actors. Therefore, the presence, role, and effects of offerings by third parties and other suppliers in value creation must be identified, understood, and ultimately facilitated. With suppliers, the main driver for this seems to be related to the high importance of the network capabilities of the provider (i.e., the provider's strength in accessing and making use of other suppliers) (Macdonald et al., 2011). In the case of customers, the network approach is crucial, because the value-creation experience seems to be a networked phenomenon itself; value-in-use is relational and subject to the customers' own network experiences and opinions. Edvardsson, Tronvoll, and Gruber (2011) refer to this phenomenon as value-in-social context.

Toward Social Platforms

Platform research, along with platform thinking, have gained considerable traction during the past two decades, during which the concept has matured from the context of physical products and technologies into abstract business environments (Eisenmann et al., 2006; Cusumano & Gawer, 2002, 2008; Meyer et al., 1997; Rochet & Tirole, 2003; Sawhney, 1998). Originally, platforms were perceived only as bundles of standard components around which actors such as buyers and sellers coordinated their efforts (e.g., Bresnahan & Greenstein, 1999). Later research (e.g., Eisenmann et al., 2006) suggests that platforms are products and services that bring together groups of users in two-sided networks. Thus, the focus of platforms moved to providing the infrastructure and rules facilitating the transactions. Recently, it has been concluded (e.g., Nishino et al., 2012) that platforms are, in essence, comprehensive strategies that provide business models upon which service providers, consumers, and manufacturers can interact. Hence, viewed from the service-dominant logic approach, the latest writings tend to see platforms as *service systems* that are dynamic configurations of resources that enable the co-creation of value with other service systems through shared information (cf. Maglio et al., 2008).

What does the widened scope and especially the service system approach mean for the platform concept in practice? Edvardsson and Olsson (1996) suggest that service systems should be designed to support co-creation so that the customers should not only participate but actively contribute to the process. In practice, this interaction is carried out by adapting the service process to the logic of the customers' behaviour, requiring a thorough understanding of the customers' needs and expectations. In a platform context, the implication is that reciprocal processes must be employed as part of the platform for the customers to be involved in the service process as co-creators of the customer experience (cf. Chesbrough, 2011a). Furthermore, research by Smedlund (2012) attempts to establish a connection between the current theories in service sciences and the literature stream of platforms and supports the notion that value creation relies ultimately upon the end user and involves high levels of interaction among actors participating on the platform, often through *flexible front ends* (Chesbrough, 2011b).

The role of social media and value co-creation in digital platforms
Because few platform leaders can manage to create complete systems and all the complements themselves, collaboration between actors is needed to enhance complementary innovation (Cusumano & Gawer, 2002). For this reason, platforms are not under the full control of the company maintaining the platform, so strategies for managing the industry-wide network, as well as for facilitating the value co-creation in platforms, are needed. The traditional approach has addressed these needs through pricing and structure (Eisenmann et al., 2006; Evans, 2003; Rochet & Tirole, 2003). However, as platforms are moving more to digital environments, companies wishing to enhance their

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

service platforms are seeking new ways of providing incentives for collaboration.

Social media technologies applied in the context of platforms could provide a new kind of venue for companies to facilitate interactions with actors in their service networks. Andzulis, Panagopoulos, and Rapp (2012) define social media as "the technological component of the communication, transaction, and relationship building functions of a business, which leverages the network of customers and prospects to promote value co-creation." Currently, there is a plethora of social media technologies, such as blogs, collaborative projects, social networking sites, content communities, virtual social worlds, and virtual game worlds, all representing different types of networked environments and channels that enable people, communities, and organizations to connect and share information (Kaplan & Haenlein, 2010). Social media should therefore be viewed as the whole operating logic behind services that provides the means for social interactions between various actors in a network.

Social media and various methods of co-design may be used to engage companies and customers in collaborative innovation (Piller et al., 2012). Research by Agnihotri and colleagues (2012) also suggests that the presence of *social content enablers* (e.g., collaborative projects) and *social network enablers* (e.g., social networking sites) can be used to manage and promote the co-creation of value among actors. Social media technologies enable organizations to listen to their customers and analyze their experiences merely by monitoring and identifying issues, questions, and concerns voiced in their discussions (Andzulis et al., 2012). Consequently, the level of social participation influences the usability, relevance, and outcome of the acquired value-in-use information.

Establishing consensus on social platforms

Platforms are inherently service systems and, more specifically, environments that foster interactions among participants. Platforms serve to resolve issues of value co-creation and allow even unintended end uses. They often rely on intelligent digital systems that appear as easy-to-use front ends that allow the users to be in control of information. When the modern view of platforms is viewed in light of the social media literature, it seems that value co-creation in platforms can be facilitated through social media technologies. Hence, to enrich the concept of the platform with the possibilities of social media technologies and to form a unified concept for the purposes of this study, we define a new combinatory concept of the *social platform*. Formally, we define a social platform as *an adaptable digital service environment that enables the co-creation of value through social interactions with other service systems.*

Integrating the Concepts of Value-in-Use and Social Platform

The theory of service-dominant logic stresses the importance of extending the scope of assessment further toward customers' own actions as the suppliers and customers together co-create the value (Vargo & Lusch, 2004, 2008). Therefore, the aim of suppliers is to acquire invitations to take part in the customers' own internal usage processes and to understand the value-in-use for the customers to be able to engage in value co-creation more extensively (Ballantyne & Varey, 2006; Grönroos, 2006; Payne et al., 2008). Consequently, relation-specific knowledge and a longitudinal perspective on the development of value-in-use were identified as relevant aspects of the issue (Ballantyne, 2004; Macdonald et al., 2011; Matthing et al., 2004).

Social platforms seem to support these requirements. Platforms engage and involve companies and customers in collaborative innovation (Piller et al., 2012) and empower all stakeholders to participate in the co-creation of the customer experience (Chesbrough, 2011a). In practice, platforms connect different suppliers and customers with innovative interfaces – as in Chesbrough's (2011b) flexible front ends – and discovering and forming unique capabilities (Smedlund, 2012).

Due to the ability and convention of the customers to spontaneously articulate their goals, purposes, and objectives, accompanied by feedback about the gained value, the social platform orchestrator can extend its reach to the users and receive information about the customers' actions on the platform and ultimately understand the value-in-use of the customers while facilitating the processes, if appropriate. In addition, as the whole supplier-user interaction path is stored in the accumulated usage history, the platform owner can acquire a longitudinal perspective on the customer's perceived value-in-use.

Social platforms are themselves, in essence, service systems representing dynamic configurations of resources that enable the co-creation of value with other service systems through shared information (Maglio et al., 2008). Thus, social platforms can be embedded in the actual service systems, which further enables the suppliers to integrate their operations into the customers'

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

processes. However, we argue that the success of the social platform in meeting the requirements is moderated by the design of the platform. This is because the co-creation and the collection of value-in-use information are not attained unless customers find it meaningful to operate on the social platform.

Proposition 1: *Social platforms facilitate the disclosure of value-in-use information by enabling suppliers to embed their operations with customers' processes and thereby intensify co-creation among customers and suppliers.*

Social platforms provide in-depth information about individual customer value-in-use insights

According to scholars on service-dominant logic, context-sensitivity (i.e., the relationship to the customer's individual and situational objectives, purposes, and outcomes that are achieved through the service, as well as the environment in which the co-creation happens) is one of the most crucial issues when assessing value-in-use (Chandler & Vargo, 2011; Grönroos & Ravald, 2011; Vargo & Lusch, 2004, 2008). This view emphasizes the need to acquire deep-enough insights about the personal and situational conditions and communicative as well to learn about the interactions involved in value creation (Ballantyne & Varey, 2006; Sandström et al., 2008). In addition, the adaptability of the value-in-use assessment system in regard to unknown and unanticipated usage scenarios is seen as important (Ballantyne & Varey, 2006; Vargo & Lusch, 2008).

It seems that social media is able to facilitate both spontaneous and structured self-disclosure for its users. The utilization of diverse social media technologies enables social platforms to foster varying degrees of intimacy and immediacy providing an environment for rich self-presentation (Kaplan & Haenlein, 2010). Placed in the context of value-in-use assessment, the implication is that social platforms can provide in-depth information about the users and their experiences with the products and services. Furthermore, if platforms are, as described earlier, embedded in the service systems themselves, the social platforms reveal how individual users actually use the solutions and thereby disclose the actual usage scenarios, value-creation activities, and related contextual factors.

Social platforms are not confined or restricted environments and may therefore adapt to meet the unanticipated needs of the surrounding system (Cusumano & Gawer, 2002). Moreover, research by Gawer & Cusumano (2008) acknowledges that social platforms enable actors to connect to or to build upon the system and allow even unintended end uses. Based on these arguments, social platforms appear to be well-adapting service systems suitable for acquiring value-in-use information from both planned and unanticipated customer usage settings but also for supporting the value co-creation in those scenarios.

Proposition 2: *The ability of social platforms to promote structured and context-sensitive self-disclosure, and the ability to adapt to the surrounding systems, enhance and facilitate the acquisition of value-in-use information in both planned and unanticipated usage settings.*

A networked approach for value-in-use information is natural for social platforms

Theory on the assessment of value-in-use emphasizes the relevance of adopting a network approach to value creation and the analysis of use-value, as well as moving beyond the dyadic supplier-customer relationships (Ballantyne & Varey, 2006; Chandler & Vargo, 2011; Maglio et al., 2008). The scholars underline the importance of understanding the actor-offering network where the value-in-use experience takes place (Chandler & Vargo, 2011; Edvardsson et al., 2011). Extending the perspective to the network level makes it possible to identify and orchestrate multi-faceted relationship issues concerning the suppliers, the customers, and third parties (Chandler & Vargo, 2011). It also enables and facilitates completely new ways of value creation.

Social platforms allow different types of collaboration to emerge depending on the level of effort put into digital content creation and the options for network-based interactions. Social network enablers (i.e., push-type technologies such as content communities) and social content enablers (i.e., pull-type technologies such as collaborative projects) as part of social platforms, allow the customers to influence their degree of involvement as well as the type of information acquired and shared (Agnihotri et al., 2012). Therefore, the presence of social content enablers and social network enablers can promote the co-creation of value among actors. The ability of platforms to adapt to the surrounding system has an influence on the degree of innovation and complements, the extent of modularity, relationships with external complementors, and the internal organization (Cusumano & Gawer, 2002). Thus, social platforms themselves promote networked operations and thereby foster innovation and build relationships across organization boundaries – even in unique ways, as described earlier in reference to Smedlund (2012). Hence, we ar-

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

gue that there is considerable potential for the platform orchestrator to organize the whole service system development and influence its direction.

Proposition 3: *The networked approach of social platforms inherently allows for the collection of value-in-use information from multiple parties as well as the management of the service system.*

Concluding Discussion

This article proposes a new approach for assessing the value derived from using a service offering (value-in-use) through the utilization of social platforms. We propose that embedding social platforms in the company's service offering would result in more efficient retrieval and understanding of context-aware individual-level insights about customer and third-party networks, better management of customer intelligence, and ultimately higher value-in-use for the whole service ecosystem. In addition, we argue that social platforms as well as social media technologies should not be treated as independent tools but should, instead, be embedded in the service systems. In theory, this approach means combining the concepts of service systems, platforms, and social platforms and forming a metatheory about them. We have begun this work by connecting the service-dominant logic's concept of value-in-use and social platforms, but this is just a starting point for more extensive research. In practice, social platforms should be embedded in the service systems themselves. That is, instead of "toolism", we would like to see more practical implementations of complete digital service systems.

Let us consider an example in the context of a factory automation system. It is relatively easy to remotely monitor the technical aspects of the system but the social and tacit side of value co-creation is left with less attention, although these factors have considerable influence on the experienced value-in-use. What would happen if a social platform was embedded into the automation system's operation logic? Given that using the social platform would actually be a natural part of the system management, the operator and system supplier could learn from comparing technical data and employee-to-employee interactions. Also, the social platform could reveal hidden structures and influencers deep inside the organizations. With modern analytics software already available for the common social media, the possibilities for organizational learning would be immense. Most importantly, the users would see only little overhead because the social platform would be the operations environment itself.

Another example can be conceptualized for the healthcare sector. Instead of a traditional appointment-based service, the physician could interact with the patient in real time, with the help of relatively inexpensive wearable device. The social platform would enable the physician to develop a closer relationship to the patient and follow their real-life operations – of course only with patient's consent. Hence, the physician would not be limited by the information the patient is able to explicate during an appointment but would be able to assess the real value-in-use information from the patient's real-life context. Moreover, the social platform would enable the combination of information from multiple sources such as sports trackers, calorie counters, and sleep meters, to name but a few. Therefore, social platforms could provide better patient care and also provide new opportunities for profitable business. To summarize, the social platform would enable a completely new kind of business model: health-as-a-service, and make it possible to reach entirely new levels of value for the patient.

Having presented all these promising ideas regarding the potential of social platforms in service business, it might be tempting to rush into developing platforms and implementing social media technologies into service offerings. However, practitioners need to be aware of the challenges involved and recall that many platform providers and owners fail to become platform leaders. In platforms, leadership can only be acquired by fostering collaboration between different actors, driving the platform innovation forward, and also securing the owner's benefits in the business model (e.g., Gawer & Cusumano, 2008). The same argument is evident in the social media literature that stresses the active role of customers in the co-creation of value but also in influencing who orchestrates the brand experience (Hanna et al., 2011). In more abstract marketing literature, this situation has been approached, for example, with the term "channel multiplicity", which means that the leadership position in different channels has become "occasion-specific and user defined" (Van Bruggen et al., 2010). Thus, broad evidence asserts that setting up a new platform as merely a simple service extension is not enough: value co-creation should be comprehensively facilitated and benefits must be secured to all relevant stakeholders.

