Tax Return Filing Online – Case Finnish Tax Administration

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Abstract

The purpose of this study was to investigate which factors affect diffusion of tax return filing online (e-return) in Finland. Another aim was to develop an adoption forecast for the service. Finally, customer categorization was suggested in order to enable e-return deliver more public value by accommodating the needs of different customer groups.

Diffusion of Innovations theory, Bass Diffusion Model and Service Process Analysis were used as theoretical base for the study. E-return user satisfaction survey conducted by Finnish Tax Administration was used for statistical analysis and mathematical modeling. In addition, e-return in Finland was benchmarked against leading practices from Denmark, Estonia and the Netherlands. Another comparative study was conducted with a popular business-to-customer service with similar characteristics – e-billing in TeliaSonera.

As a result of the study, we discovered that the diffusion of e-return is dependent on such variables as perceived attributes of e-return system, interpersonal communication channels, performance of related services, and extent of Tax Administration's promotion efforts. In addition, we classified taxpayers in four main categories based on taxpayers' demographics and personal income tax filing needs. The first category, which accounts for 60% of all population, represents those who accept tax assessment decision without making any deductions. The second category, which covers another 36% of taxpayers, consists of individuals who make few deductions. Another 2.5% of taxpayers make speculative deductions that involve consultations with friends or professionals, e.g. healthcare-related deductions. The last 1.5% is the wealthiest taxpayers who use financial advisors for asset management and taxation.

Based on our analysis, we prepared recommendations for improving the e-return service in Finland. The recommendations can be split into two groups: recommendations aiming at increasing the attractiveness of e-return for potential adopters (e.g. introduction of instant tax assessment feature online), and recommendations meant to discourage people from submitting tax return in paper (e.g. paper form service processing fee).

Keywords: income tax returns, tax return filing online, e-return, e-Government, diffusion of innovations, bass model, service process analysis

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1. Introduction

E-Government (derived from electronic government, also known as e-Gov, digital government, online government) has emerged in the area of citizen-government interaction as a result of technology development and society transformation. Started as an information dissemination tool for government institutions, it now covers such areas as e-voting, e-procurement and internal efficiency systems. If successful, e-Government can considerably improve the quality and discover new dimensions of government operations.

In the environment of growing popularity of electronic services, the fact that automation should not happen for the sake of automation frequently remains unnoticed. However, new automated services should bring considerable added value over its traditional counterparts. Therefore, in the area of e-Government it is important to remember the public value of e-initiatives. Public value of e-Government is a multi-dimensional topic and can be viewed from various perspectives, such as financial and organizational value (driven by improved efficiency), political value (driven by improved democracy) or constituency value (driven by improved effectiveness), as suggested by the European Commission (2006).

In this report we analyzed a relatively new, however, very prospective area of e-Government – tax return filing online (e-return) in Finland. The new system enabled taxpayers to make modifications to their taxation statements faster and more accurately, as compared to the traditional paper forms.

In 2008 Finnish Tax Administration (Verohallinto) introduced e-return service through website http://www.vero.fi/veroilmoitus/. In 2009[1,] the service was used by 272 556 taxpayers, which represents approximately 24% of the total number of potential users of this service, where potential users are those who could be completely served online; of those, almost 40% of users come from Uusimaa region. Even though the number of adopters has increased from the previous year (Finnish Tax Administration (2008) estimated that there were146 000 users of e-return in 2008), the result was lower than the targeted level of 301 826 users (the target was achieved by approximately 80%). The situation was better in

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[1] Data provided by Finnish Tax Administration

Uusimaa region, where the goal was achieved by 93% and even as high as 109% in Helsinki region alone.

Even though tax return filing online seems to be an obvious choice for moving taxation towards e-Government, and it is even listed among the basic public services offered across European Union (Capgemini 2007); its immediate public value is not necessarily obvious. For example, introduction of new tax filing system requires significant investments which are not necessarily outweighed by potential cost savings. In addition, the new service may require significant deviations from old habits both for citizens and Tax Administration. Moreover, inadequate measurement of benefits of e-return can lead to overestimation or underestimation of its public value.

