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Users as Service Innovators: The Case of Banking Services

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Abstract

Many services can be self-provided. An individual user or a user firm can, for example, choose to do its own accounting – choose to self-provide that service - instead of hiring an accounting firm to provide it. Since users can 'serve themselves' in many cases, it is also possible for users to innovate with respect to the services they self-provide. In this paper, we explore the histories of 47 functionally novel and important commercial and retail banking services. We find that, in 85% of these cases, *users self-provided the service before any bank offered it.*

Our empirical findings differ significantly from prevalent producer-centered views of service development. We speculate that the patterns we have observed in the banking industry will be found to be quite general. If so, this will be an important matter: perhaps 75% of GDP in advanced economies today is derived from services. We discuss the implications of our findings for research and practice in service development.

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Users as Service Innovators: The Case of Banking Services

1. Introduction and overview

Many services can be self-provided. An individual user or a user firm can, for example, choose to do its own accounting – choose to self-provide that service - instead of hiring an accounting firm to provide it. Since users can 'serve themselves' in many cases, it is also possible for users to innovate with respect to the services they deliver to themselves. In this paper, we will show that, at least in one field, users have self-provided almost all of the service innovations that later became commercially important, long before they were first offered by commercial service providers.

Service users, as we define the term, are individuals or firms that expect to benefit from *using* a service. In contrast, service providers are firms or individuals that expect to benefit from *selling* a service. A service innovation is therefore user-developed if the developer expects to benefit from use, and provider-developed if the developer expects to benefit from sales.

The empirical study we report upon here is focused on financial services. Financial services are an important services category, representing about 8% of GDP and 4% of employment in the OECD (OECD 2008). For our study, we first identified all important service innovations newly commercialized by retail and commercial banks between 1975 and 2008. We then inquired into the history of user activity prior to the offering of each of these service innovations by banks. In overview, we found that in 85% of the 47 cases in our sample some or many users were self-providing the function - producing the same outcome - delivered by each of the novel services in our sample for themselves *before* banks offered it to them. Indeed, quite strikingly, we found this pattern in *all* cases where self-service was technically possible absent bank involvement.

As an illustration, consider the introduction of "sweep" accounts, first offered to corporate customers in the 1980s and later offered to the retail market in 1994 (Cantillon and Franzke 1998). This banking service transfers money between checking accounts to interest-bearing savings-type accounts. Consumers find it a useful way to increase their interest income: money they do not plan to spend immediately can be "swept" from their checking accounts into a savings account offering higher interest rates, and then returned to

their checking account as needed. At the time of commercial introduction by banks, the sweep account service was *not* functionally novel to users. Long before banks offered the commercial service of sweep accounts, many users made it a practice to periodically transfer ("sweep") money between their checking and savings accounts in order to increase the interest income they earned from their banks. In other words, users were serving themselves with their own version of a sweep account service. Today sweep accounts are a very important commercial service offering for banks to both the corporate and retail markets. Assets in such accounts have grown from $20 billion in 1991 to $368 billion in 2005 (Cantillon and Franzke 1998) and have allowed banks to reduce their required reserves (Anderson and Rasche 2001).

When banks offer the function of a user self-provided service to customers, we find the *processes* they use often differed from processes employed by users. Both users and banks develop service delivery systems compatible with their own operating environments. For example, in the case of sweep accounts, the process flow pioneered by users involved manual monitoring of account balances, followed by sweeping money between interest-bearing and non interest-bearing customer accounts when a trigger point they had in mind was reached. Banks' commercial implementation of this service followed the same general sequence of process steps, but implemented it via bank-developed software. Transitioning to the bank's version of a sweep service offered both gains and losses for users. Because the banks' implementation was software-based rather than manual, banks could offer users improved convenience. In banks' version of the sweep service, a single instruction from a user specifying a desired trigger point can automatically initiate any number of sweep events without further user involvement. On the other hand, self-service gave users flexibility to adjust trigger points and timing *ad hoc* based upon information regarding future income and spending expectations not known to banks.

We think that further research will show the pattern of user innovation found in banking services will hold in service fields and instances where users both anticipate benefit from an innovation, and *can* self-provide the service in question – and so can innovate with respect to it. For example, users can and do self-provide the service of transporting goods they purchase from stores to their homes, and so we would expect to find user innovations in the field of "home delivery services." In contrast users (patients)

cannot self-provide heart operations, and so we would not expect to see them innovating in that specific medical service field.

In the sections that follow, we first review relevant literature (section 2), then explain our research methods (section 3). In section 4 we present our findings, and in section 5 we discuss the implications of these findings and further research possibilities.

2. Literature review

In this literature review, we first review definitions of services and quantify their economic importance (2.1). Next, we review literature on process innovation in services. (2.2). Finally we briefly review what is known about the locus of innovation in both services and products (2.3).

2.1. The definition and economic importance of services

The definition of services is not fully consistent among scholars working in that field. However, there are a number of attributes of services that most agree upon. These include intangibility, inseparability of production and consumption, heterogeneity, perishability, and inability to keep in inventory. Thus, according to Fitzsimmons and Fitzsimmons (2004, p. 4) "A service is a time-perishable, intangible experience performed for a customer acting in the role of a co-producer." Zeithaml and Bitner (2003) define services as "deeds, processes, and performances." In the same line, Vargo and Lusch (2004, p. 2) define services as "the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself."