Fortunately, the platform literature does offer solutions to these questions. Moore (1993) identified cooperative actions (i.e., working with the market to design, promote, and innovate an expanding and self-renewing offering and vision) and competitive operations (i.e.,

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

protecting the platform itself and the company's own incentives). More recently, Gawer and Cusumano (2008) advanced the discussion further by making a distinction between creating a new platform (i.e., "coring") and creating competing offerings (i.e., "tipping"). In coring, the authors stressed the discovery of the systemic problem in the actor network and the role of platforms in solving the problem. With tipping, the authors referred to the development of unique and hard-to-imitate features, as well as to absorbing and bundling features from adjacent markets. Also, looking more towards the strategic management discussion, Eisenmann (2011) introduced the concept of "platform envelopment", referring to a company's attempt to integrate functionalities from competing platforms into its own environment.

Thus, these authors, in addition to many others, provide numerous abstract-level answers to the platform development and leadership issues, and hence pave the way for applications in practical social platform contexts. The social media literature has already widely assessed the challenges of user and actor engagement. Now, this discourse could be further integrated with the platform literature in order to address not only the potential of social platforms – the theme of this article – but also their orchestration.

Acknowledgements

This research was conducted in the Future Industrial Services (FutIS) research program, which is managed by the Finnish Metals and Engineering Competence Cluster (FIMECC) and jointly funded by the Finnish Funding Agency for Technology and Innovation (TEKES) as well as research institutes and companies involved in the FutIS program. Their support is gratefully acknowledged. In addition, we would like to thank Dr. Anssi Smedlund from Aalto University School of Science for valuable conceptual input.

About the Authors

Ville Eloranta, MSc (Tech), is a doctoral student in the Service Engineering and Management (SEM) research group at Aalto University School of Science, Finland. Ville joined academia in 2012 after seventeen years in digital service design business and seven years of entrepreneurship. Ville's research interests cover manufacturers' service infusion/servitization, service networks, and service platforms. Currently, he is focusing on studying the sources of competitive advantage in service networks and methods of agile service network orchestration.

Juho-Ville Matveinen, MSc (Tech), is a business designer at Diagonal, an acclaimed service design agency in Finland. His forte is organization development and the strategic planning of service ecosystems in addition to managing change as part of business development activities. He has a background in research at the Department of Industrial Engineering and Management at Aalto University School of Science, where he focused on researching digital service platforms and their application in business development.

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

References

Agnihotri, R., Kothandaraman, P., Kashyap, R., & Singh, R. 2012. Bringing "Social" Into Sales: The Impact of Salespeople's Social Media Use on Service Behaviors and Value Creation. *Journal of Personal Selling and Sales Management*, 32(3): 333–348. http://dx.doi.org/10.2753/PSS0885-3134320304

Albors, J., Ramos, J.C., & Hervas, J.L. 2008. New Learning Network Paradigms: Communities of Objectives, Crowdsourcing, Wikis and Open source. *International Journal of Information Management,* 28(3): 194–202. http://dx.doi.org/10.1016/j.ijinfomgt.2007.09.006

Andzulis, J., Panagopoulos, N., & Rapp, A. 2012. A Review of Social Media and Implications for the Sales Process. *Journal of Personal Selling and Sales Management,* 32(3): 305–316. http://dx.doi.org/10.2753/PSS0885-3134320302

Ballantyne, D. 2004. Dialogue and its Role in the Development of Relationship Specific Knowledge. *Journal of Business & Industrial Marketing,* 19(2): 114–123. http://dx.doi.org/10.1108/08858620410523990

Ballantyne, D. & Varey, R. 2006. Creating Value-in-Use Through Marketing Interaction: The Exchange Logic of Relating, Communicating and Knowing. *Marketing Theory,* 6(3): 335–348. http://dx.doi.org/10.1177/1470593106066795

Bowman, C. & Ambrosini, V. 2000. Value Creation Versus Value Capture: Towards a Coherent Definition of Value in Strategy. *British Journal of Management,* 11(1): 1–15. http://dx.doi.org/10.1111/1467-8551.00147

Bresnahan, T.F. & Greenstein, S. 1999. Technological Competition and the Structure of the Computer Industry. *The Journal of Industrial Economics,* 47(1): 1–40. http://dx.doi.org/10.1111/1467-6451.00088

Chandler, J.D. & Vargo, S.L. 2011. Contextualization and Value-in-Context: How Context Frames Exchange. *Marketing Theory,* 11(1): 35–49. http://dx.doi.org/10.1177/1470593110393713

Chesbrough, H. 2011a. Bringing Open Innovation to Services. *MIT Sloan Management Review,* 52(2): 85–90.

Chesbrough, H. 2011b. *Open Services Innovation: Rethinking Your Business to Grow and Compete in a New Era.* Jossey Bass, San Francisco.

Cusumano, M. & Gawer, A. 2002. The Elements of Platform Leadership. *MIT Sloan Management Review,* 43(3): 51-58.

Edvardsson, B. & Olsson, J. 1996. Key Concepts for New Service Development. *The Service Industries Journal,* 16(2): 140–164. http://dx.doi.org/10.1080/02642069600000019

Edvardsson, B., Tronvoll, B., & Gruber, T. 2011. Expanding Understanding of Service Exchange and Value Co-Creation: A Social Construction Approach. *Journal of the Academy of Marketing Science,* 39(2): 327–339. http://dx.doi.org/10.1007/s11747-010-0200-y

Eisenmann, T., Parker, G., & Van Alstyne, M.W. 2006. Strategies for Two-Sided Markets. *Harvard Business Review,* 84(10): 92–104.

Eisenmann, T., Parker, G., & Van Alstyne, M.W. 2011. Platform Envelopment. *Strategic Management Journal,* 32(12): 1270–1285. http://dx.doi.org/10.1002/smj.935

Evans, D.S. 2003. Some Empirical Aspects of Multi-sided Platform Industries. *Review of Network Economics,* 2(3): 1–19. http://dx.doi.org/10.2202/1446-9022.1026

Gawer, A. & Cusumano, M.A. 2008. How Companies Become Platform Leaders. *MIT Sloan Management Review,* 49(2): 28–35.

Grönroos, C. 2006. Adopting a Service Logic for Marketing. *Marketing Theory,* 6(3): 317–333. http://dx.doi.org/10.1177/1470593106066794

Grönroos, C. 2008. Service Logic Revisited: Who Creates Value? And Who Co-Creates? *European Business Review,* 20(4): 298–314. http://dx.doi.org/10.1108/09555340810886585

Grönroos, C. & Ravald, A. 2011. Service as Business Logic: Implications for Value Creation and Marketing. *Journal of Service Management,* 22(1): 5–22. http://dx.doi.org/10.1108/09564231111106893

Hanna, R., Rohm, A., & Crittenden, V.L. 2011. We're All Connected: The Power of the Social Media Ecosystem. *Business Horizons,* 54(3): 265–273. http://dx.doi.org/10.1016/j.bushor.2011.01.007

Kaplan, A.M. & Haenlein, M. 2010. Users of the World, Unite! The Challenges and Opportunities of Social Media. *Business Horizons,* 53(1): 59–68. http://dx.doi.org/10.1016/j.bushor.2009.09.003

Kärkkäinen, H., Jussila, J., & Leino, H. 2012. Learning from and with Customers with Social Media: A Model for Social Customer Learning. *International Journal of Management, Knowledge and Learning,* 1(1): 5–25.

Khalifa, A.S. 2004. Customer Value: A Review of Recent Literature and an Integrative Configuration. *Management Decision,* 42(5): 645–666. http://dx.doi.org/10.1108/00251740410538497

Kietzmann, J.H., Hermkens, K., McCarthy, I.P., & Silvestre, B.S. 2011. Social Media? Get Serious! Understanding the Functional Building Blocks of Social Media. *Business Horizons,* 54(3): 241–251. http://dx.doi.org/10.1016/j.bushor.2011.01.005

Lusch, R.F., Vargo, S.L., & O'Brien, M. 2007. Competing through Service: Insights from Service-Dominant Logic. *Journal of Retailing,* 83(1): 5–18. http://dx.doi.org/10.1016/j.jretai.2006.10.002

Macdonald, E.K., Wilson, H., Martinez, V., & Toossi, A. 2011. Assessing Value-in-Use: A Conceptual Framework and Exploratory Study. *Industrial Marketing Management,* 40(5): 671–682. http://dx.doi.org/10.1016/j.indmarman.2011.05.006

Maglio, P.P., Vargo, S.L., Caswell, N., & Spohrer, J. 2008. The Service System Is the Basic Abstraction of Service Science. *Information Systems and e-Business Management,* 7(4): 395–406. http://dx.doi.org/10.1007/s10257-008-0105-1

Matthing, J., Sanden, B., & Edvardsson, B. 2004. New Service Development: Learning from and with Customers. *International Journal of Service Industry Management,* 15(5): 479–498. http://dx.doi.org/10.1108/09564230410564948

Meyer, M.H., Tertzakian, P., & Utterback, J.M. 1997. Metrics for Managing Research and Development in the Context of the Product Family. *Management Science,* 43: 88–111. http://dx.doi.org/10.1287/mnsc.43.1.88

Accessing Value-in-Use Information by Integrating Social Platforms into Service Offerings

Ville Eloranta and Juho-Ville Matveinen

Moore, J.F. 1993. Predators and Prey: A New Ecology of Competition. *Harvard Business Review,* 71(3): 75–86.

Nishino, N., Wang, S., Tsuji, N., Kageyama, K., & Ueda, K. 2012. Categorization and Mechanism of Platform-Type Product-Service Systems in Manufacturing. *CIRP Annals - Manufacturing Technology,* 61(1): 391–394. http://dx.doi.org/10.1016/j.cirp.2012.03.053

Ostrom, A.L., Bitner, M.J., Brown, S.W., Burkhard, K. a., Goul, M., Smith-Daniels, V., Demirkan, H., et al. 2010. Moving Forward and Making a Difference: Research Priorities for the Science of Service. *Journal of Service Research,* 13(1): 4–36. http://dx.doi.org/10.1177/1094670509357611

Payne, A.F., Storbacka, K., & Frow, P. 2008. Managing the Co-Creation of Value. *Journal of the Academy of Marketing Science,* 36(1): 83–96. http://dx.doi.org/10.1007/s11747-007-0070-0

Peppler, K.A. & Solomou, M. 2011. Building Creativity: Collaborative Learning and Creativity in Social Media Environments. *On the Horizon,* 19(1): 13–23. http://dx.doi.org/10.1108/10748121111107672

Piller, F., Vossen, A., & Ihl, C. 2012. From Social Media to Social Product Development: The Impact of Social Media on Co-Creation of Innovation. *Die Unternehmung,* 65(1): 7–27. http://ssrn.com/abstract=1975523

Rishika, R., Kumar, A., Janakiraman, R., & Bezawada, R. 2013. The Effect of Customers' Social Media Participation on Customer Visit Frequency and Profitability: An Empirical Investigation. *Information Systems Research,* 24(1): 108–127. http://dx.doi.org/10.1287/isre.1120.0460

Rochet, J.-C. & Tirole, J. 2003. Platform Competition in Two-Sided Markets. *Journal of the European Economic Association,* 1(4): 990–1029. http://dx.doi.org/10.1162/154247603322493212

Sandström, S., Edvardsson, B., Kristensson, P., & Magnusson, P. 2008. Value in Use through Service Experience. *Managing Service Quality,* 18(2): 112–126. http://dx.doi.org/10.1108/09604520810859184

Sawhney, M.S. 1998. Leveraged High-Variety Strategies: From Portfolio Thinking to Platfrom Thinking. *Journal of the Academy of Marketing Science,* 26: 54–61. http://dx.doi.org/10.1177/0092070398261006

Smedlund, A. 2012. Value Cocreation in Service Platform Business Models. *Service Science,* 4(1): 79–88. http://dx.doi.org/10.1287/serv.1110.0001

Van Bruggen, G.H., Antia, K.D., Jap, S.D., Reinartz, W.J., & Pallas, F. 2010. Managing Marketing Channel Multiplicity. *Journal of Service Research,* 13(3): 331–340. http://dx.doi.org/10.1177/1094670510375601

Vargo, S.L. & Lusch, R.F. 2004. Evolving to a New Dominant Logic for Marketing. *Journal of Marketing,* 68: 1–17. http://dx.doi.org/10.1509/jmkg.68.1.1.24036

Vargo, S.L. & Lusch, R.F. 2008. Service-Dominant Logic: Continuing the Evolution. *Journal of the Academy of Marketing Science,* 36(1): 1–10. http://dx.doi.org/10.1007/s11747-007-0069-6

Citation: Eloranta, V. & Matveinen, J-V. 2014. Assessing Value-in-Use Information by Integrating Social Platforms into Service Offerings. *Technology Innovation Management Review*, 4(4): 26–34. http://timreview.ca/article/782

Keywords: platforms, social media, value-in-use, service systems, service-dominant logic

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

> *"Undoubtedly, philosophers are in the right when they tell us that nothing is great or little otherwise than by comparison."*
>
> *Gulliver's Travels*
> by Jonathan Swift (1667–1745)

Word-of-mouth communication is a valuable means of marketing for small, local service providers. Face-to-face transmission is most prevalent, but electronic word-of-mouth is on the rise. Through the results of an agent-based simulation, this article shows that the penetration of word-of-mouth for a small service provider, who is locally restricted due to the inseparability of production and consumption, could benefit less from a growth in word-of-mouth connections than a larger service provider. Only if the added electronic connections are mainly local, small and larger service providers have similar effects on the penetration of word-of-mouth. The article includes a discussion of how small service providers could react to this threat.