This study aimed at analyzing the nature of e-return service and environment surrounding it, so that the development of the service would add public value rather than simply follow a popular trend of automating services. Specifically, the study addressed the following research questions:

1. What factors affect the process of diffusion of online tax return filing and how it will develop in the coming years?

2. How to increase public value of tax return filing?

From theoretical perspective, our research is grounded on three major frameworks. The first one, Service Process Analysis, assisted us in understanding how efficiency and effectiveness of tax return filing process can be improved, at the same time increasing responsiveness to customer needs. The second framework, Diffusion of Innovations theory, was used to understand diffusion of tax return filing online and forecast the future development. For the latter, we applied the third framework, Bass Diffusion Model – a mathematical model which uses Diffusion of Innovations theory as its basis.

From empirical perspective, our study employed quantitative methods supported by cross-examination. Speaking about quantitative research, we mainly used statistical analysis and mathematical modeling based on data from user satisfaction survey conducted by Tax Administration combined with several internal reports of Tax Administration and publicly available information.

For cross-examination we benchmarked leading world practices of tax return filing online - the Netherlands, Estonia and Denmark – and compared our findings with the situation in Finland. We also compared the service with another service with similar characteristics from B2C area – e-billing case of TeliaSonera – one of the largest telecommunication companies in Northern Europe and the largest billing provider in Finland.

Our study is organized in the following way. In the second chapter, we will discuss theoretical background underlying our research: we will start by introducing the universe of possible studies on e-Government in order to identify our niche; and continue with explanation of Service Process Analysis model, Diffusion of Innovations theory, and Bass Diffusion. In the third chapter, we will describe taxation in Finland, emphasizing the importance of improved efficiency in this government unit and how it can be achieved through innovations, followed by more detailed overview of personal income taxation and then narrowing down to the topic of our research - online tax return filing. In the fourth chapter we will present methodology for our study. In the fifth chapter we will report the results of our empirical study, which will be followed by a detailed discussion of results and possible limitations of the study in chapter six. Chapter seven will present our major theoretical and empirical implications, as well as suggestions for further research.

2. Theoretical Background

In this study, we analyzed income tax return filing online, which is an example of e-Government in Finland. E-Government emerged as a topic of active research in the late 90s. This is reasonable due to dependability of e-Government development on development of the Internet. In this work we will be using the definition of e-Government by the European Union (2009):

"e-Government is about using the tools and systems made possible by Information and Communication Technologies (ICTs) to provide better public services to citizens and businesses."

When European Commission (2006) adopted its i2010 e-Government Action Plan, it declared "making efficiency & effectiveness reality" one of the five priorities. In order to evaluate performance of Member States in this action plan and track overall progress of e-Government, European Commission developed measurement frameworks based on experience in earlier projects, such as the eGEP[2] study on the economics and measurement of e-Government. This prior experience suggests that public value of e-Government initiatives is multi-dimensional: it can be viewed as financial and organizational value (driven by improved efficiency), political value (driven by improved democracy) or constituency value (driven by improved effectiveness). With respect to efficiency, the following criteria were adopted: cashable financial gains, better empowered employees, better organizational and information technology (IT) architectures. Speaking about democracy, such criteria as openness, transparency and accountability, and participation are used. Finally, effectiveness is measured by the degree of reduced administrative burden, increased user value and satisfaction, and inclusiveness of public services.

Since e-Government is a broad topic which covers all aspects of government, we will analyze the implication of innovation in personal income taxation from three different perspectives covered in the following subsections. First, we will discuss the universe of possible developments of government with the help of ICT. Then, we review Service Channel Analysis framework which talks about how various service types can be matched effectively

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[2] eGEP project: http://www.rso.it/egep

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with appropriate service delivery channels. And, lastly, we will analyze research on how innovations diffuse in society.

2.1. Major areas of development of e-Government

Existing research on the major areas of development of e-Government or, as they are also referred, categories of interaction (Srivastava and Teo 2004) has created different approaches to identifying major groups. Even though most of the authors agree on the three broad areas: Government-to-Customer (Citizen) (G2C), Government-to-Business (G2B) and Government-to-Government (G2G), authors disagree on existence and scope of additional areas.

While Hung, Chang and Yu (2006) limit the number to those described above; one more area is presented in a framework by Executive Office of the President (EOP 2002): Internal Efficiency and Effectiveness (IEE).