Crespi et al (2006, p.2) review the literature and conclude: '...it is often useful to think of services as either intermediation activities, such as transport, that arise because consumers want to separate production and consumption, or contact services, such as haircuts or medical services, where production involves the consumer directly and where the output of the activity is embodied in the consumer ... ...an important aspect of a service is the 'jointness' of production and consumption – i.e. that goods can be produced meaningfully without consumers (think of a firm producing a car), whereas services require jointness (a haircut, or repairing a car).'

Governmental agencies also have generated definitions of services. Thus, the Manual on Statistics of International Trade in Services (UN et al. 2002), a joint publication of six agencies (the UN, EC, IMF, OECD, UNCTAD, and WTO) states that "the term services covers a heterogeneous range of intangible products and activities that are difficult to encapsulate within a simple definition. Services are also often difficult to separate from goods with which they may be associated in varying degrees." The Manual generally respects the 1993 UN System of National Accounts usage and definition of the term services as follows:

> "Services are not separate entities over which ownership rights can be established. They cannot be traded separately from their production. Services are heterogeneous outputs produced to order and typically consist of changes in the condition of the consuming units realised by the activities of the producers at the demand of the customers. By the time their production is completed they must have been provided to the customers".

Collection of uniform governmental statistics on services is enabled by the creation of standard lists of activities deemed to be services. The World Trade Organization's General Agreement on Trade in Services includes a list with the following activity categories to be classified as services: business services, communication services, construction and engineering services, distribution services, educational services, environmental services, financial services, health related and social services, tourism and travel related services, recreational, cultural and sporting services, transport services (UN et al. 2002). The North American Industry Classification System (NAICS) and the Statistical Classification of Economic Activities in the European Community (NACE) provide classifications of services under nine high-level categories: Wholesale and retail trade; hotels and restaurants; transport, storage, and communication; financial intermediation; real estate, renting, and business activities; public administration and defense; education; health and social work; other community, social, and personal service activities (UN et al. 2002).

Statistics based upon the definitions noted above indicate that economic activity in modern economies involves services primarily. For example, in 2006 in the US, services in aggregate employed 144.4 million people, representing 78.7% of total employment. Services also contributed 77% of Gross Domestic Product (GDP) in the US economy in

2006 (GDP is a measure of an economy's economic performance and represents the market value of all final goods and services made within the borders of a nation in a year).

2.2 Users' role in services innovation

To the best of our knowledge, the study to be reported upon here is the first to quantitatively explore the role of users in development of commercially important service innovations. Prior empirical work on the role of users in service development has shown by example that users do sometimes develop novel services for their own use. The great bulk of the literature in the services innovation field, however, has explored service development as a process assumed to be carried out by service providers.

Prior literature on user innovation in services has identified examples of service development by users in a few fields. Riggs and von Hippel (1996) reported on user development of novel banking services related to an early form of electronic home banking that utilized a telephone channel between customer and bank. Potential study participants ("lead users") were recruited by an email directed to a sample of convenience - approximately 1,300 research and development engineers employed by a telecom firm. These individuals were asked whether they had "... found novel ways to take care of their personal banking service needs via electronic home banking. For example, ... written or adapted a home software program to automate a manual procedure, found a novel way to use a service offered by the bank to achieve a purpose other than was originally intended, or devised a novel procedure for paying bills or keeping records." Fifteen individuals responded with return messages that included a brief description of novel home banking services they had self-developed for their own use.

Skiba and Herstatt (2009) explored Internet and newspaper reports and identified 3 examples of commercially important services that had been developed by users for their own use and then commercialized by these same user-innovators. One of these, the pre-commercial history of the service firm Weight Watchers, is illustrative. In brief recapitulation, in 1961 a US housewife named Jean Nidetch was frustrated at encountering repeated failures in her personal efforts to lose weight. As a new approach, she created weekly group meetings with her overweight friends to provide a peer-to-peer support service to augment their previously independent efforts to lose weight. This self-developed

and self-provided service proved very effective for the members of her group. In 1963 she incorporated the firm "Weight Watchers" to commercialize the service and diffuse it more widely.

Researchers on the topic of services have traditionally conceived of new service development as a producer-centered process similar to traditional producer-centered new product development processes. They also have focused prescriptively on 'how service development should be done by service providers' rather than on exploring user roles in service innovation histories. In the multistep processes generally prescribed, firms wishing to provide new services – for example, banks and hotel chains – are instructed to study users to discern and deeply understand the users' articulated and unarticulated service-related needs. Then, service developers employed by the provider firm are tasked with creating and testing new services intended to be responsive to the needs identified. Service users are clearly not viewed as potential service creators in these processes (e.g. Shostack 1981, Shostack 1984, Storey and Easingwood 1995, Johne and Storey 1998, Flikkema et al. 2007).

Recently, some innovation researchers and process consultants have described processes in which users are viewed as "co-creators" who should be invited in to join service provider personnel to work together on service development (e.g., Prahalad and Ramaswamy 2002, 2004, Moller et al. 2008, Spohrer 2009, Nambisan and Nambisan 2008, Payne et al. 2008, Skiba and Herstatt 2008, Nambisan and Baron 2009). For example, Moller et al. (2008) provide a recipe for managing service co-creation and propose guidelines on how to succeed through collaborative capabilities and culture. In the same line, Prahalad and Ramaswamy (2002) propose a framework to suggest how companies can better understand the consumer's view, and work with them to co-create innovations. Matthing et al (2006) and Lüthje (2000) among others, support the potential utility of this approach. They argue that the most effective service users to incorporate in co-creation exercises are 'lead users'. They also document that lead users are sources of new service ideas with high commercial potential. Lead users are a subset of users who are at the leading edge of market needs and positioned to obtain significant benefits from solutions to the emerging needs they have encountered there (von Hippel 1986).