Introduction

Word-of-mouth communication has become a hot research topic in recent years because of its effectiveness as a tool for marketing (East et al., 2005; Trusov et al., 2009). Although word-of-mouth is often studied in the context of selling goods (Libai et al., 2009), it is even more important to the sales of services (van den Bulte & Wuyts, 2007; Zeithaml, 1981). Services are largely intangible and have credence qualities (Zeithaml et al., 1996), leaving potential customers uncertain about the quality of the service. In particular, small service providers – such hairdressers or plumbers – heavily rely on word-of-mouth communication by their customers, because they are often locally restricted due to their small number of staff and the inseparability of production and consumption (Zeithaml et al., 1996; Lovelock, 2001).

In recent years, the electronic version of word-of-mouth communication grew strongly and now accounts for 10% of all word-of-mouth contacts (Carl, 2006; Keller & Berry, 2006; Keller & Fay, 2012). Electronic word-of-mouth is based on media with low synchronicity requirements, other than, for example, face-to-face communication. Such low- synchronicity media are especially suited to familiar tasks and to situations where transmitting information is more important than creating common understanding (Dennis et al., 2008), both of which are relevant with electronic word-of-mouth. Lower synchronicity also means that spatial proximity is less important for electronic word-of-mouth than other forms of word-of-mouth (De Bruyn & Lilien, 2008). The Internet is an essentially global medium (Lagrosen, 2005; Subramaniam et al., 2000), and even though many online contacts might actually sit next door, the overall proximity of online contacts can be considered to be lower than the proximity of face-to-face contacts who exchange traditional word-of-mouth communication (Wellman, 1996).

Now, if word-of-mouth is local and electronic word-of-mouth is less so, the penetration of word-of-mouth for small local service providers could suffer. With mainly non-electronic communication, people will exchange word-of-mouth communication about a local service provider with the people they meet every day, face to face. Most of the recipients of this communication are then able to purchase the services of this provider because they live nearby. If people engage more and more

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

in electronic communication, the amount of communication (and of word-of-mouth) heavily increases, and a certain portion of the new communication goes to non-local recipients. Such non-local electronic word-of-mouth leaves the realm of a small service provider. People who receive the communication, but do not live close to the service provider, cannot purchase the service and will also not pass on the electronic word-of-mouth.

The objective of the study is to show the impact that electronic word-of-mouth could have on small local service providers. First, the relevant theories are described to show how hypotheses were developed. Next, the methodology and analysis of an agent-based simulation of a word-of-mouth are presented. Finally, several recommendations are given to help small service providers benefit from increases in electronic word-of-mouth communication.

Theoretical Overview and Hypotheses

Word-of-mouth is defined as communication between people about brands, goods, or services (Zeithaml, 1981; van den Bulte & Lilien, 2001) that induces a change in the behaviour or the preferences of its addressee (Libai et al., 2010). This change is brought about by mere communication, observation (Garber et al., 2004; Godes et al., 2005; Libai et al., 2010), and social pressure once a certain number of people within a person's network all start to behave in a certain way (e.g., a threshold model: Delre et al., 2007a; Granovetter, 1978). Word-of-mouth processes are usually self-reinforcing (Winch & Bianchi, 2006). The impact of word-of-mouth depends on characteristics of the customer, the product, the market, the message, the channel, and on the relationship between the sender and addressee (Arndt, 1967; Libai et al., 2010). This article focuses on the relationship between sender and addressee, and mainly examines their physical proximity. Other important aspects of this relationship are tie strength, demographic similarity, or perceptual affinity (Bruyn & Lilien, 2008), but these aspects are beyond the scope of this study.

Electronic communication and electronic word-of-mouth are on the rise, altering the nature and effects of word-of-mouth communication. Two developments are associated with rising electronic communication relevant to word-of-mouth. First, a strong growth in the amount of word-of-mouth connections can be expected, because electronic communication can easily be shared and copied. Second, parts of these new connections will be non-local, given that electronic word-of-mouth can go to contacts anywhere in the world, whereas traditional word-of-mouth mostly addresses people in the same area. Thus, the non-local share of all connections increases. Our analysis is informed by the literature on the role of proximity in innovation diffusion. It has been shown that spatial proximity has a positive influence on the diffusion of innovation (Agrawal et al., 2008; Bell & Song, 2007; Bronnenberg & Mela, 2004; Choi et al., 2010; Garber et al., 2004).

From this consideration, we derive two hypotheses: First, we argue that a mere rise in the number of connections of customers can be detrimental for small service providers. Should electronic word-of-mouth be addressed towards local and non-local connections (e.g., a post on Facebook about a service), one could assume that only the electronic word-of-mouth that reaches local contacts is helpful, because only these addressees can use the services of the provider. The electronic word-of-mouth that reaches non-local contacts will probably be useless, because the non-local addressees cannot use the services of the recommended provider. On the contrary, a larger service provider in the same situation (i.e., where electronic word-of-mouth about the provider is spread to local and non-local contacts alike) will find more of the non-local electronic word-of-mouth addressees inside that provider's realm. These addressees can use these services, so the larger provider benefits from electronic word-of-mouth to both local and certain non-local addressees. From this foundation, the following hypothesis is derived:

Hypothesis 1*: The more electronic word-of-mouth connections, the more the penetration of word-of-mouth for small local service providers will lag behind larger service providers.*

An example can help illustrate this difference between small and larger providers: If one person posts a picture of a Starbucks coffee on their Facebook account, the vast majority of their friends will be able to try the same coffee in their local Starbucks, even if they live far away. But, when posting a picture of a coffee from a small café with only a single branch, only those Facebook friends who live in the same place will be able to react to the electronic word-of-mouth and also try the coffee.

One way for small service providers to overcome this threat is if many of the newly added electronic connections are local. New local connections remain relevant for the small provider, even if they are electronic: the addressee can purchase the service or at least pass on

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

the information by word-of-mouth. Thus, there should be fewer differences between larger and small service providers if the electronic word-of-mouth connections are local.

Hypothesis 2: *The more local the electronic word-of-mouth communication, the smaller the difference in the penetration of word-of-mouth should be seen between small local service providers and larger service providers.*

Word-of-Mouth Simulation in an Agent-Based Network

The study employs an agent-based simulation of a word-of-mouth process. A growing number of word-of-mouth studies use such agent-based simulations for modelling word-of-mouth processes (Deffuant et al., 2005; Libai et al., 2010). These simulations are fed with behavioural rules for single agents and network specifications as input parameters. After observing the agents' behaviour for multiple rounds, the aggregated consequences of the agents' actions can be observed and traced back to the respective input parameter (Smith & Conrey, 2007). By systematically varying the inputs, data for statistical analysis is generated. The type of network employed is a small-world network (Watts & Strogatz, 1998), where the vast majority of relations is clustered locally, but some relations are random to help information travel quickly (Delre et al., 2007b; Dorogovtsev & Mendes, 2010; Goldenberg et al., 2001; Watts & Strogatz, 1998).

The actual word-of-mouth communication that is modeled in such a network starts with external effects that go to some agents (e.g., through advertising or actually using the service) and then spread to others via internal effects (Garber et al., 2004; Murray, 1991). This spreading can either happen like a virus infection (Goldenberg et al., 2001) or along the lines of a threshold model (Delre et al., 2007b; Granovetter, 1978; Granovetter & Soong, 1986).

We simulated a word-of-mouth process in a small-world network of 2000 agents where 5% of the relations were random and the rest were locally clustered (Bampo et al., 2008; Garber et al., 2004). The simulation was created in Netlogo (Stonedahl & Wilensky, 2008; Wilensky, 1999) and was run approximately 6oo times. Each simulation included either a small or a larger service provider that differed in reach. Their respective reach was modelled by breaking the two-dimensional network into windows (Garber et al., 2004) and then allocating more windows to the larger provider and fewer windows to the small provider. Thus, a small local service provider covered approximately 10% of the network and a larger provider covered approximately 25%, of the network. The infection would only hit an agent if they live within the pre-defined realm of the local service provider and are not immune; 10% of all agents are set to be immune, which is comparable to "interest state no" in the study by Deffuant and colleagues (2005).

The network was gradually altered to account for the expected rise in electronic communication. The total amount of connections was raised to either 120% or 140%, creating the variable "added connections". The local share of connections varied: 95, 100, 105, 110 or 115 percentage points were local. The dependent variable is the impact of the word-of-mouth, which measures the share of infected agents in the realm of the local service provider among all agents in this realm after 50 rounds (i.e., the penetration of the population with word-of-mouth communication).

The infection mechanism employs a threshold model and largely relies on extant literature. Nevertheless, one blind spot is being refined: the difference between word-of-mouth from those who actually used a service (i.e., "use agents") and those who only heard about it (i.e.,"hear agents"). We assume that use agents have more powerful word-of-mouth to share than hear agents, which is somewhat similar to Deffuant and colleagues (2005), who model more-convinced agents as being more influential. The infection starts through external effects that exert their influence in every round. It can then take multiple (hierarchical) routes via different thresholds to infect more agents. The size of the threshold ranges from 3 to 6, depending on whether the word-of-mouth comes from agents who used the service or only heard about it.

Analysis of Data from an Agent-Based Model

After approximately 600 simulation runs, data on input and output parameters were drawn and analyzed using ordinary least squares regression, because the dependent variable is metric (Goldenberg et al., 2001; Goldenberg et al., 2010). In order to test the hypotheses, three models were developed (Table 1). The first model contains the main effects of the variables "added connections", "local share of connections", and the dummy "small provider", plus the effects of the controls (i.e., external effects through hearsay and use, and infection probability). The second and the third models show

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

two interaction effects: one between added connections and small providers, the other one between local share of connections and small providers.

Model 1 shows that smaller service providers in general perform worse in terms of the penetration of word-of-mouth, as indicated by the significant negative coefficient for small service providers (Table 1). The main effect of added connections is not significant in the first model, so simply having more connections does not increase the penetration of word-of-mouth. The local share of the connections nevertheless matters strongly for the penetration of word-of-mouth – the significant, positive coefficient shows the positive relationship.

Table 1. Simulation models explaining the penetration of word-of-mouth communication

	Model 1	Model 2	Model 3
Added connections	0.009 (0.022)	0.090*** (0.030)	0.009 (0.022)
Share of local connections	0.491*** (0.038)	0.491*** (0.038)	0.522*** (0.053)
Small provider	-0.052*** (0.005)	0.155*** (0.053)	0.013 (0.077)
External use-effect	0.033*** (0.001)	0.033*** (0.001)	0.033*** (0.001)
External hear-effect	0.024*** (0.002)	0.024*** (0.002)	0.024*** (0.002)
Probability of infection	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Added connections x Small provider		-0.163*** (0.042)	
Share of local connections x Small provider			-0.062 (0.074)
_cons	-0.555*** (0.043)	-0.658*** (0.050)	-0.587*** (0.058)
N	588	588	588
adj. R2	0.808	0.813	0.808

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

The interaction effects necessary to test the hypotheses are provided in Model 2 and 3. The coefficient for the interaction between small providers and added connections (Model 2) is significant and negative, meaning that small providers benefit significantly less from added connections than larger providers do (Table 1). The significant main effect of "added connections" shows that each connection added is positive for larger providers, which means that it increases their penetration of word-of-mouth. For smaller providers, the negative and significant interaction effect shows that their penetration of word-of-mouth will be lower than that of a larger provider once new connections are added, thus supporting Hypothesis 1. Keeping all other factors constant, this negative effect would even mean that the penetration of a small provider is even being *harmed* by every new connection made. Nevertheless, this is a somewhat theoretical effect: two separate regressions, one for small providers and one for larger providers, were run and the standardized betas (not shown here) were compared, and all the other coefficients do have much higher, significant and positive effects on the penetration of word-of-mouth communication. Thus, it can be concluded that the penetration of the small providers' word-of-mouth communication will be lower than those of the larger providers', but not necessarily negative.

Model 3 shows the interaction between the local share of connections and small provider, allowing for the test of Hypothesis 2. The coefficient for the interaction does not become significant (Table 1), thus there is no significant difference between large and small providers in terms of how they benefit from a higher share of local connections. This result shows that Hypothesis 2 also finds support in the data.

In summary, larger providers benefit much more than small providers from a growth in the number of connections their customers have. Only if these new connections are mainly local, do small providers and larger providers experience similar penetration of word-of-mouth.

To further illustrate these differences, the data were sorted into eight groups. The groups were formed by crossing the variables "added connections", "share of local connections", and "small provider". Four of the groups represent small providers (denoted with solid lines in Figure 1); the other four represent larger providers (denoted with dotted lines in Figure 1).