Siau and Long (2005) renamed Internal Efficiency and Effectiveness (IEE) as Government-to-Employees (G2E). In addition, they added orientation perspective (internal vs. external) and focus (individual vs. organization). This enabled them to build an e-Government portfolio matrix presented in Figure 2.1.1.

Figure 2.1.1. Summary of e-Government portfolios. Source: adapted from Siau and Long (2005)

However, this matrix could not consider the importance of cooperation between the different e-Government areas, such as usage of common security protection, hardware and others. Lee, Tan and Trimi (2005) further developed it by introducing Cross-Cutting

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initiatives facilitating interoperability across different practices (see Figure 2.1.2). These initiatives go beyond the previously defined e-Government areas and enable their cooperation and communication. European Union Member States applied this category in their promotion of the use of electronic signatures within the public sector at the end of 2001.
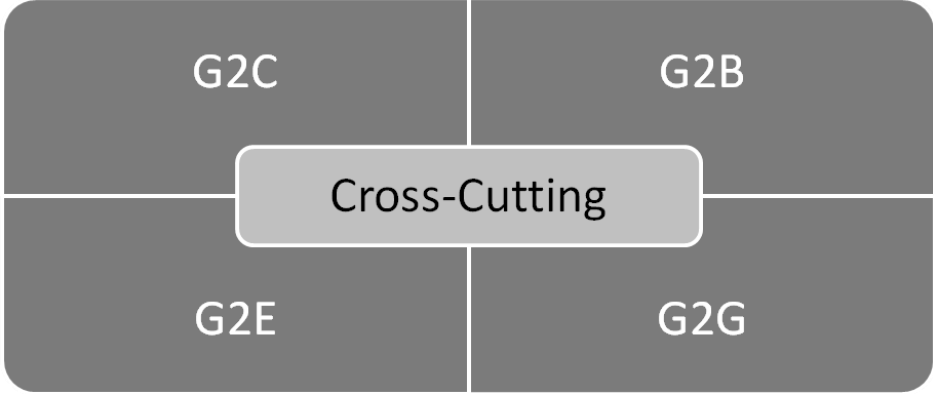
Figure 2.1.2. E-Government portfolios. Source: Lee, Tan and Trimi (2005)

These Cross-Cutting initiatives overlap with the term Electronics for Government (E4G) introduced by Srivastava and Teo (2004 p.2080). According to them, "*this intragovernment operation refers to making better use of the modern technology to reduce costs and improve quality administration, by using industry best practices in areas such as supply-chain management, financial management and knowledge management*".

Furthermore, Srivastava and Teo (2004) and Yildiz (2007) continue the analysis of possible e-Government areas of development by focusing on less discussed interactions of e-Government. Citizen-to-Citizen (C2C) is introduced in both studies and is intended to enable peer-to-peer communication leading to open communication and better support. Srivastava and Teo (2004) also recognize Government to Foreign Government (G2F) as an area related to interactions among governments. Yildiz (2003), however, discusses Government-to-Civil Society Organizations (G2SC), an example of which is electronic communication and coordination efforts after a disaster.

Table 2.1.1 summarizes different viewpoints on the major areas of e-Government development. It demonstrates the lack of unanimity among researchers: as stated earlier, even though all the researchers agree on existence of G2C, G2B and G2G, most of them complete the list with additional areas which differ from author to author. These fluctuations do not show relation to the temporary development of research activity, since the broadest selections

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of areas were introduced by researchers in the middle of the period formed by articles analyzed.

Table 2.1.1. Major areas of e-Government development by different authors

Area	Example	Brown and Brudney (2001)	EOP (2002)	Yildiz (2003)	Srivastava and Teo (2004)	Lee;Tan and Trimi (2005)	Siau and Long (2005)	Hung; Chang and Yu (2006)
G2C	Online tax card for citizens	Yes	Yes	Yes	Yes	Yes	Yes	Yes
G2B	E-procurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes
G2G	A shared database among agencies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IEE/G2E	Web-based health care system		Yes			Yes	Yes	
Cross-Cutting /E4G	Public – Key infrastructure interoperability				Yes	Yes		
C2C	Electronic discussion groups on civic issues			Yes	Yes			
G2F	Facilitated information flow between 2 state governments				Yes			
G2SC	Electronic communication and coordination efforts after a disaster			Yes				

One of the reasons behind fragmentation of approaches could be the fact e-Government is still evolving and new dimensions may emerge when researchers approach the topic from a different prospective. Another reason could be the purpose of underlining research: if it is more generic, then the three most common areas may be sufficient.