2.3: Users' role in product *innovation*

It seems to us likely that findings with respect to user development of service innovations will be similar in many ways to those documented in the case of user development of product innovations. We therefore briefly review some major findings on users as product innovators.

Quantitative studies of user innovation document that many of the most important and novel products and processes commercialized in a range of fields are developed by users for in-house use. Thus, Enos (1962) reported that nearly all the most important innovations in oil refining were developed by user firms. Freeman (1968) found that the most widely licensed chemical production processes were developed by user firms. Von Hippel (1988) found that users were the developers of about 80 percent of the most important scientific instrument innovations, and also the developers of most of the major innovations in semiconductor processing. Pavitt (1984) found that a considerable fraction of invention by British firms was for in-house use. Shah (2000) found that the most commercially important equipment innovations in four sporting fields tended to be developed by individual users.

Empirical studies also show that *many* users—from 10 percent to nearly 40 percent—engage in developing or modifying products. This has been documented in the case of specific types of industrial products and consumer products, and in large, multi-industry studies of process innovation in Canada and the Netherlands as well (Urban and von Hippel 1988, Herstatt and von Hippel 1992, Morrison et al. 2000, Lüthje 2003, Franke and von Hippel 2003, Lüthje 2004, Franke and Shah 2003, Lüthje et al. 2002, Arundel and Sonntag 1999, Gault and von Hippel 2009, de Jong and von Hippel 2009). When taken together, the findings make it very clear that users are doing a *lot* of product development and product modification in many fields.

Research has also shown that innovation by users tends to be concentrated among 'lead users'. Lead users are a subset of user populations distinguished by two attributes. They are: (1) ahead of the bulk of the market with respect to an important trend and; (2) expect to gain major benefits from solutions to needs they encounter at that leading edge. Because

they expect major benefits from a solution they are likely to innovate. Because they are 'at the leading edge', products they develop for their own use often represent commercialization opportunities for producers (Urban and von Hippel 1988, Herstatt and von Hippel 1992, Olson and Bakke 2001).

The likelihood a user will innovate is affected by the amount of profit expected, as is the case for all types of innovation and innovators (e.g., Schmookler 1966, Mansfield 1968, Morrison et al 2000). The probability that a user will innovate is also positively associated with the amount of resources a potential user-innovator has to invest in an innovation. Given full information availability to all potential investors, the amount of resources possessed by the potential innovator itself should not matter – an attractive opportunity should draw resources from elsewhere if they are not available locally. However, information stickiness results in potential user-innovators having better information on their own need and solution strategy than can be conveyed to outside investors. Therefore, the level of in-house resources available for investment at the discretion of a potential user-innovator matters, and is positively associated with innovation likelihood (Franke et al. 2006).

Information stickiness also causes user and producer innovators to rely more heavily on information they have 'in stock' than upon information they must draw in from external sources. This in turn means that users and producers will tend to develop different *types* of innovations. Users generally have a more accurate and more detailed model of their needs than manufacturers have, while producers have a better model of the solution approach in which they specialize than does the user. As a consequence, users tend to develop innovations that are functionally novel, since these tend to require a great deal of user-generated need information and context of use information for their development. In contrast, manufacturers tend to develop innovations that are improvements on well-known needs and that require a rich understanding of solution information for their development (Riggs and von Hippel 1994, Ogawa 1998).

3. Research context and methods

For our exploratory empirical study on the sources of major services innovations, we elected to study the origins of major banking services provided by banks to retail and

corporate customers. Financial services are major factors in modern economies. As was noted earlier, in aggregate, financial service firms contributed 7.9% of US GDP in 2004, and also were major employers, accounting for 4.5% of total US employment in 2004 (OECD 2008). Within financial services the specific field we chose to focus on was service innovations in commercial and retail banking. We had no pre-knowledge of innovation patterns that informed this choice. However, we thought it would be helpful to our readers that most are familiar with banking, and with some of the banking services we report upon.

3.1 Sample identification process and sample

Our sample consists of financial services currently offered by major US commercial banks at the time of this study – June, 2009 – and that were first commercially introduced by US banks in the period 1975-2008. (Important banking services introduced before this date are identified in Appendix 1.) Commercial banks are defined as privately owned institutions that offer a broad range of deposit accounts, including checking, savings and time deposits and extend loans to individuals and businesses. Recently, commercial banks have begun to offer services beyond their traditional scope, such as brokerage and insurance services. We restrict our sample to the activities mentioned earlier that are considered the traditional "core" of commercial banking.

In order to identify a list of financial services in an objective manner with respect to our research question, we elected to include only services included on one or more of the corporate websites of the 5 largest U.S. commercial banks as measured by assets in 2009. These banks were Bank of America, JP Morgan Chase, Citigroup, Wells Fargo and PNC Financial Services (Hutchinson 2009). We searched the websites of these 5 banks for both the personal and corporate services (including small businesses, large corporations and institutions), they offered.

Via discussions with experts in the banks, we then distinguished the central innovations from the multitude of minor variations that banks typically offer – e.g., we included corporate sweep accounts, but did not include variations based upon the specific types of investments into which funds were swept. Some cases were not clear, and our experts needed to exercise professional judgment. For example, when an original innovation such as a sweep account had spawned a separate, clearly distinct service, such as

a loan sweep of a Zero Balance Account, they suggested we include that service in our sample.