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

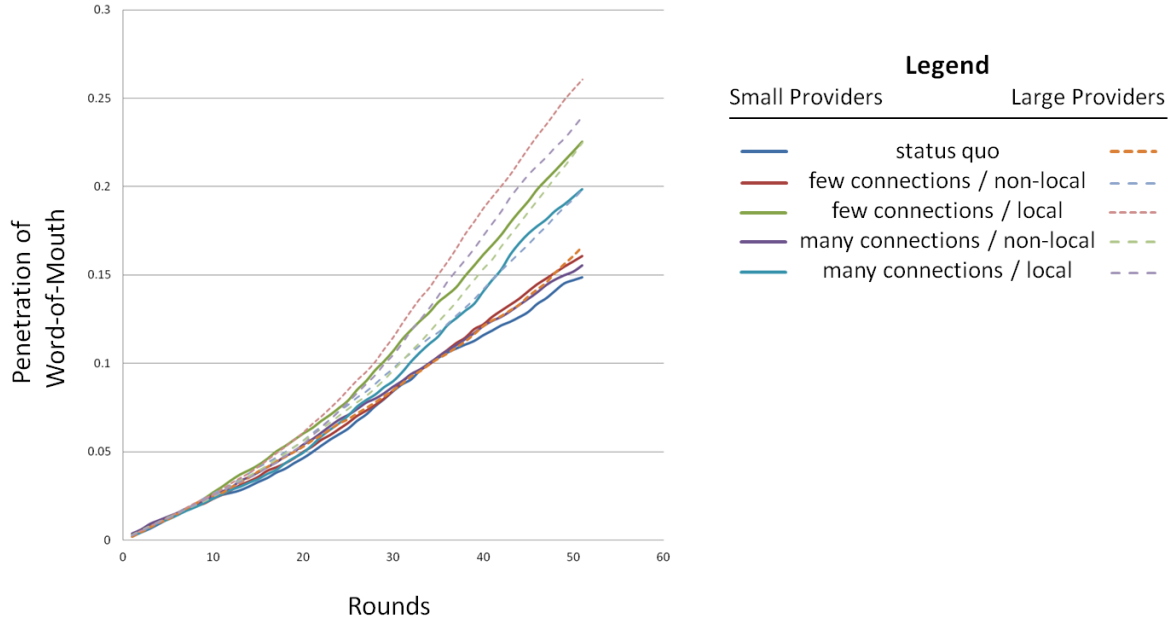

Figure 1. Simulated penetration of word-of-mouth communication by service-provider group

The simulation shows that, for small as well as for larger providers, adding connections and increasing the local share results in higher penetration of word-of-mouth. Nevertheless, for the small providers, the improvement versus the status quo is rather small if most connections are non-local, no matter how many new connections are added. Only if many of the connections are local, can a small provider truly benefit. For larger providers, the picture is different: they are positively affected by both factors, added connections and higher local share of connections.

Another interesting aspect of Figure 1 is the development of the penetration over time. The "take-off" of the better-performing groups only starts after about 30 rounds. This finding points to the self-reinforcing effect of word-of-mouth (Winch & Bianchi, 2006) that only exerts its influence once the external effects have reached a certain size.

The point of the simulation could be empirically validated by studying actual word-of-mouth and electronic word-of-mouth processes of small and larger service providers. All of their word-of-mouth communications should be gathered over a certain time period and then be compared in terms of penetration and the impact of the proximity of the electronic contacts. Alternatively, only gathering the electronic word-of-mouth could suffice to make the point of differences in penetration between small and larger providers, and the impact of distant electronic word-of-mouth recipients.

Recommendations for Small Service Providers

Small local service providers could take the following actions to benefit from increased electronic word-of-mouth communication:

1. *Foster word-of-mouth communications, especially those that are local and electronic:* Most local service providers treat word-of-mouth as something out of their influence that just "comes naturally". With the danger of losing penetration of word-of-mouth due to increased electronic communication, local service providers should make an effort to foster word-of-mouth, for example, by implementing a "Tell a friend" program. The more word-of-mouth communication there is (be it face-to-face or electronic), the more self-reinforcing it becomes. An important facet of such a program is stimulating local electronic word-of-mouth, that is encouraging local customers to talk to their *local online* connections about a provider, for example, by offering local prizes for every 100th post about the provider or service in a social network. Local electronic word-of-mouth will be of utmost importance to local service providers because it helps to reinforce the normal word-of-mouth and thus to maintain its penetration. It also reacts to the customers' need for online communication.

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

2. *Aggregate electronic word-of-mouth and channel it to its own servicing area:* This article shows that the penetration of word-of-mouth decreases when electronic word-of-mouth leaves the service provider's realm and cannot "find a way back" to the local context by itself. Still, there are ways for a provider to help channel this electronic word-of-mouth back into its local area. For example, the service provider could implement a mechanism for collecting electronic word-of-mouth communication about it services and then create links from these communications back to the offline world, for example by printing electronic posts on cards to hang up on the shop walls, and to its own web presence, for example by retweeting word-of-mouth messages posted on Twitter by the provider's customers.

3. *Find new ways to combine word-of-mouth and electronic word-of-mouth*: For the self-reinforcing effect of word-of-mouth to unfold, it is necessary for the communications to easily change channels, for example, to go from face-to-face to electronic and back. Finding technical ways to ensure a smooth and easy transition from one means of communication to another will promote the penetration of word-of-mouth. This need for an easy transition not only holds true for the rather coarse distinction between word-of-mouth and electronic word-of-mouth, but also for transitions between subcategories such as email, tweets, Facebook likes, feedback on websites, received oral feedback, and so on.

4. *Extend reach by cooperating with competitors:* Reach is key for a local service provider, as shown in this study. One innovative way to fight off decreased penetration of word-of-mouth would be to cooperate with other local service providers in order to increase reach. These other providers should at best be providers in the same line of business, but in another geographical area. Reach could increase fundamentally if some providers from different areas marketed their services together online. Electronic word-of-mouth for such an alliance could hardly leave the combined realm, so the penetration of word-of-mouth would stay high. Furthermore, resource pooling could help advance the above-mentioned innovations.

Conclusion

This article shows that small local service providers may suffer from the increased digitization of communication. Relative to large service providers, the important marketing tool of word-of-mouth might leave small service providers worse off in terms of penetration. The agent-based simulation used in this study shows that this gap grows wider as the number of electronic connections increases. Electronic connections often link people who are distant, that is, who do not live within the realm of a small service provider. Word-of-mouth distributed to those people could be less helpful to a small and locally restricted service provider, because the recipients living outside of his realm cannot purchase the service and will probably not spread the word about it.

The simulation also shows that this challenge may be largely overcome if the online connections are as local as possible, meaning that local service providers can benefit from increased levels of electronic word-of-mouth if those electronic communications are targeted at people living nearby. If this is the case, the difference in the penetration of word-of-mouth for small and larger providers is expected to be smaller.

However, there are several limitations pertaining to the analysis. First, the goal of this study was to investigate the role of physical proximity in influencing the effects of electronic word-of-mouth for small local service providers. Thus, physical proximity lies at the core of the analysis and other factors that might impact the effects of electronic word-of-mouth, such as the strength of ties between connections, are ignored. The effects of tie strength have been debated in the literature: although strong ties are more influential than weak ties in the awareness phase of a purchase (De Bruyn & Lilien, 2008), weak ties have been shown to be more influential than strong ties once the size of a person's network decreases or when there are many contacts with weak ties (Goldenberg et al., 2001). Depending on the proximity of strong and weak ties, the impact of tie strength might influence the effects of physical proximity. An examination of this factor (and others) could be an interesting extension to the research discussed here. Second, a more fine-grained simulation could include more aspects of the word-of-mouth process (e.g., the valence of the word-of-mouth) or further detail out the behaviour of the agents. Third, the predictive power of the simulation could be increased with real-world data instead of basing the simulation on parameters drawn from the literature.

Despite these limitations, the study suggests that small service providers can improve the penetration of their word-of-mouth to benefit from electronic communication. Such innovative solutions could aim at supporting

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

local electronic connections to invoke local electronic word-of-mouth, but need not be confined to this approach. Four recommendations for small service providers were offered here: i) fostering word-of-mouth and electronic word-of-mouth; aggregating and channeling electronic word-of-mouth into the provider's own servicing realm; searching for new ways of combining face-to-face word-of-mouth and electronic word-of-mouth; and extending the reach of small service providers, for example, through alliances with providers from different areas but from the same line of business.

About the Author

Nora Schütze is a PhD student at Cottbus University of Technology, Germany. Her current research focuses on e-commerce and the network formation phase of small service providers. In addition to her research, she works as a management consultant to help clients change mindsets and behaviours. She has also studied sociology and political science at the University of Mannheim, Germany.

References

Agrawal, A., Kapur, D., & McHale, J. 2008. How Do Spatial and Social Proximity Influence Knowledge Flows? Evidence from Patent Data. *Journal of Urban Economics,* 64(2): 258–269. http://dx.doi.org/10.1016/j.jue.2008.01.003

Arndt, J. 1967. Role of Product-Related Conversations in the Diffusion of a New Product. *Journal of Marketing Research,* 4(3): 291–295. http://dx.doi.org/10.2307/3149462

Bampo, M., Ewing, M. T., Mather, D. R., Stewart, D., & Wallace, M. 2008. The Effects of the Social Structure of Digital Networks on Viral Marketing Performance. *Information Systems Research*, 19(3): 273–290. http://dx.doi.org/10.1287/isre.1070.0152

Bell, D. R. & Song, S. 2007. Neighborhood Effects and Trial on the Internet: Evidence from Online Grocery Retailing. *Quantitative Marketing and Economics,* 5(4): 361–400. http://dx.doi.org/10.1007/s11129-007-9025-5

Bronnenberg, B. J. & Mela, C. F. 2004. Market Roll-Out and Retailer Adoption for New Brands. *Marketing Science,* 23(4): 500–518. http://dx.doi.org/10.1287/mksc.1040.0072

Carl, W. J. 2006. What's All The Buzz about? Everyday Communication and the Relational Basis of Word-of-Mouth and Buzz Marketing Practices. *Management Communication Quarterly,* 19(4): 601–634. http://dx.doi.org/10.1177/0893318905284763

Choi, J., Hui, S. K., & Bell, D. R. 2010. Spatiotemporal Analysis of Imitation Behavior Across New Buyers at an Online Grocery Retailer. *Journal of Marketing Research,* 47(1): 75–89. http://dx.doi.org/10.1509/jmkr.47.1.75

De Bruyn, A. & Lilien, G. L. 2008. A Multi-Stage Model of Word-of-Mouth Influence through Viral Marketing. *International Journal of Research in Marketing,* 25(3): 151–163. http://dx.doi.org/10.1016/j.ijresmar.2008.03.004

Deffuant, G., Huet, S., & Amblard, F. 2005. An Individual-Based Model of Innovation Diffusion Mixing Social Value and Individual Benefit. *American Journal of Sociology,* 110(4): 1041–1069. http://dx.doi.org/10.1086/430220

Delre, S. A., Jager, W., Bijmolt, T. H. A., & Janssen, M. A. 2007. Targeting and Timing Promotional Activities: An Agent-Based Model for the Takeoff of New Products. *Journal of Business Research,* 60(8): 826–835. http://dx.doi.org/10.1016/j.jbusres.2007.02.002

Delre, S. A., Jager, W., & Janssen, M. A. 2007. Diffusion dynamics in small-world networks with heterogeneous consumers. *Computational and Mathematical Organization Theory,* 13(2): 185–202. http://dx.doi.org/10.1007/s10588-006-9007-2

Dennis, A. R., Fuller, R. M., & Valacich, J. S. 2008. Media, Tasks, and Communication Processes: A Theory of Media Synchronicity. MIS Quarterly, 32(3): 575–600.

Dorogovtsev, S. N. & Mendes, J. F. F. 2003. *Evolution of Networks: From Biological Nets to the Internet and WWW*. Oxford: Oxford University Press.

East, R., Hammond, K., Lomax, W., & Robinson, H. 2005. What is the Effect of a Recommendation? *The Marketing Review,* 5(2): 145–157. http://dx.doi.org/10.1362/1469347054426186

Garber, T., Goldenberg, J., Libai, B., & Muller, E. 2004. From Density to Destiny: Using Spatial Dimension of Sales Data for Early Prediction of New Product Success. *Marketing Science,* 23(3): 419–428. http://dx.doi.org/10.1287/mksc.1040.0051

Godes, D., Mayzlin, D., Chen, Y., Das, S., Dellarocas, C., Pfeiffer, B., et al. 2005. The Firm's Management of Social Interactions. *Marketing Letters*, 16(3-4): 415–428. http://dx.doi.org/10.1007/s11002-005-5902-4

Goldenberg, J., Libai, B., & Muller, E. 2001. Talk of the Network: A Complex Systems Look at the Underlying Process of Word-of-Mouth. *Marketing Letters*, 12(3): 211–223. http://dx.doi.org/10.1023/A:1011122126881

Goldenberg, J., Libai, B., & Muller, E. 2010. The Chilling Effects of Network Externalities. *International Journal of Research in Marketing,* 27(1): 4–15. http://dx.doi.org/10.1016/j.ijresmar.2009.06.006

Granovetter, M. 1978. Threshold Models of Collective Behavior. *American Journal of Sociology*, 83(6): 1420–1443. http://www.jstor.org/stable/2778111

Granovetter, M. & Soong, R. 1986. Threshold models of interpersonal effects in consumer demand. *Journal of Economic Behavior & Organization,* 7(1): 83–99. http://dx.doi.org/10.1016/0167-2681(86)90023-5

Electronic Word-of-Mouth Communication for Local Service Providers

Nora Schütze

Keller, E. & Berry, J. 2006. Word-of-mouth: The real action is offline. The Keller Fay Group. April 1, 2014: http://www.kellerfay.com/word-of-mouth-the-real-action-is-offline/

Keller, E. & Fay, B. 2012. *The Face-to-Face Book: Why Real Relationships Rule in a Digital Marketplace* (First Edition edition.). New York: Free Press.

Lagrosen, S. 2005. Effects of the Internet on the Marketing Communication of Service Companies. *Journal of Services Marketing,* 19(2): 63–69. http://dx.doi.org/10.1108/08876040510591376

Libai, B., Bolton, R., Bügel, M. S., Ruyter, K. de, Götz, O., Risselada, H., et al. 2010. Customer-to-Customer Interactions: Broadening the Scope of Word of Mouth Research. *Journal of Service Research,* 13(3): 267–282. http://dx.doi.org/10.1177/1094670510375600

Libai, B., Muller, E., & Peres, R. 2009. The Diffusion of Services. *Journal of Marketing Research,* 46(2): 163–175. http://dx.doi.org/10.1509/jmkr.46.2.163

Lovelock, C. H. & Wirtz, J. 2010. *Services Marketing* (7th edition.). Boston: Prentice Hall.