In order to avoid bias in our analyses of the sources of our sample of service innovations, we next screened our sample to exclude service innovations which banks were prevented from introducing at the time users developed them due to regulatory constraints. On this basis, we excluded digital "substitute checks," (electronic legally-acceptable substitutes for paper checks) because the commercial introduction of this service by banks was only made possible by The Check Clearing for the 21st Century Act, a federal law that took effect on October 28, 2004. Since banks were prevented from introducing this service prior to that date, we removed it from our sample. We found no other cases of this type.

Our sample of banking service innovations identified and screened in the manner just described is listed in table 1 (next page).

3.2 Locus of innovation determinations

Following identification of our samples, we investigated the history of each innovation in our sample *prior* to the date of its introduction as a commercially-provided service by a bank. Our goal was to determine whether one or more service users self-provided the function of each service before any bank offered it. Since we were only interested in determining which category of potential innovator – service user or banking service provider – was first to develop and implement the service, we did not have to determine which specific user or bank was first to do this. We used a combination of literature searches and interviews with banking experts to make these determinations, as we describe in more detail next.

Table 1: Significant retail and corporate banking services introduced by banks from 1975 to 2008

Retail banking services (N=25)	***Information services and planning solutions***
	1. "Relationship statements" aggregating information on accounts within the same bank 2. Aggregation of information on accounts held in *all* financial institutions 3. Statement savings account 4. Consumer forums and communities 5. Alerts, notifications or reminders via email/text message 6. Online banking budget planner 7. Tax preparation and computation services
	Products, transaction services and security
	1. Automatic bill paying 2. Money Market account 3. Sweep service between accounts in the same bank 4. "*keep the change*" program 5. Automatic savings account 6. Cash Management Account (CMA) 7. Microcredit and microfinance 8. Automatic payment of same institution loans 9. Overdraft protection 10. Bank-to-bank wire transfers 11. Debit or check cards 12. Adjustable rate mortgages 13. Home equity credit line 14. Dynamic password system
	New channels to access banking services
	1. Telephone banking 2. Text messaging services 3. Online banking 4. Mobile banking
Corporate banking services (N=22) (includes small-business)	***Information services and planning solutions***
	1. Balance Reporting Services 2. Account aggregation across different institutions 3. Alerts, notifications or reminders via email 4. Corporate forums and communities
	Products, transaction services and security
	1. Entry Collection Services (ECS) including account reconciliation 2. Merchant Services 3. Controlled Disbursement Account 4. Corporate Salary Account 5. Depositing many checks as a form of debt note 6. Cash Management Account 7. Sweep services between any accounts in the same bank 8. Zero Balance Account 9. Overdraft protection 10. Business Risk Assessment 11. Automatic Clearing House 12. Retailer-specific debit cards 13. Employee expenditure management cards 14. Advanced Lockbox (accepts both paper and electronic payments) 15. Positive pay 16. Remote deposit
	Channels to access banking services
	1. Telephone banking 2. Online banking

3.2.1 Literature search

To identify users' best practices, we searched online, on Google Books, Google Scholar and so on, and in libraries for books on personal and corporate financial management by popular authors from the 1960s, 1970s and 1980s. If a financial management book advised users to apply a service from our sample as a "self-service" *before* it was first offered as a commercial service by any bank, we coded it as a user-developed service. For example, the first two bank services in our retail services sample are 'Relationship' statements which aggregate information on all accounts a customer holds in a specific bank, and 'Aggregation of information on accounts an individual holds in *all* financial institutions.' Readings in popular personal financial management books of the day find everyone prescribing adding up one's assets (and liabilities) as a step in determining one's total financial situation. Thus, Blair (1963, p.11) advises "Let's find out exactly where you stand today. The form at the end of the book will help to make this easier for you. …filling out this statement requires you to set down all your major assets and liabilities on one particular day… how much cash have you in banks, in your checking and savings account, in savings and loan associations…" etc.

Often, there is also a logical case that users "must have" performed a specific self-service before the relatively recent dates that banks offered a commercial version. For example, individual retail bank customers logically "must have" paid bills by check or cash before banks offered an 'automatic bill-paying' option. Also, many holders of money in several accounts "must have" performed the self-service of adding up the amounts of money held in their accounts before banks offered a 'relationship statement' service to do this for them. Of course, this does not mean that users were the only *possible* innovators in these instances. Banks also played a role in the transactions just mentioned. They clearly had an opportunity to perceive their customers' needs earlier, and to create appropriate innovations *for* them and so forestall the need for user innovation – but they didn't.

Note that via our search processes we were able to determine that users were self-providing a service before banks offered it. However, we cannot positively exclude the possibility that some innovations in our sample were developed by some type of *non-bank* producer – for example, a for-hire accounting firm – rather than by a user or users. We think this is unlikely: there are no traces of attribution to non-user innovators in the

extensive literature searches we made. Since producer-innovators would have an incentive to advertise their prowess, this is suggestive – but, again, not proof positive.

3.2.2 *Panel of banking services experts*

Written information on the histories of many commercially important banking service innovations is sparse. Accordingly, we found it very important to assemble a list of expert informants with a long history in banking to help us answer research questions that were not answered in books and articles. Our primary method of assembling this group involved literature and online searches to identify authors who had written on some aspects of banking services in articles published in academic and/or trade journals. We identified six such authors (including three academics) and also contacted 6 banking executives, including two senior executives from the largest US banks considered in our analysis. In addition to the banking executives, we talked with two senior consultants with a long experience in the banking industry. We contacted all of these to ask about what they knew about the histories of one or more banking services innovations in our sample. They became our informal panel of 12 banking experts who proved willing to help us via repeated conversations via telephone.