Murray, K. B. 1991. A Test of Services Marketing Theory: Consumer Information Acquisition Activities. *Journal of Marketing,* 55(1): 10. http://dx.doi.org/10.2307/1252200

Smith, E. R. & Conrey, F. R. 2007. Agent-Based Modeling: A New Approach for Theory Building in Social Psychology. *Personality and Social Psychology Review,* 11(1): 87–104. http://dx.doi.org/10.1177/1088868306294789

Stonedahl, F. & Wilensky, U. 2008. NetLogo Virus on a Network model. Center for Connected Learning and Computer-Based Modeling, Northwestern University, Evanston, IL. http://ccl.northwestern.edu/netlogo/models/VirusonaNetwork

Subramaniam, C., Shaw, M. J., & Gardner, D. M. 2000. Product Marketing and Channel Management in Electronic Commerce. *Information Systems Frontiers,* 1(4): 363–378. http://dx.doi.org/10.1023/A:1010061924822

Trusov, M., Bucklin, R. E., & Pauwels, K. H. 2008. Effects of Word-of-Mouth Versus Traditional Marketing: Findings from an Internet Social Networking Site. Robert H. Smith School Research Paper No. RHS 06-06: 49. http://papers.ssrn.com/abstract=1129351

Van den Bulte, C. & Wuyts, S. 2007. *Social Networks and Marketing.* Cambridge, MA: Marketing Science Institute.

Watts, D. J. & Strogatz, S. H. 1998. Collective Dynamics of "Small-World" Networks. *Nature,* 393(6684): 440–442. http://dx.doi.org/10.1038/30918

Wellman, B. 1996. Are Personal Communities Local? A Dumptarian Reconsideration. *Social Networks,* 18(4): 347–354. http://dx.doi.org/10.1016/0378-8733(95)00282-0

Wilensky, U. 1999. NetLogo. Center for Connected Learning and Computer-Based Modeling, Northwestern University, Evanston, IL. http://ccl.northwestern.edu/netlogo/

Winch, G. W. & Bianchi, C. 2006. Drivers and Dynamic Processes for SMEs Going Global. *Journal of Small Business and Enterprise Development,* 13(1): 73–88. http://dx.doi.org/10.1108/14626000610645324

Wuyts, S. & van den Bulte, C. 2007. *Social Networks and Marketing.* Cambridge, MA: Marketing Science Institute.

Zeithaml, V. A. 1981. How Consumer Evaluate Processes Differ between Goods and Services. *Marketing of Services*: 1. Chicago: American Marketing Association.

Zeithaml, V., Bitner, M. J., & Gremler, D. 2012. *Services Marketing:* Sixth Edition. McGraw-Hill Higher Education.

Citation: Schütze, N. 2014. Electronic Word-of-Mouth Communication for Local Service Providers. *Technology Innovation Management Review,* 4(4): 35–42. http://timreview.ca/article/783

Keywords: electronic word-of-mouth, agent-based simulation, local service provider, threshold model

Finnish Knowledge-Intensive Business Services in China: Market Entry and Position in the Value Chain

Sen Bao and Marja Toivonen

> *"Man is born free and everywhere he is in chains."*
>
> Jean-Jacques Rousseau (1712–1778)
> Philosopher, writer, and composer

The internationalization of companies offering knowledge-intensive business services (KIBS) plays an important role in the general process of globalization. As the largest emerging market, China is attractive for Western KIBS. This article presents a case study on Finnish KIBS in China. Three companies in "clean tech" engineering, eco-cities design, and 3D media solutions describe the challenges and promoting factors in entering the Chinese markets. The study also examines the various ways of positioning the firm in the value chain through the roles of an integrator, a concept developer, and a multi-stage actor. Our findings illustrate the new business opportunities provided by China in advanced service sectors focusing on sustainability issues and creative content.

Introduction

Knowledge-intensive business services (KIBS) are expert companies that provide design and consultancy to other companies and organizations. They offer solutions to both technological (e.g., engineering and ICT) and managerial (e.g., legal, financial, and marketing) issues (Miles, 2005). KIBS have composed the most rapidly growing sector in Western countries for more than three decades, and their internationalization has been argued to be one of the most significant contributors to the general process of globalization (Miozzo & Miles, 2003). KIBS are particularly important actors in the globalized structures of innovation: internationally operating KIBS transfer knowledge between global, national, and regional levels (Howells & Roberts, 2000).

Recently, KIBS have also aroused attention in emerging markets, particularly in China (Wei & Wang, 2005). Studies indicate that KIBS play a crucial role in knowledge flows within regional industrial clusters in China (Shyu et al, 2007). The country-wide development of KIBS is still at an early stage, with a limited scale and expansion ability. However, some geographical regions, particularly the Yangtze River Delta and Pearl River Delta areas, show rapid growth of this sector (Qi & Guan, 2009).

As a huge market, China is also interesting as a target country for internationalizing Western KIBS. Our study focuses on this topic: we have carried out case research among Finnish small and medium-sized enterprises that offer knowledge-intensive business services in China. We focus on two research questions:

1. What kind of a process characterizes the internationalization of Western KIBS when they enter the Chinese markets?

2. How do KIBS position themselves in the respective value chain when they establish their activities in China?

Based on these questions, we map the challenges and promoting factors in the internationalization of Western KIBS in China.

Internationalization of Services

The three basic ways to operate on the international markets are: *foreign direct investments*, *exports*, and *presence through third parties*. Foreign direct investments have been considered dominant in services due to the need for close contact between the providers and

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

clients. The presence through third parties also has its benefits: it provides control over the service delivery and quality, and it requires fewer resources than foreign direct investments (Roberts, 1998).

In exports, sending experts to work in another country has been the predominant model but is increasingly replaced today by online activities – in training and consultancy for instance (Javalgi et al., 2004). However, *export projects* as a specific form of travelling-based internationalization have "survived" the change. They are particularly common in engineering consultancy, in which the same expertise is used in different countries instead of expansion in one country (Léo & Philippe, 2001).

In the international operations through third parties, collaboration may concern a common brand, common acquisition of clients and contacts, common subcontracting, common R&D and training, and even partially common ways of working. Also, deeper forms of cooperation, such as strategic alliances, are possible (Tapscott et al., 2000).

The model that is purposeful for an individual firm depends both on the resources and skills of the firm and on the nature of the service. All models require contacts and material resources as well as know-how in international business. Trusted partners are critical in operations through third parties, whereas material resources are emphasized in foreign direct investment. As regards the nature of the service, the most important question is the extent to which the service is commodifiable and the extent to which the knowledge included is codifiable. If the elicitation and interpretation of tacit knowledge plays a central role, the provider should be present in the delivery (Majkgård & Sharma, 1998).

In the process of internationalization, a long-lasting view was that service firms either *follow their clients to foreign markets*, or in the case of independent internationalization, *apply a cautious, gradual approach*. Later studies have shown that service firms may also *internationalize rapidly*, following the way that high-tech firms adopted in the mid-1990s (Chetty & Campbell-Hunt, 2004).

The benefit of following the clients is the reduction of risk: there are contacts in the target country and information about the markets is available right from the start. However, new contacts with local actors may develop too slowly, which causes difficulties if the business of the original client diminishes (O'Farrell et al., 1998). In an independent internationalization, the building of credibility speaks for a gradual approach (Contractor et al., 2003). Companies following this path often initiate their international activities at a small scale in those countries that resemble their domestic market.

KIBS compose a service sector that has shown alternative approaches for decades. For instance, European engineering offices have carried out projects in developing countries since the 1960s (Sharma & Johanson, 1987). It is not rare either that KIBS "skip" some stages in internationalization or take the steps in a different order in different cases (O'Farrell et al., 1998). The advancement of information and communications technology, which has fostered the development of KIBS in general, is also influential here. Versatile internationalization was first found in software KIBS, and nowadays, it is becoming common in all kinds of KIBS that utilize on-line distribution of services (i.e., for recruitment, training etc.).

An interesting alternative is "born globals" – companies that include international operations in the original business plan and internationalize immediately after their establishment. Internationalization may occur simultaneously in many different forms, such as wired exports, subsidiaries, strategic alliances, non-equity networks, and so on. (Toivonen, 2002). Most "born globals" are small companies whose focus is on some niche area where they attract pioneers throughout the world as their clients.

The different internationalization paths may also be mixed. "Born globals" may take their first international steps in countries with a short "psychic distance" (wikipedia.org/wiki/Psychic_distance), and only after that penetrate rapidly to global markets (Chetty & Campbell-Hunt, 2004). Correspondingly, cautious companies often speed up their internationalization when their experience accumulates. In addition, a service company may follow a client to a target market, but develop its own internationalization strategy simultaneously (O'Farrell et al., 1998). It is also important to point out that a strategic stance is needed irrespective of the specific model and path selected. Within strategic considerations, the positioning the firm in the respective value chain is a key issue.

Value Chains and Value-Offering Points

Value chains cover the full range of activities from a product or service concept through production and delivery to final consumers and to final disposal after the use (Kaplinsky, 2004). A value chain is usually divided

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

into primary and support activities. Primary activities consist of inbound logistics, operations, outbound logistics, marketing and sales, and services; support activities include the firm's infrastructure, human resource management, technology development, and procurement (Porter, 1985).

The perspective of value chain has been widely used since the 1990s, often hand in hand with the business model approach (Morris et al., 2005). A value chain is considered a tool to disaggregate a business into strategically relevant activities (Brown, 1997). The *value logic* has been highlighted in this context. A business model is seen to represent the economic logic in delivering the value to customers at a certain cost (Magretta, 2002). It is a representation of a firm's underlying core logic and strategic choices for creating and capturing value (Shafer et al., 2005). Value for customers has been increasingly emphasized as a prerequisite for provider value (Lusch et al., 2010). Correspondingly, challenging the value chain members to improve the value proposition to end customers has gained ground in value chain management.

According to Rappa (2001), a company generates profit by specifying its *position in the value chain*. Chesbrough and Rosenbloom (2002) point out that the business model defines the value chain structure of the firm: it determines the offerings and complementary assets needed to support the firms' position in the value chain. A more detailed analysis of this position helps to purposefully manage both the demand and the supply chains. Upstream participants constitute an individual firm's supply chain and downstream participants constitute its demand chain (Horvath, 2001). The *value-offering point* is the place where the demand and supply chains meet, in other words, where the supplier fulfils demand in the customers' demand chain – here, the customer may be either an intermediary or end user (Holmström et al., 2001).

Research into value chain management and value-offering points has been carried out mainly in the context of manufacturing or service sectors near to it (e.g., retailing). However, the approach also applies to KIBS. In the conventional, arm's-length buyer-seller relationship the value-offering point is based on fulfilling orders. An alternative is the situation in which companies are increasingly interested is "offer to planning", which moves the value-offering point to analyzing the demand categories that can be fulfilled with more knowledge-intensive and also more profitable services. (Holmström et al., 2001)

Today, some authors prefer the term "value network" instead of a value chain (e.g. Allee, 2003). Be it a chain or a network, there is consensus about the importance of integrating the various activities included. The role of *KIBS as integrators* has aroused much interest because these companies possess the necessary knowledge for understanding and coordinating the multi-tiered and distributed "value segments" (Windrum, 2002; Zhou et al., 2005). The ability of KIBS to take this role, despite their often small size, is based on the combination of generic knowledge with practical applications in their clients' specific operational environments. In addition to functioning as integrators of value offerings, KIBS have been suggested to form key nodes and hubs that synchronize several complex resource domains involving highly embedded tacit knowledge (Miles, 2005). An example is provided by KIBS that facilitate the elaboration of open public data into various services. In the areas of transportation and city planning, for instance, this elaboration requires the bridging of many different stakeholder groups.

Context and Methodology

Three Finnish KIBS form the basis of our study. Each of the companies is technologically oriented, and they offer "clean tech" engineering (Case A), architectural design (Case B), and 3D solutions in digital media (Case C).

Case A was founded in 2001. It is a leading Nordic company providing carbon asset management and other services in the renewable energy markets. It has carried out more than 100 projects linked to a clean development mechanism between Europe and China. Its business in China is currently focused on an energy management contract (EMC) – an area supported by the local government.

Case B was established in 1979. It has performed hundreds of successful projects in urban, landscape, and building design throughout Finland. Sustainability is emphasized in its design projects. In recent years, Case B has seized a new opportunity that has emerged in China: the local government has increasingly favoured sustainable design solutions and has applied the eco-city concept, among others. Since 2008, Case B has exported several sustainability projects to China, including infrastructure planning, energy and traffic, and carbon control.

Case C is a stereoscopic 3D company founded in 2007. It offers native 3D production, 2D-to-3D conversion, and 3D display solutions, including 3D holographic pro-

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

jection and glass-free 3D. Case C has not yet established business in China, but it has sent experts there to seek local partners and to find out the demand for its offerings.

In order to obtain in-depth knowledge in quite a new topic, we have applied a qualitative research approach. A multiple-case study was conducted to improve the transferability of results. The data were mainly collected through 12 face-to-face interviews with representatives of the top management teams of each case company. Each interview lasted about one and half hours. The interviews were semi-structured based on the research questions and the literature review. Interviewees were given a great deal of freedom to respond the open-ended questions (Bryman & Bell, 2011).

Besides the interviews, we participated in three seminars, which were organized in China by the experts in the fields of our case companies. In these seminars, we had an opportunity to discuss the topic with important stakeholders, including (potential) customers, competitors, partners, and industry experts.

During the data analysis and interpretation, we aimed to form a deep understanding of each case. The interview transcripts were categorized into specific themes that were originally guided by the research questions and interview topics, but were modified on the basis of the emerging issues that came out in the interviews and seminar discussions.

Case Results

Our results show that *local partners* play a critical role in China, both in market entry and in further development. However, the detailed methods of organizing partner collaboration and gaining benefits from such collaborations varies in our case companies:

- Case A owns a subsidiary in China through a joint venture with a local partner. In addition to close customer contacts, the influential network provided by the partner has motivated Case A to select this deepest form of local presence. The joint venture and the existing network have diminished the risk linked to investments.