3.3 Analysis of findings

Our samples are small, but the effect sizes proved to be quite large. Accordingly, non-parametric (chi square) tests of significance could be used to analyze the significance of the patterns found.

4. Findings

In table 2, we report on the sources of innovation for banking services. As can be seen from table 2, 85% of the functionality in our samples of both retail banking services and corporate banking services were being used in the field by users before banks offered them commercially. Producer-centered innovation service development models would assume that most or all of these innovations would have been developed and introduced to the field by service providers. But even if we take as our null hypothesis that both users and producers are equally likely to be first to introduce a novel service innovation

(excluding joint user-producer innovations), we find this hypothesis rejected for both the retail and corporate services samples (retail banking sample $\chi 2 = 15.1$, p-value <.001); corporate banking sample ($\chi 2 = 14.2$, p-value <.001).

Table 2: Source of *functional* innovations of retail and corporate services

	Service Type	% User	% Bank	% Joint user & bank	Total
Retail Services	1. Information Services	100%	0%	0%	7
	2. Accounts and Transaction Services	93%	7%	0%	14
	3. Access Channel	25%	25%	50%	4
	Retail services total	**84% (21)**	**8% (2)**	**8% (2)**	**25**
Corporate Services	1. Information Services	100%	0%	0%	4
	2. Accounts and Transaction Services	94%	6%	0%	16
	3. Access Channel	0%	50%	50%	2
	Corporate services total	**86% (19)**	**9% (2)**	**5% (1)**	**22**
Complete sample	***Total (all services)***	**85% (40)**	**9% (4)**	**6% (3)**	**47**

Note that our table 2 findings are grouped under three headings: (1) account information services; (2) products, transaction services and security; and (3) new channels to access banking services. We do this because the constraints on user innovation appear to us to differ in the case of each of the categories listed, and may well increase as we move from category 1 to category 3.

In category 1, account information services, no financial transaction or money transfer by the bank is involved. Services in this category involve processing information generated by users or provided to users by banks on the status and history of individual accounts. The goal of service innovations of this type is to generate more useful financial indicators and summaries, often across multiple accounts. In the case of category 2, transaction services, implementing the service requires that a transaction must occur in which the commercial bank system "does something" in response to instructions from account holders. For example, a user might issue an instruction to pay X amount from Y account to party Z. With respect to category 3, it seemed to us that action by both users and banks must be involved: a functioning new channel between two parties requires that both

parties have the appropriate transmitters and receivers, and that both "staff" the new access channel.

As can be seen in table 2, the level of user innovation is indeed highest in category 1, and lowest in category 3. Our findings regarding category 3, however, surprised us. It turned out that some channel innovations can be attributed primarily to one party or the other rather than necessarily being attributed to both. Rather than all our "new channels" involving additions to channel infrastructure by both sides, sometimes what was involved was one side or the other creating a new combination of existing channels. For example, consider Internet banking via cell phone. As soon as cell phones became Internet-enabled, customers could access the preexisting Internet banking channel via this device. Initially, it was difficult to do so, because banks had not expected users to do this, and so the web pages on bank Internet banking sites had been designed with the screen size of a personal computer in mind. When banks became aware of the new user practice, they created "mobile banking" web pages to make them more appropriate for cell phone screens.

The few innovations that were developed by banks first are interesting and worth specific note. In our retail banking services sample, service innovations we attributed to banks were dynamic password systems and online banking. In our corporate banking services sample, it was the automated interbank clearing house for financial transfers. Each of these was something that users *could not* do on their own, even if they wanted to. Dynamic password systems are designed to allow users access to bank information with increased security, and must be implemented on bank computers. Online banking was a channel innovation in which the user end was already implemented and staffed – users had internet access and personal computers already in place at the time that banking channel was opened – what was missing was the bank's implementation of its end of the Internet channel. In the case of corporate banking services, automated clearing houses provided improved services for both banks and customers – but required a coalition of banking institutions to agree to common standards and transfer protocols in order to achieve implementation.

4.1 Service processes differ between users and commercial providers

When banks offer the function of a user self-provided service to customers, we find the *processes* they use often differed from the self-service processes employed by users. Very reasonably, both users and banks developed service delivery systems compatible with their own operating environments. For example, consider how retail banking customers paid "same institution loans" such as a car loan or a mortgage, before banks offered this service. To perform the self-service, customers had to know the amount they owed, and the identity of the two accounts involved. Then, they had to issue instructions to the bank in the proper format for processing: 'Here is a paper check made out for the proper amount, and here is a paper deposit slip for the proper account to receive my car loan payment. I instruct you to make the transfer'. Banks, when they offer the service, require the same information, and follow the same basic sequence of steps. However, banks accomplish the service via software instruction sets that differ from the instructions activated by the customer when following the self-service method.

As is typical, the conversion of a self-service to a bank-provided service offers both benefits and costs from a user's point of view. In the case of 'automatic payment of same-institution loans', the service as offered by the bank is clearly more convenient – the user no longer has to remember to perform this monthly task. On the other hand, when the user gives up control, the service becomes less flexible and possibly more costly as well. With respect to flexibility, consider that users know more about their spending plans than their banks do. Users may find it convenient or profitable to delay a payment till the very last minute – or even to skip a payment and incur a fine as a way of receiving a fast micro-loan without paperwork. Bank, in contrast, simply process the transfer at a fixed time each month, and their automated systems typically make it difficult or impossible for users to make last-minute payment timing changes. With respect to increased user costs, consider that banks have an incentive to make loan payment transfers with a timing beneficial to their own profits, rather than to customer profits.