- Case B carries out export projects by sending travelling experts to China. It also has a representative office in its local partner's incubation centre. The partner's resources complement Case B's own resources in that office: they can be used for free, but there is a profit-sharing agreement for the future projects.

- Case C is preparing to enter the Chinese market. It has relocated an expert to work with a potential partner and to present itself in China. This expert works partially for Case C and partially for the partner, but a common aim is to cooperatively secure and manage projects.

The case companies also show different paths of entry into Chinese markets. However, all of them have *internationalized independently* – they have not followed their domestic clients. All of them also show *a combination of rapid and cautious steps*:

- Case A has perceived China as an important market since its founding: local interest in its expert areas – environmental protection and energy saving – is growing and is driven by government policy. However, the energy industry in China is very conservative, and therefore Case A entered this market only after a careful exploration of opportunities. Thereafter, it established its business in China quite rapidly. Experience about subsidiaries in Europe supported this initiative, and a crucial step was finding an appropriate venture partner.

- For Case B, China is the only foreign market. Thus, this company exemplifies the approach of starting international activities from a remote area. Case B focuses on the Chinese eco-cities development that is driven by the government's sustainability policy, and its first project was based on success in an eco-city design competition. An interesting point is the interaction between foreign and domestic markets: not all eco-city projects have generated profit, but the brand effect has helped the company to win projects in the domestic markets.

- Case C is a genuine born-global company operating in a niche area. It is compelled to extend its business beyond the home country due to the very small 3D market in Finland. It is present in several foreign countries (e.g., Sweden, Russia, and the United Kingdom). Recently, it has made a preliminary analysis concerning the Chinese 3D market. In order to reduce the risk in the early stage, its preferred form of activities in China is exports via the Internet (e.g., 2D to 3D conversion).

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

To summarize the factors that seem to promote the success of Western KIBS in China, we highlight the importance of *local references*. Our cases show that a joint venture subsidiary enables the rapid accumulation of business cases. However, if this option is not available, even a looser network or an individual "spokesperson" may crucially help during a company's first steps in China. A combination of Western and Chinese representatives seems to be the best way to compile human resources. On one hand, Chinese customers often want to see foreigners in the projects when discussing large lines of business. On the other hand, they prefer negotiating with locals for practical issues.

In addition to the challenge of securing a foothold in China, *a reasonable pricing strategy* turned out to be a challenge to Western KIBS. Finding a price level that is acceptable to local clients and that provides competitive advantage to the KIBS themselves is not easy. A solution that is typical of our case companies was the combination of Western and Chinese workforces. For instance, company B carries out the design of the core concept in the West with Western resources and prices, whereas the preliminary and follow-up work is implemented in China with local resources and local prices. However, this "traditional" solution based on work allocation was not the only option. Case A applied very modern *value-based pricing* by sharing the profit with clients.

Customer segmentation is essential in China and one central categorization in this regard is based on the ownership of companies. State-owned, privately owned, and foreign companies show different business behaviours, for instance, in customer-relationship management and decision-making practices. There are also differences in the payment risk. Our case companies reported that state-owned enterprises are quite reliable although the payment may be delayed, but privately-owned enterprises may be risky. One solution (applied by Case C) is to restrict the after-delivery invoicing to premium customers and invoice the other customers beforehand. This practice also relieves the problem that clients do not always complete the payment: the first invoices that cover the costs are usually reimbursed, but the final part that includes the profit is not always accomplished.

Alternative positioning in the value chain

All case companies have aimed to find *an influential position* in their respective value chains in China. They illustrate three different ways to achieve this goal through the roles of an integrator, a concept designer, or a multi-stage actor. An integrator coordinates the business of other stakeholders in the value chain. A concept designer, located upstream in the chain, has the capability of offering profitable services by a holistic analysis of the potential demand. A multi-stage actor may have a more or less influential role depending on which parts of the value chain are combined and how.

Case A represents *a value chain integrator* (Figure 1). Achieving this role is based on the company's profound knowledge about the energy industry and on its long experience in China. Case A combines the technology, material, components, and equipment of the other providers. More specifically, it offers full services to its clients in energy management contract (EMC) projects, which include energy efficiency audits; energy conservation project design, construction, and equipment installation; and energy conservation monitoring.

There are several factors that support the success of Case A in the role it has selected. The first factor is the profit model. The project funding is based on the EMC concept and consists of Case A's own capital and commercial or special purpose loans. Clients pay the costs back during the contract period (e.g., five years) on the basis of the achieved energy savings. This payment also includes profit for Case A. Second, Case A receives subsidies from the Chinese government based on the investment and energy saving results. Third, the supply chain partners whose operations Case A integrates deliver their products (within the EMC) to the clients via Case A. All parties involved in the EMC business benefit from the arrangement.

Case B has positioned itself *upstream in the value chain as a concept designer* (Figure 2). Its main activity is in the early design of the eco-city projects. A concept designer has the opportunity to heavily influence the project owner's decisions in the early stages of a project. Thus, Case B's activities are an example of "offer to planning" and of the respective value-offering point (Holmström et al., 2001). By carefully analyzing the project owner's needs and desires, Case B can create a concept that includes both sustainable elements and profitable services.

However, in order to follow the Chinese license regulations in the construction projects, Case B needs to work closely with the local design institute. The company's share of design work compared with the local design institute decreases dramatically when the project proceeds from the schematic design to the preliminary design and further to the construction design. However,

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

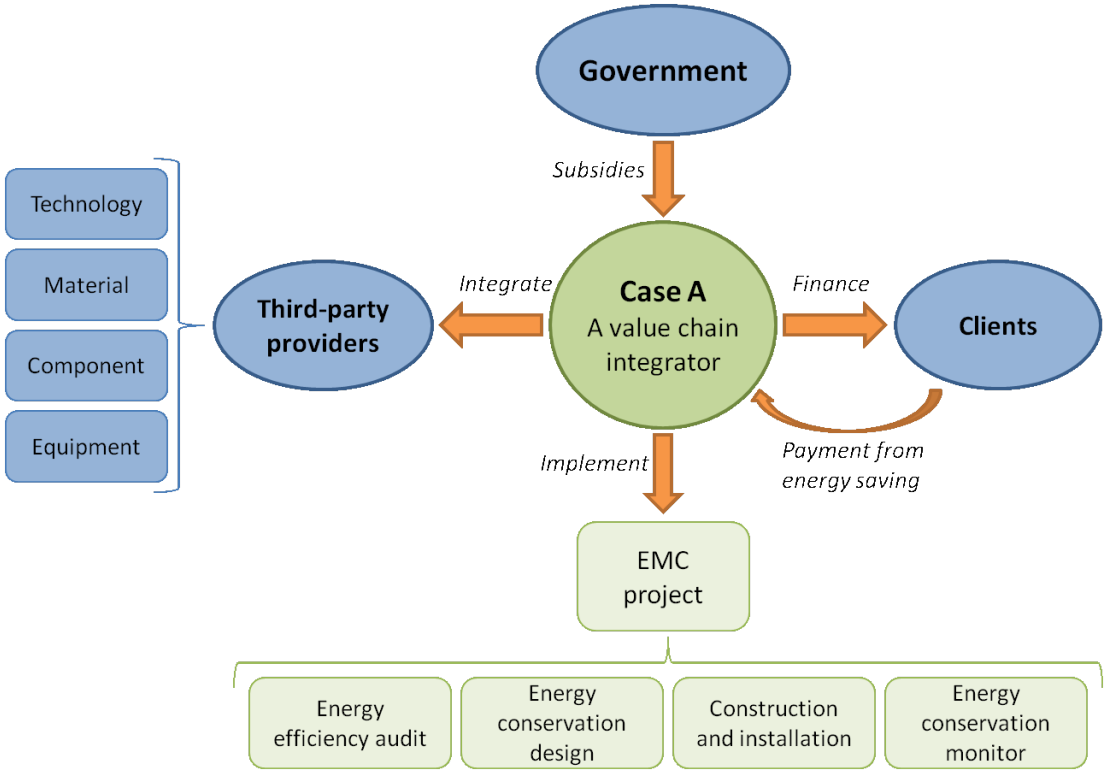

Figure 1. Case A as an integrator in its respective value chain

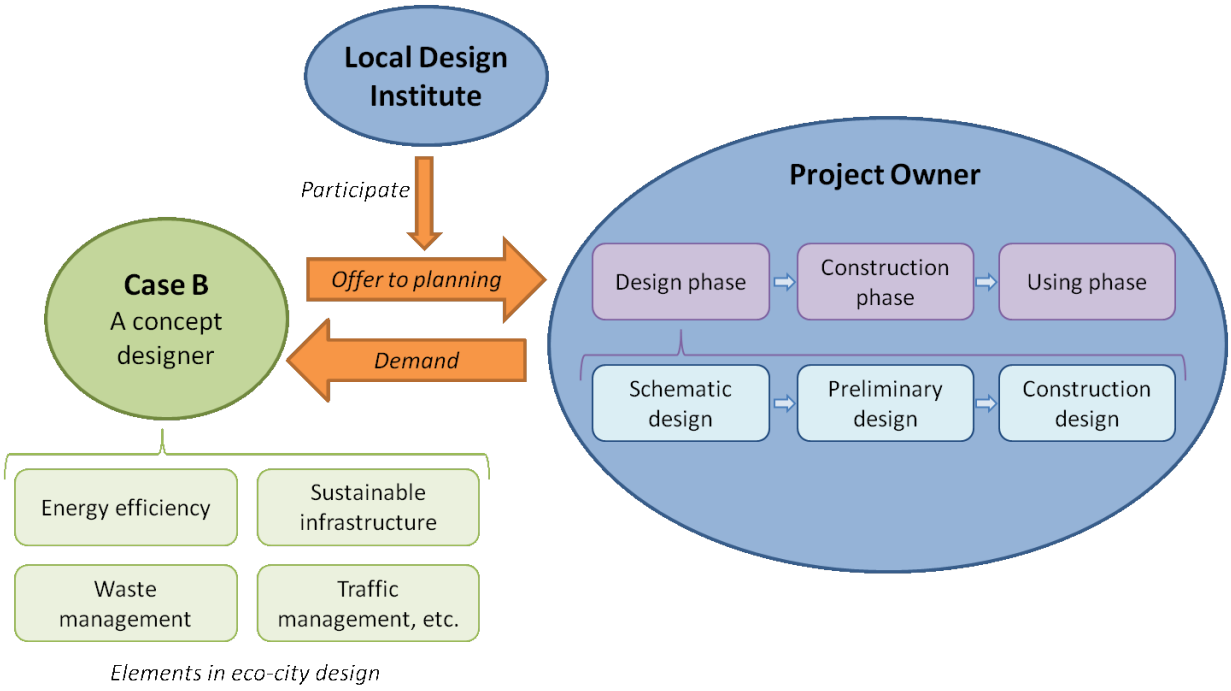

Figure 2. Case B as a concept designer in its respective value chain

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

its role in consultancy becomes more important and drives the project owner to follow the original concept.

Case C is *a multi-stage actor* (Figure 3). Its activities focus on two points in the value chain: development and marketing. The company creates 3D content as a producer, and it resells the content and the related 3D equipment as an agency. In the early stages, just after its founding, the company focused on the former role. The latter role became important in the business practice due to the immaturity of the 3D market: many clients do not have suitable hardware to support the 3D content.

As a newcomer, Case C's activity in China relies on the partners' network. Currently, the company is seeking niche markets to provide 3D solutions with a premium price. It is also trying to acquire price-sensitive clients and, for that purpose, it aims to reduce costs by using its own technology and its partners' labour resources.

Based on our case observations, we suggest that a KIBS can acquire an influential position in its value chain in many ways. However, there are factors that restrict the possibilities: the length of experience in the domain and in the specific market, the nature of service, among others. Thus, not all alternatives are open to all companies. Analyzing the position in the value chain is, however, always possible and enables the search for an alternative that is influential and achievable.

Conclusion

This article has examined the ways in which Western KIBS enter Chinese markets and position their business in their respective value chains. Our empirical data consist of a case study including three Finnish KIBS in the areas of clean tech engineering, eco-cities design, and 3D solutions in digital media. Thus, we have focused on novel issues, not only regarding China as a target country, but also regarding the nature of the expertise offered by the KIBS in relation to sustainability issues and the creative sector.

Our results confirm many earlier findings on the internationalization of services. All basic forms of international operations came out in our study: a subsidiary, export projects, and collaboration with a third party. The form of local presence was linked to the degree of establishment: the company having the longest experience in China had a subsidiary. The company having some experience carried out export projects, and the company taking its first steps operated through a third party. This result confirms the view that companies select more risky forms of foreign operations when their experience grows.