4.2 In the case of similar services which was first - commercial or retail?

We identified 15 cases in which the services offered to retail and commercial bank customers were substantially the same (table 3). All of these services were developed by

users as a form of self-service before they were offered by banks. We were not able to determine whether, in these cases, the service was developed by corporate users or individual users first due to lack of reliable data. However, we were able to determine via discussions with our expert panel that in all of these cases, the service was made available by banks to commercial customers first. As illustration of this pattern, consider that online banking was first initiated for businesses and only later pursued for individuals users.

Table 3: In cases where banks offer similar services to both corporate and retail customers, the corporate service was always introduced first (N= 15)

Service category	Corporate version introduced first; retail version followed
Information Services (n=6)	Account aggregation across different institutions Statement savings account [1)] Relationship (multi-account) statements [1)] Corporate budget planning solutions provided by banks [1)] Bank forums Alerts, notifications or reminders via email
Accounts and Transaction Services (n=7)	Sweep service between accounts in the same bank Overdraft protection Cash Management Account Automatic savings account [1)] Bank-to-bank wire transfer [1)] Online tax preparation services [1)] Microcredit [1)]
Access Channel (n=2)	Online banking Telephone banking

[1)] The commercial version of this corporate service was introduced before 1975. Therefore it is not part of our corporate services innovation sample.

We do not know why this pattern occurs in our sample, or whether it also occurs in other service fields. There are several candidate explanations. Three among these: individual business customers will logically see more profit potential in many new services than do individual retail customers, leading businesses to apply greater pressure on banks to provide them; banks may see more profit potential in supplying a service to business clients than to retail clients; it may be technically easier for banks to implement a new service for a relatively small number of business clients, than for the mass market of retail clients. If the pattern does occur in other fields, it implies that corporate service innovations are a good source of ideas for consumer service innovations.

5. Discussion

We have found that retail and corporate banking services introduced by banks since 1975 are, in 85% of the cases in our sample, preceded by self-provision of *functionally* similar or identical services by users. By functional similarity we mean that the outputs of the user self-provided services are similar to or identical to the outputs of services later provided by a commercial service provider. Commercial versions of services generally have both advantages and drawbacks for users relative to service self-provision, but it is reasonable that in net many or most users will prefer the commercial version: otherwise they would not switch from service self-provision.

In contrast to functionality, the processing steps used by users and producers to generate service outputs often differ. The two provider types often have different operating systems and environments, and will logically develop their own service provision process details accordingly. Earlier research by many has documented a very similar pattern in the case of product innovations. Users, it has been shown, tend to develop product innovations that implement new functions for the first time. When a producer then adopts the innovation for commercial sale, it may reengineer the user-developed prototype to make the design a good fit to its production processes, and to create what it considers to be a commercial-quality product appropriate to bring to market.

The similarity of the user role in novel service development to that which has been observed in product development makes sense, because the underlying economic arguments that have been developed to explain user innovation in products seem to us to apply equally well to services. It is reasonable that users will tend to be the first to develop many of the functionally novel services they need (via self-service) or novel products (via self-built prototypes) for the same 3 basic reasons. First, novel functionality involves a significant amount of need information, and users generally understand their needs better than do producers. After all, need information originates with users, and there is often a significant cost involved in transferring that information to producers – the information is often "sticky" (von Hippel 1994). Second, needs for novel functionality are generally encountered first by lead users situated at the leading edge of markets. The nature and extent of demand is at first both small and uncertain at the leading edge, and so the opportunity is often not attractive for commercial providers at this stage of market

development (Baldwin et al, 2006). Third, at least some users facing a given leading-edge need will be able to develop a product or service innovation for themselves at very low cost. It will fall within their personal or corporate 'low-cost innovation niche' as users because of their specific preexisting expertise and tools and, very importantly, their ability to conduct low-cost trial-and-error development within their own user environments (Lüthje et al 2005, von Hippel 2005).

Once a novel function has been developed and prototyped, and its value proven in field use via user innovation, the position of product or service producers improves with respect to pursuing development of improvement innovations, especially along general "dimensions of merit." Dimensions of merit – dimensions such as efficiency, effectiveness, and reduced cost – are known to be valued by consumers in the case of essentially all products. Developing innovations that improve a given function in these ways does not require so much in the way of detailed sticky, user-developed need information. In addition, of course, as the market for a given service function grows in size, service producers will have an increased incentive to develop all types of improvements related to that function (Klepper 1996).

The pattern just described is clearly displayed in our study of banking services. As was discussed earlier, for example, "sweep account" functionality was pioneered and performed manually by users. Later, it was built into banking software by banks, and offered to banking customers in a convenient, automated form. Further research is likely to show that, when the initial innovation is followed by successive improvements, functionally novel incremental improvement innovations are likely to be first developed and implemented by users, while producers would tend to develop incremental improvements falling along dimensions of merit (Riggs and von Hippel 1996, Ogawa 1998).

5.1 Towards generalizability

We anticipate that our findings will be quite broadly generalizable within the domain of services. Evidence we have so far is encouraging in this regard, and there is also a logical case to be made, based upon what we already know about user innovation in products.

With respect to currently-available evidence, we have anecdotally observed that the pattern we found in banking services for innovations introduced after 1975 appears to hold for many earlier banking service innovations as well. Take lockbox services as an example. Lockboxes enable a company to receive checks by mail at a special post office box address. Prior to the introduction of lockbox services by banks, companies self-provided that service. Companies would arrange receive customer payments at a special "lockbox" mailing address, would open all correspondence as soon as received, deposit checks received into their bank accounts several times a day, and in that way put the money to work immediately. In 1947 Radio Corporation of America arranged with the First National Bank of Chicago and Bankers Trust Company to create a bank-provided lockbox service in Chicago, Ill., and New York, N.Y. In the case of the commercial service, *bank* employees pick up payments mailed to a company subscribing to the service at a lockbox address several times a day, deposit these payments into the company's account immediately, and notify the company of the deposit immediately (typically the bank provides electronic access to daily activity). This enables the company to put the money to work as soon as it's received.

As a second empirical indicator of generalizability, the present authors have a similar services innovation study underway focused on hospitality industry services – and are finding the same pattern as was observed in the case of banking services (von Hippel and Oliveira 2009 forthcoming). For example, we find that hotel guests served themselves by bringing food to eat in their rooms long before hotels offered 'in-room dining' to guests. Similarly, parents arranged and self-provided birthday party services in restaurants for their children – complete with party favors - long before restaurants offered commercial childrens' birthday party services – complete with party favors.

Based upon what we already know about user innovation in products, it is possible to speculate that users are likely to be the developers of services having novel functionality across a *broad* range of service fields. Consider first that individual services are really only modules in larger systems of interconnecting activities. At the leading edge, lead users innovate at the system level by stringing together available or self-provided service modules into larger combinations that, when used together, create a total system to generate a desired outcome. For example, when individuals or firms wish to manage their financial

affairs they need *complete*, even if not sophisticated, multi-module financial and accounting systems to accomplish this. Thus, users must have a way to bill for what they are owed, *and* receive funds, *and* have a place to store or invest assets, *and* track what they have, *and* track what they owe, *and* have a way to disburse funds to make even the most primitive complete financial system. Each of these self-service modules then offer a opportunity for a commercial service provider, with some modules being more commercially attractive than others.

Of course, as we mentioned at the start of this paper, we expect user innovation only for service types where users *can* 'serve themselves,' and so have an opportunity to innovate via "learning by doing." We also expect that users will only develop service innovations from which they expect to benefit. There are service innovations that require changes by users – but that offer no benefit *to* users. In such cases we would not expect to see users developing the innovation. For example, we would not expect banking customers to invent the system that enabled banks to save costs by switching from human telephone operators to a telephone menu "service" ("press 7 to reach a loan officer").

5.2 Managerial implications

There are clear practical implications of our findings for service providers seeking to innovate. First, it is useful to recognize that services provided by commercial providers are modules in larger user-developed systems. A good way to search for commercial services opportunities, therefore, is to explore the system of self-service modules that precede and follow those that the service or product provider now provides – to see which additional modular functions can profitably be commercialized. Thus, it makes sense for the owner of a store to observe that his customer, after purchase, takes the purchased product home – and then offer to replace that self-service with a home delivery service. Next, that same user routinely progresses to the self-services of unwrapping the purchase, disposing of the packaging, and setting up the product for use. These adjacent service modules will sometimes be of high enough value to be appealing opportunities for service providers. For this reason furniture retailers, sellers of a product type where packaging and the item itself can be especially bulky, do often include these further services in the

delivery service they provide. Store personnel, for an extra charge, may unwrap and set up your purchase – and even offer to take away the item you are replacing for disposal.

Similar service commercialization opportunities, we think, exist for most service providers. For example, users know what they do with banking-related data before and after they utilize bank services. They may, for example, use the data in budgeting or in tax preparation. To bankers, these "adjacent" activities in the larger user system are not automatically visible, and so must be purposefully identified and explored.

An important reason that it can be appropriate to focus on offering commercial substitutes for services that users develop for themselves, rather than trying to invent "new services," is that, as was mentioned earlier, users are the ones who string together available or self-provideable products and services into larger combinations that, when used together, can create a total system to create a desired outcome. If the service provider seeks to minimize user switching costs and so increase likelihood of adoption, the commercial service modules offered by the service provider as a replacement for one or a series of adjacent modules must fit the functional interfaces of adjacent user-developed service modules in the user-developed self-service systems. The architecture of user-developed self-service systems tends to determines the function of individual components that service providers may choose to offer.

Firms that supply service functions "adjacent" to new service opportunities currently being provided by users for themselves have an advantage over other potential providers. They have economies with respect to already having some or much of the information needed to provide the adjacent service in hand. They also already have the customer relationship in hand as a result of their current provision of the adjacent service. The economic considerations here are similar to those involved in analyzing the costs and benefits of vertical integration.

Recall that the processes used in service provision by a commercial provider will often differ from the processes used by a user to create a functionally similar self-service. Managers should remind themselves that these process differences can create both gains and losses for users when compared with service users have developed for themselves – and strive to minimize user losses. For example, consumer self-delivery of products purchased at a store enables consumers to know when the delivery will arrive at home: at

exactly the same time as the consumer does. In contrast, store home delivery services save consumers the effort of physically transporting their purchases, but generally do not offer precise delivery times - because store delivery service processes are generally based upon trucks each making multiple deliveries. Is it possible to do better? Some firms have learned to borrow a solution traditionally used by individual users in many similar situations: "As your day progresses you may know your arrival time more precisely. If you do, call me and let me know."

An interesting side effect of the substitution of a self-provided service by a commercial one is that, often, the service introduced by a firm takes away users' freedom to make modifications and adjustments on their own. For example, in earlier days, when users aggregated and reconciled their own monthly banking activities in a ledger, they could set up and adapt and evolve this ledger precisely according to their preferences – the service was user-adjustable. Once banks introduced a commercial multi-account reconciliation statement, users abandoned personal ledgers because of the gain in convenience. This shift from a self-provided to a firm provided service, however, also meant that users sacrificed their prior easy ability to tailor and retailor the service. The reconciliation format was now set by programming choices made within the bank, and the tools to adapt it were not accessible to banking customers.