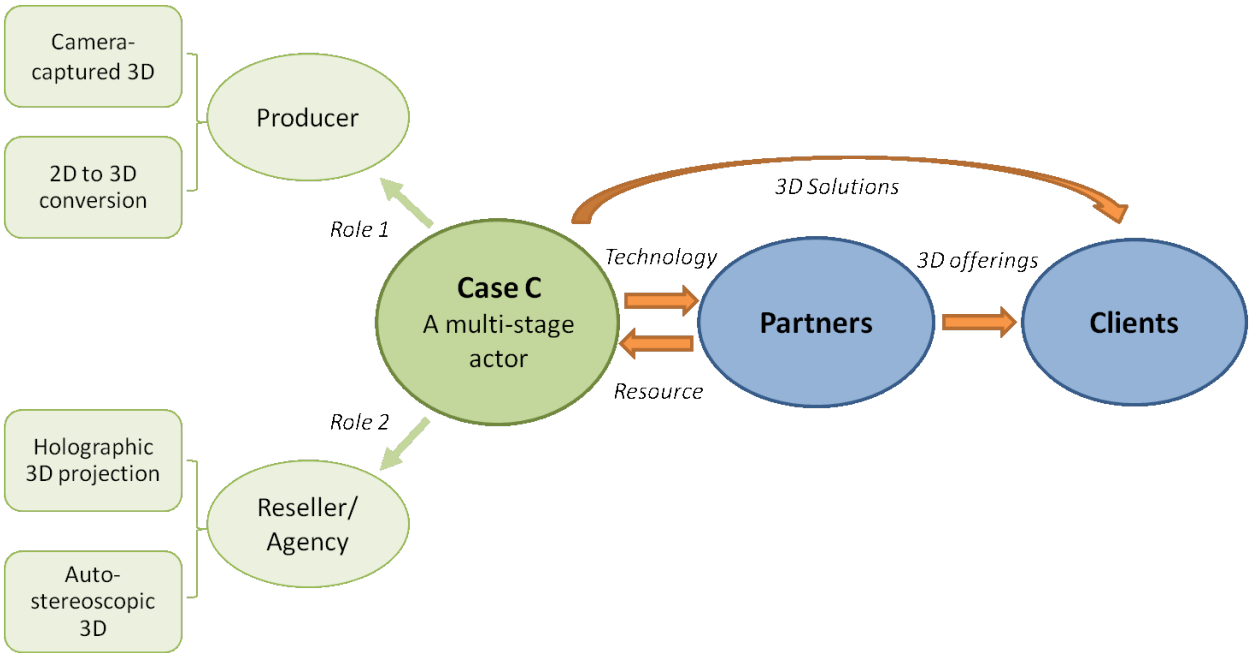

Figure 3. Case C as a multi-stage actor in its respective value chain

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

On the other hand, there were several indications of courage in entering Chinese markets. One case company is a born global and, for another, the Chinese market is their first foreign market. Deviating from earlier studies, not one of our companies had followed a domestic or other Western client to these markets. Here, the novelty of the expert areas may be one reason. Due to the small size of domestic markets, there is no one or very few clients with whom to internationalize. China is also a pioneering country in some areas – thus, the most dynamic demand can be found there. The eco-city case is an example of this phenomenon. In this case, the activities in China also promoted the company to win projects in the domestic markets.

Our study also highlights some specific issues that are important to take into account when entering Chinese markets. Irrespective of the form of international activities and the path followed, the role of local partners turned out to be central. The partners not only function as business references, but they may also provide additional resources and open doors to broader networks. A skilful combination of Western and Chinese resources is a success factor. The "foreign face" increases the credibility of the project, but local representatives are needed to secure smooth solutions in business practice. The price issue favours carrying out the most demanding expert tasks with a Western workforce and others with local resources.

As regards the value chains, we found that all companies in our study had established a role that reflects a desire to move away from a narrow position. One company is a service integrator, meaning that it coordinates the activities of upstream suppliers to provide broad solutions to the downstream clients. Our study indicates that this role requires profound knowledge, rich local experience, and abundant resources, including a good financial situation. Thus, this position is maybe not as easily adopted as earlier KIBS studies have suggested. There are also reasonable alternatives for this most demanding role: the roles of a concept designer and a multi-stage actor. A concept designer has much influence at the beginning of a project when potential demand is mapped. A multi-stage actor has flexibility as strength: various types of services can be offered according to the demand and the capacity of the provider. This opportunity is particularly important in emerging industries, as illustrated by our 3D solutions case.

A more general managerial implication of our study is open-mindedness in learning the characteristics of the Chinese business culture. Both the exaggeration of differences between Western and Eastern cultures and an over-assimilation of them are identifiable in earlier studies. The latter problem is visible in the analyses that evaluate the development in China similar to the Western development, just a couple of decades later. A similar perspective has been applied, for instance, when interpreting the current development stage of services. It is true that a long tradition in China has preferred goods over services, but now the situation is changing and the change may take place very rapidly in some respects. Our study shows examples regarding both topics and practices. Knowledge-intensive services linked to sustainability issues are a very modern approach, which China is now adopting. Value-based pricing is a business practice that is gaining a foothold in Western companies, and our small sample revealed it as a realistic alternative in China as well.

Because our study was based on a few cases in one country, more extensive studies are needed to generalize the results. Both the entry of Western KIBS to China and their positioning in the value chains there deserve further attention. In addition, it would be interesting to deepen our understanding about the KIBS market in China, including its similarities and differences compared to Western countries. Finally, our cases exemplify different value dimensions in the Chinese context: i) customer value (i.e., the balance between benefits and sacrifices); ii) provider value (i.e., paybacks and brand value); and iii) relationship value (i.e., trust, commitment, and loyalty). The interrelationships of these dimensions are an important area for further research.

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

About the Authors

Sen Bao is PhD candidate in the School of Science at Aalto University in Helsinki, Finland, where he also holds a Master's degree in Service Management and Engineering. He also works as Research Scientist in Business Ecosystems Development at VTT Technical Research Centre of Finland. He has over 4 years' working experience in service industries, half of it in the ICT sector. Currently, his research interests focus on service business development and internationalization of services. He is carrying out a research project on the service activities of Finnish manufacturers and technological knowledge-intensive business services (KIBS) in China.

Marja Toivonen is Research Professor at VTT Technical Research Centre of Finland, her specialty being service innovation and service business models. She is also Adjunct Professor at Aalto University in Helsinki, Finland. Marja has written several articles on service-related topics and been an invited speaker in many international conferences focusing on these topics. She is a council member of the European Association for Research on Services (RESER), and she is a member of the European Union's 2013–2014 High-Level Expert Group on Business Services.

References

Allee, V. (Ed.). 2003. *The Future of Knowledge - Increasing Prosperity Through Value Networks.* Burlington, MA: Butterworth-Heinemann.

Brown, L. (Ed.). 1997. *Competitive Marketing Strategy.* Melbourne: Nelson.

Bryman, A. & Bell, E. (Eds.). 2011. *Business Research Methods.* New York, NY: Oxford University Press.

Chesbrough, H. & Rosenbloom, R. S. 2002. The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation's Technology Spin-off Companies. *Industrial and Corporate Change,* 11(3): 529-555. http://dx.doi.org/10.1093/icc/11.3.529

Chetty, S. & Campbell-Hunt, C. 2004. A Strategic Approach to Internationalization: A Traditional Versus a "Born-Global" Approach. *Journal of International Marketing,* 12(1): 57-81. http://dx.doi.org/10.1509/jimk.12.1.57.25651

Contractor, F. J., Kundu, S. K., & Hsu, C. 2003. A Three-Stage Theory of International Expansion: The Link between Multinationality and Performance. *Journal of International Business Studies*, 34(1): 5-18. http://dx.doi.org/10.1057/palgrave.jibs.8400003

Holmström, J., Louhiluoto, P., Vasara, A., & Hoover, W.E. 2001. The Other End of the Supply Chain. Supply Chain Forum – An International Journal, 2(1): 22-25.

Horvath, L. 2001. Insight from Industry Collaboration: The Key to Value Creation in Supply Chain Management. *Supply Chain Management – An International Journal,* 6(5): 205-207. http://dx.doi.org/10.1108/EUM0000000006039

Howells, J. and Roberts, J. 2000. Global Knowledge Systems in a Service Economy. In Andersen, B., Howells, J., Hull, B., Miles, I. and Roberts, J. (Eds.), *Knowledge and Innovation in the New Service Economy:* 248-266. Cheltenham and Northampton: Edward Elgar.

Javalgi, R. G., Martin, C. L., & Todd, P. R. 2004. The Export of E-Services in the Age of Technology Transformation: Challenges and Implications for International Service Providers. *Journal of Services Marketing,* 18(7): 560-573. http://dx.doi.org/10.1108/08876040410561884

Kaplinsky, R. 2004. Spreading the Gains from Globalization: What Can Be Learned from Value-Chain Analysis? *Problems of Economic Transition,* 47(2): 74-115.

Léo, P. & Philippe, J. 2001. Internationalisation of Service Activities in the Haute-Gronne. *The Service Industries Journal,* 21(1): 63-80. http://dx.doi.org/10.1080/714005004

Lusch, R., Vargo, S., & Tanniru, M. 2010. Service, Value Networks and Learning. *Journal of the Academy of Marketing Science,* 38: 19-31. http://dx.doi.org/10.1007/s11747-008-0131-z

Magretta, J. 2002. Why Business Models Matter. *Harvard Business Review,* 80(5): 86-92.

Majkgård, A. & Sharma, D. D. 1998. Client-Following and Market-Seeking Strategies in the Internationalization of Service Firms. *Journal of Business-to-Business Marketing,* 4(3): 1-41. http://dx.doi.org/10.1300/J033v04n03_01

Miles, I. 2005. Knowledge Intensive Business Services: Prospects and Policies. *Foresight,* 7(6): 39-63. http://dx.doi.org/10.1108/14636680510630939

Miozzo, M. & Miles, I. 2003. Introduction. In Miozzo, M. and Miles, I. (Eds.), *Internationalization, Technology and Services:* 1-11. Cheltenham and Northampton: Edward Elgar.

Morris, M., Schindehutte, M., & Allen, J. 2005. The Entrepreneur's Business Model: Toward a Unified Perspective. *Journal of Business Research,* 58(6): 726-735. http://dx.doi.org/10.1016/j.jbusres.2003.11.001

O'Farrell, P. N., Wood, P. A., & Zheng, J. 1998. Regional Influences on Foreign Market Development by Business Service Companies: Elements of a Strategic Context Explanation. *Regional Studies,* 32(1): 31-48. http://dx.doi.org/10.1080/00343409850123602

Porter, M. 1985. *Competitive Advantage.* New York, NY: Free Press.

Qi, Y.S. & Guan, P.L. 2009. Study on the Brain Drain Crisis Management Mechanism of Knowledge-intensive Business Services. *Service Systems and Service Management,* 8(10): 489-492. http://dx.doi.org/10.1109/ICSSSM.2009.5174933

Rappa, M. 2001. Managing the Digital Enterprise - Business Models on the Web. April 1, 2014: http://ecommerce.ncsu.edu/business_models.html

Finnish Knowledge-Intensive Business Services in China

Sen Bao and Marja Toivonen

Roberts, J. 1998. *Multinational Business Service Firms: The Development of Multinational Organisational Structures in the UK Business Services Sector*. Aldershot: Ashgate.

Shafer, S. M., Smith, H. J., & Linder, J. C. 2005. The Power of Business Models. *Business Horizons,* 48(3): 199-207. http://dx.doi.org/10.1016/j.bushor.2004.10.014

Sharma D.D. & Johanson J. 1987. Technical Consultancy in Internationalization. *International Marketing Review,* 4(4): 20-29. http://dx.doi.org/10.1108/eb008339

Shyu, J.Z., Chen, C.J., & Yang, C.H. 2007. A Business Model for Knowledge-Based Service Enterprises in China: The Case Study of Kunshan. *Proceedings of International Conference on Chinese Enterprises Research:* 265-282.

Tapscott, D., Ticoll, D., & Lowy, A. 2000. *Digital Capital: Harnessing the Power of Business Webs*. London: Nicholas Brealey Publishing.

Toivonen, M. 2002. Internationalization of Knowledge-Intensive Business Services in a Small European Country: Experiences from Finland. In Miozzo, M.; Miles, I. (Eds.), *Internationalization, Technology and Services:* 206-226. Cheltemham: Edward Elgar Publishing Ltd.

Wei, J. & Wang, T. 2005. Comparison of EU Knowledge-Intensive Business Services with China Ones. *Chinese Journal of Management,* 2(3): 312-316.

Windrum, P. 2002. The Role of Knowledge-Intensive Business Services (KIBS) in e-Commerce. In Pyka, A. and Kuppers, G. (Eds.), *Innovation Networks - Theory and Practice:* 108-133. Cheltenham and Northampton: Edward Elgar.

Zhou, J., Tang, C., & Xiong, W. 2005. Interactive Relationship between KIBS and Knowledge Environment. *International Journal of Technology Management*, 32(3/4): 288-301. http://dx.doi.org/10.1504/IJTM.2005.007335

Citation: Bao, S. & Toivonen, M. 2014. Finnish Knowledge-Intensive Business Services in China: Market Entry and Position in the Value Chain. *Technology Innovation Management Review,* 4(4): 43–52. http://timreview.ca/article/784

Keywords: knowledge-intensive business services, KIBS, internationalization of services, Western companies in China

TIM Lecture Series
The Business of Cybersecurity

David Grau and Charles Kennedy

> *"Fundamentally, the key problem in cybersecurity isn't the technology – it's a people problem."*
>
> David Grau
> Head of Threat Response, TD Bank Group

Overview

The TIM Lecture Series is hosted by the Technology Innovation Management program (carleton.ca/tim) at Carleton University in Ottawa, Canada. The lectures provide a forum to promote the transfer of knowledge between university research to technology company executives and entrepreneurs as well as research and development personnel. Readers are encouraged to share related insights or provide feedback on the presentation or the TIM Lecture Series, including recommendations of future speakers.

The third TIM lecture of 2014 was held at Carleton University on March 26th, and was presented by David Grau, Vice President and Head of Threat Response, Intelligence, and Defensive Technologies at TD Bank Group (td.com), and Charles Kennedy, VP Credit Card Technology. Kennedy and Grau discussed the state of the information security industry and current trends in threat management and focused their lecture on the banking industry and the TD Bank Group's experience with cybersecurity within it. However, many of the messages are applicable to broader and multidisciplinary domains.

Summary

The lecture began with an overview of the state of the industry, including types of common threats faced today, such as malware, physical attacks, social engineering, social media, misuse, errors, and environmental effects. Kennedy highlighted that hacking is a particular priority that disproportionately introduces risk to the bank and its customers. Hacking can take the form of system hacking (e.g., operating systems), infrastructure hacking (e.g., wireless, hardware, network devices), or application and data hacking (e.g., ports, code, users). Typically, events that occur as a result of these types of activities are not a case of one individual criminal targeting an individual user; more common and significant threats come from automated systems.

These threats are not perceived in the same way by all people or organizations. Kennedy explained that the degree and nature of concerns – or posture – in relation cybersecurity threats varies between citizens, governments, and infrastructure organizations:

1. **Citizens** are typically worried about identity protection and identity theft, social networks, convenience, privacy, confidentiality, and issues relating to mobile (e.g., payments, reservations, location, retail applications). In this group, the typical demographics point to high rates of use and adoption of the Internet and mobile technologies among young adults.

2. **Governments** are typically worried about data protection and theft, as well as the reliability of both the public and private sectors. The concerns of individual governments may be unique, and there is a wide range of postures around the globe. Initial steps are being taken to define the international rules of engagement for governments combating cyberterrorism and cyberwarfare. Examples include *The Talinn Manual on the International Law Applicable to Cyber Warfare* (NATO, 2013; ccdcoe.org/249.html)

3. **Banks and key infrastructure** are typically worried about maintaining financial services (e.g., payments and exchanges), utilities, and commercial activities. Innovation, research, and response all depend upon co-operation between industries and between gov-

The Business of Cybersecurity

David Grau and Charles Kennedy

ernment and industry. The increasing complexity of the threats necessitates increasing co-operation in the future.

Threat actors and motivations

Grau highlighted the natural tendency of information security staff – as technologists – to look at problems from a technology perspective. When evaluating a security threat or incident, this tendency leads to a focus on the tangibles – the what, the when, and the where – that can be analyzed and processed. Often, this analysis comes at the expense of considering the human element – the who and the why – and leads to the creation of tools that reinforce the technology bias, and leaves staff overwhelmed with a massive and increasing volume of unmanageable data. In response to the current state of affairs in information security, much greater attention must be paid to the factors that motivate actors. Unless efforts are focused on indentifying and understanding the who and the why, there is insufficient context to detect the important patterns in large volumes of event data and to make intelligent decisions based on that data.

Broadly speaking, the threats facing citizens, governments, and infrastructure organizations come from three types of actor:

1. **The Criminal:** motivated by profit; focused on fraud; the "top of the food chain"

2. **The Hactivist:** motivated by sociopolitical causes; focused on drawing attention through disruption and shaming; adopts tools and methods from criminal actors; examples: Anonymous, AntiSec.

3. **The Nation-State:** motivated by political or economic advantage; focused on espionage; late adopters that learn from criminal actors and hactivists

Of these three types of actors, criminal actors are the greatest concern in the banking industry, and so the greater part of the lecture focused on describing the threats posed by criminal actors and the bank's strategies to not only defend against them, but take proactive steps to reduce the risk they pose. The threat levels from the other two types of actor are increasing; however, criminal actors remain the greatest threat to the banking industry, in part because of their profit motive, but also because most of the innovation tends to come from this group – the hactivist and nation-state actors typically adopt the techniques and technologies that were first developed by the criminal actors.

Compared to just 15 years ago, the criminal landscape has changed considerably. Whereas criminal activity in cyberspace was typically initiated by "one-man shows", there are now complex criminal ecosystems that are both stratified and service oriented. For example, the tiers of actors in an ecosystem might include the following:

1. funders (e.g., organized crime)
2. malware writers
3. botnet operators
4. botnet users
5. money mules (i.e., those who transfer money out of the ecosystem)
6. mule herders (i.e., those who line up the connections to money mules)
7. state-funded "skunkworks"

In the past, security efforts might have targeted the individual who writes the malicious code, who likely also would have played all or most of the roles listed above. Now, the servitization of the criminal ecosystem means that actors wishing to commit fraud do not require advanced technical skills; the required tools and services are readily available and easy to use. However, once the fraud has been committed, it remains a challenge for the criminal actors to retrieve the money. As the people who take the money out of the ecosystem, the money mules are the weakest link in the chain – the most likely to be detected and the most likely starting point for further investigation of the ecosystem. To illustrate the sophistication and stratification of the criminal ecosystems, Grau provided examples of services offered within such networks, such as fraud aggregators, which are websites that collect and organize stolen data (e.g., credit card numbers), which can then be queried by criminal actors.

Current and emerging trends

Grau examined some of the current and emerging trends in techniques used by threat actors, including:

1. **Man-in-the-browser attacks:** a method of using malware to create a false, but truly convincing, browser experience to a victim and to harvest credentials and other valuable data in the background. This type of malware is fully automated, easy to use, and very powerful. Because it is so convincing – even the URLs in the browser address bar appear correct – this type of approach is much more effective than traditional phishing techniques. It is also very difficult to detect with anti-virus and anti-spyware applications, and so there is an urgent need for innovation in this area.

The Business of Cybersecurity

David Grau and Charles Kennedy

2. **Ransomware:** malware that installs itself on a computer and pretends to be anti-virus or other well-intentioned software. For example, it may present the user with a choice of whether or not to allow the software to "clean" the computer, but if the user declines, it either permanently damages the victim's hard drive or demands online ransom payments.

3. **Polymorphism:** malware that is customized to each user, meaning that each version of the malware is unique to that user even if it may be functionally identical to another version. This approach can overcome the types of general rules and definition databases that traditional anti-virus software depend upon.

4. **Packaged exploit kits:** malware frameworks that deliver tailored packages of malware components that correspond to a victim's particular vulnerabilities. If a user can be tricked into visiting a website where a packaged exploit kit is installed, the framework tests the victim's computer and then packages a set of exploits designed specifically to suit the victim's vulnerabilities. This customized approach also means that the criminal actors do not need to "show all of their cards" in terms of the full complement of exploits they have available. This approach can also take advantage of polymorphism to obfuscate the new, customized package.

5. **Distributed denial-of-service attacks (DDoS):** an approach that effectively creates a massive digital traffic jam in the target organization's infrastructure, usually by amplifying and redirecting traffic to the target's network. Although in the past, DDoS attacks were typically "nuisance" attacks, this approach is now often used as a diversionary tactic to facilitate fraud.

6. **New-generation botnets:** networks of computers under an outside actor's control for the purposes of sending spam or participating in DDoS attacks. In the past, botnets primarily recruited thousands of individual home computers; however, the scale of the botnet approach has grown massively not by increased recruitment of additional computers, but by focusing on servers, which provide much greater power per infection, resulting in smaller but more powerful botnets that can have enormous disruptive potential.

In describing current and emerging threats, Grau cautioned that the term "advanced persistent threat", or APT, is often misused and overused, because all modern malware is advanced, is persistent, and is a threat, in addition to being sophisticated, stealthy, and evasive. A true APT shares all of these characteristics, but it is also rare, targeted, customized, and attributable (i.e., not opportunistic).

Unfortunately, traditional anti-virus software is largely ineffective against the current and emerging techniques used by criminal actors. Verizon (2011; tinyurl.com/lvdpsnl) reported a 37% success rate for anti-virus applications in its study of data breaches; other datasets report even lower numbers. The key reason is the growing complexity of the problem: as additional devices and features appear, the attack surface grows. As more and more ways appear for criminal actors to infiltrate a system, it becomes increasingly difficult to protect the entire attack surface. Grau provided several industry examples, including the Zeus Trojan horse and Cryptolocker ransomware, and the 2013 Target data breach, to reinforce the sophistication of current and emerging threats.

Innovation opportunities

Based on their experiences, Grau and Kennedy identified the following areas where innovation is needed in the cybersecurity domain:

1. **Skilled workers and innovators:** there is a shortage of talent in the information security domain.

2. **Borderless networks:** organizations no longer have a well-defined perimeter – this paradigm has become outdated. Today, organizations are more porous and no longer have clearly defined "doors" that simply need to be locked down by security staff. There is now a need for ubiquitous security (e.g., a portable security stack) that does not just assume a defensive posture, but is nimble, pervasive, and dynamic.

3. **Avoiding fragmentation of the Internet:** changes to the Internet over time in response to the cybersecurity threats provides incentive for nations to fragment the Internet (e.g., the Great Firewall of China). The underlying problem is that efforts to enhance cybersecurity are often at odds with the ideals upon which the Internet is based and requires to function effectively.

The Business of Cybersecurity

David Grau and Charles Kennedy

4. **Security as big data analytics:** there is a need for real-time detection of events with in-line correlation and decision making based on scores derived from analytics.

5. **Wetware versus software:** there is a mismatch between the data experts, who do not understand the threat scenarios, and the security professionals, who do not understand the data analyses.

6. **Intelligence gap**: threat intelligence is extremely valuable – it helps focus efforts and greatly increases the speed of response. There is a need for tools and processes that allow more mature intelligence analyses; however, tools will never replace analysis and interpretation by humans, and increasingly, the availability of threat intelligence skills is falling short of demand.

Lessons Learned

In the discussions that followed each portion of the presentation, audience members shared the lessons they learned from the presentation and injected their own knowledge and experience into the conversation.

The audience identified the following key takeaways from the presentation:

1. Security is expensive, but insecurity is more expensive.

2. Cybersecurity is now a global issue with global players.

3. Available automated tools and processes make it easy enough to catch the unsophisticated criminals; determined, sophisticated actors do not make it easy.

4. Understanding the motivations of threat actors is vitally important: the who and the why.

5. In terms of innovation, the "bad guys" (criminal actors) are leading the industry. And, we should try to learn from them.

6. Anti-virus software gives users a false sense of security.

7. Big data analytics is growing in importance as we try to make sense of large volumes of data and detect patterns of interest, because individual malicious events or fraudulent behaviour may look similar or even identical to normal, everyday transactions.

8. The problem is acute in the banking industry, but it is not unique to it. However, the real issue stems from the software industry that underpins these other commercial industries.

9. Small and medium-sized businesses are particularly vulnerable and should practice ensure they have good Internet "hygiene".

10. There is a skillset shortage: we need more intelligence experts and data scientists.

11. Our current approaches are not working – there is a need for innovation, which will likely come through a paradigm shift.

12. The industry is too fragmented. There is a need for greater collaboration between governments, technologists, and industry: a holistic approach to security.

The Business of Cybersecurity

David Grau and Charles Kennedy

About the Speakers

David Grau is Vice President and Head of Threat Response, Intelligence, and Defensive Technologies at TD Bank Group. David has more than 20 years of professional information security experience and leads a multi-national team of information security specialists, with a global responsibility for providing TD Bank Group's Security Incident Response, Threat Intelligence, and Defensive Technologies programs.

Chuck Kennedy is the VP for Credit Card Technology for North American Credit Card for TD Bank Group. He is responsible for technology service delivery, project management, and technology innovation for the credit card businesses for TD. Chuck has been a member of the CIO Association of Canada and has served on the Canadian Banker's Association's (CBA), Canadian Financial Institution – Computer Incident Response Team (CFI-CIRT). Chuck holds the CRISC designation (Certified In Risk and Systems Control) and was educated in the United States, Europe, and Canada. He holds a BA in Political Science (Business minor) from the University of Calgary and an MSc in Information Technology (Information Assurance) from the University of Maryland – University College. His graduate work involved the study of geo-spatial intrusion detection and its integration with complex event processing.

This report was written by Chris McPhee

Citation: Grau, D. & Kennedy, C. 2014. TIM Lecture Series – The Business of Cybersecurity. *Technology Innovation Management Review*, 4(4): 53–57. http://timreview.ca/article/785

Keywords: cybersecurity, information security, banking, threats, targets, hacking, incident response, intelligence, analytics

Author Guidelines

These guidelines should assist in the process of translating your expertise into a focused article that adds to the knowledge resources available through the *Technology Innovation Management Review*. Prior to writing an article, we recommend that you contact the Editor to discuss your article topic, the author guidelines, upcoming editorial themes, and the submission process: timreview.ca/contact

Topic

Start by asking yourself:

- Does my research or experience provide any new insights or perspectives?
- Do I often find myself having to explain this topic when I meet people as they are unaware of its relevance?
- Do I believe that I could have saved myself time, money, and frustration if someone had explained to me the issues surrounding this topic?
- Am I constantly correcting misconceptions regarding this topic?
- Am I considered to be an expert in this field? For example, do I present my research or experience at conferences?

If your answer is "yes" to any of these questions, your topic is likely of interest to readers of the TIM Review.

When writing your article, keep the following points in mind:

- Emphasize the practical application of your insights or research.
- Thoroughly examine the topic; don't leave the reader wishing for more.
- Know your central theme and stick to it.
- Demonstrate your depth of understanding for the topic, and that you have considered its benefits, possible outcomes, and applicability.
- Write in a formal, analytical style. Third-person voice is recommended; first-person voice may also be acceptable depending on the perspective of your article.

Format

1. Use an article template: .doc .odt
2. Indicate if your submission has been previously published elsewhere. This is to ensure that we don't infringe upon another publisher's copyright policy.
3. Do not send articles shorter than 1500 words or longer than 3000 words.
4. Begin with a thought-provoking quotation that matches the spirit of the article. Research the source of your quotation in order to provide proper attribution.
5. Include a 2-3 paragraph abstract that provides the key messages you will be presenting in the article.
6. Provide a 2-3 paragraph conclusion that summarizes the article's main points and leaves the reader with the most important messages.
7. Include a 75-150 word biography.
8. List the references at the end of the article.
9. If there are any texts that would be of particular interest to readers, include their full title and URL in a "Recommended Reading" section.
10. Include 5 keywords for the article's metadata to assist search engines in finding your article.
11. Include any figures at the appropriate locations in the article, but also send separate graphic files at maximum resolution available for each figure.

Issue Sponsor