When providers offer commercial versions of user-developed services, they should consider the value of designing these as "toolkits" in such a way that users retain the ability to modify and update these on their own. If users *can* modify and build improvements upon the service offered by a commercial provider they will. Producer can then study these user-developed improvements as a valuable feedstock of potential improvements to their commercially-offered service (von Hippel and Katz 2002, Franke and von Hippel 2003).

Note that enabling user innovation via toolkits is a fundamentally different process than "co-creation" sessions held at service providers service development labs. Toolkits enable a user-only service development and testing process carried out by users in their own actual user environments at no cost to service developers.

5.3 Suggestions for further research

We suggest that further explorations of the role of users in services development will be valuable. Services, as we saw, account for most of the world's economic activity – and better understanding of the pattern of innovation in services is clearly important.

With respect to useful future research, there is a clear need for studies analogous to those pioneered to explore the role of users in product innovation development. For example, in this exploratory study we did not sample service innovations that, although not functionally novel, offered important improvements on dimensions of merit such as convenience and cost. This should be done. In general, we expect that patterns of user product and service innovation will be found to be similar in most but not in all respects. Thus, it may well be that user service innovations not requiring new hardware to implement will be systematically cheaper than those requiring new hardware. (E.g., it may be cheaper to experiment with carrying something home from the store as a novel self-service than it is to develop a new shopping cart.) If so, this will affect the types of service innovations developed.

With respect to management methods development, we expect that innovation processes to systematically identify and incorporate user *service* innovations into producer development processes will differ significantly from lead user methods developed to help producers identify and utilize user product innovations. (Earlier, we made some suggestions on this matter in our discussion of managerial implications.)

With respect to methodological issues, a critical choice we made in the case of this study was to separately consider the *function* provided by a service innovation and the *process* by which that function is delivered. We think that future researchers may well find a similar distinction to be useful. In the case of this initial exploratory study, we have clearly seen that users innovate with respect to the former – and that user-developed functionality is "largely" preserved in the commercial service later offered. On the other hand, the means by which a user self-provides a novel service may or may not be preserved by the commercial service provider. The two provider types may often have different incentives and different operating systems and environments, and will logically develop their own service provision process details accordingly.

In sum, it appears that user-innovators play a major – and perhaps even a dominant - role in the development of functionally novel services. We suggest that a great deal of very interesting further work is needed to more fully explore this matter, and to develop related theory and practice.

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Appendix 1: Important retail and corporate banking services widely offered by banks prior to 1975 – and for this reason not included in our table 1 sample

Retail banking services	***Information services and planning solutions***	*Sources:*
	Monthly statement on individual checking	(Porter 1975); Banking expert interview
	Products, transaction services and security	*Sources:*
	Checking (or demand) accounts	(Porter 1975)
	Savings and time deposits	(Porter 1975); Time deposits authorized by Federal Reserve Act of 1913 (Klebaner 1990)
	Mortgages and home improvements loans	(Porter 1975)
	Credit for automobiles, appliances, the whole range of big-ticket and small-ticket items	(Porter 1975)
	Personal and student loans	(Porter 1975)
	Trust, investment, estate, and custodian services	(Porter 1975)
	Financial counseling	(Porter 1975)
	Letters of credit	(Porter 1975)
	Safe deposit boxes	(Porter 1975)
	Travelers checks	(Porter 1975)
	Christmas and vacation clubs (pay interests)	(Porter 1975)
	Credit Card	Introduced in 1958 (Evans and Schmalensee 2005)
	Customer loyalty reward programs	(Blake 1974)
	Certificates of Deposit (CD)	Banking expert interview
	International currency exchange	Banking expert interview
	Channels to access banking services	*Sources:*
	Bank branches and tellers (some with drive-in facilities)	The first incorporated bank open in 1782 (Klebaner 1990)
	Evening and Saturday banking hours	(Porter 1975)
	ATM	Introduced in the late 1960s (Klebaner 1990)
	After hours branch depositary	Banking expert interview
	Bank by mail	Banking expert interview
Corporate banking Services	***Information services and planning solutions***	*Sources:*
	Monthly statement on checking and loan accounts	Banking expert interview
	Products, transaction services and security	*Sources:*
	Checking (or demand) accounts	(Porter 1975)
	Savings and time deposits	(Porter 1975); Time deposits were authorized by Federal Reserve Act of 1913 (Klebaner 1990)
	Lockboxes (traditional post office box)	Introduced in 1947 by the Radio Corporation of America, in conjunction with the First National Bank of Chicago and Bankers Trust Company (Klebaner 1990)
	Billing and fee-collecting services	(Porter 1975)
	Financial counseling	(Porter 1975)
	Farm and business loans	(Porter 1975)
	Wire transfers	Most international transfers are executed through SWIFT, a co-operative society, founded in 1974
	Clearinghouse	The NY Clearing House Association, the nation's first and largest bank clearing house, was created in 1853 (http://www.nych.org/docs/000591.pdf)
	Channels to access banking services	*Sources:*
	Bank branches and tellers	The first incorporated bank open in 1782 (Klebaner 1990)
	After hours branch depositary	Banking expert interview
	ATM	Introduced in the late 1960s (Klebaner 1990)
	Bank by mail	Banking expert interview
	Financial Electronic Data Interchange (FEDI)	1960's (http://www.123edi.com/edi-history-101.asp)