An important observation is that the new areas are suggested along the major Government stakeholder groups and micro- and macro environment. In other words, e-Government is a means of developing relationships between Government and such stakeholders as citizens, businesses, other government agencies, employees, foreign governments, etc. In addition, e-Government can improve Government's microenvironment by facilitating interoperability between different government agencies. Furthermore, due to its size and power, Government can influence macro environment by, for example, encouraging open discussion among citizens and serving as a platform for that discussion.

This observation may also contribute to the understanding of existing controversy among authors. Since governments vary significantly from country to country, particular stakeholder groups may be underrepresented in some locations. It also implies that additional areas may develop over time.

This list of areas may become virtually endless; however, for the purpose of simplicity it is advisable to use Lee, Tan and Trimi (2005) model of e-Government portfolios for general purposes. This model has three advantages. First, it covers probably the most commonly used areas. Second, it emphasizes the importance of interoperability of different e-Government practices. Third, it is easy to visualize and comprehend.

All in all, several authors have been analyzing the major areas for e-Government development. Despite existence of common core areas - Government-to-Customer (G2C), Government-to-Business (G2B) and Government-to-Government (G2G), researchers vary in their vision of the whole model. This difference can be attributed mainly to the focus of particular research and may be developed even further. However, we believe that the model of e-Government portfolios by Lee, Tan and Trimi (2005) is suitable for general purpose discussion and simplicity.

2.2. Service process analysis

We would like to continue by presenting Service Process Analysis, a normative model introduced by Apte and Vepsäläinen (1993) and Tinnila and Vepsäläinen (1995) that is frequently used to evaluate how effectively different types of services are matched with their delivery channel. We believe that the model is useful in our analysis as it demonstrates how an underperforming homogeneous service can be dramatically improved if unique subservices can be identified and matched with the most appropriate delivery channels.

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The authors developed a categorization of service mix, which involves different levels of frequency and timeliness of transactions, uncertainty, and degree of customization, information complexity and types of resources needed, as it is perceived by the customer.

In the simplest form, mass transaction, services have few options and little customization, e.g. money transfer. On the next level, standard contract, service may include relatively complex specifications, which are not, however, customized for individual customers, e.g. bank loans. On the third level, customized delivery, service offering is more flexible for individual customers and involves a higher level of confidence, e.g. investment advising. The final category, contingent relationship, service includes complex problems, intensive communication and several interrelated activities, e.g. as in project management.

A service process is carried out via service delivery channels which consist of various organizations and relationships between them. The articles suggest a framework for categorizing service delivery channels based on their length, i.e. *"the number of different units and interorganizational linkages constituting the channel"* (Tinnilä and Vepsäläinen 1995 p.63). Market network is based on self-service of customers (e.g. ATMs) and provides direct access to market resources with minimal intermediation, thus becoming the shortest channel. The second shortest channel is service personnel, which provide personal interaction within one organization. This channel can be extended by adding several hierarchical levels. The next service channel is agent/alliance, which represent third party intermediaries which represent the organization to its customers. The longest service channel is internal hierarchy, which refers to relationship with internal customers. Rather than having a formal customer contract, this service channel relies on employment relationship.

The authors have constructed a framework which helps match different types of services with service delivery channels efficiently and effectively and demonstrates trade-offs associated with each decision (see Figure 2.2.1). The most efficient and effective service types are presented on the diagonal.

Service delivery is associated with two types of costs: production costs and transaction costs. Production costs originate from internal operations, and transaction costs are caused by the effort to establish and maintain customer relationship. If service-providers deviate from the diagonal, they have to bear excessive costs, e.g. if companies decide to establish contingent relationship via market network, they will have to bear high transaction costs and

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uncertainty in responsibility; on the other hand, if they choose to offer a mass transaction type of service through internal hierarchy, it will lead to unnecessary bureaucracy and paper work.
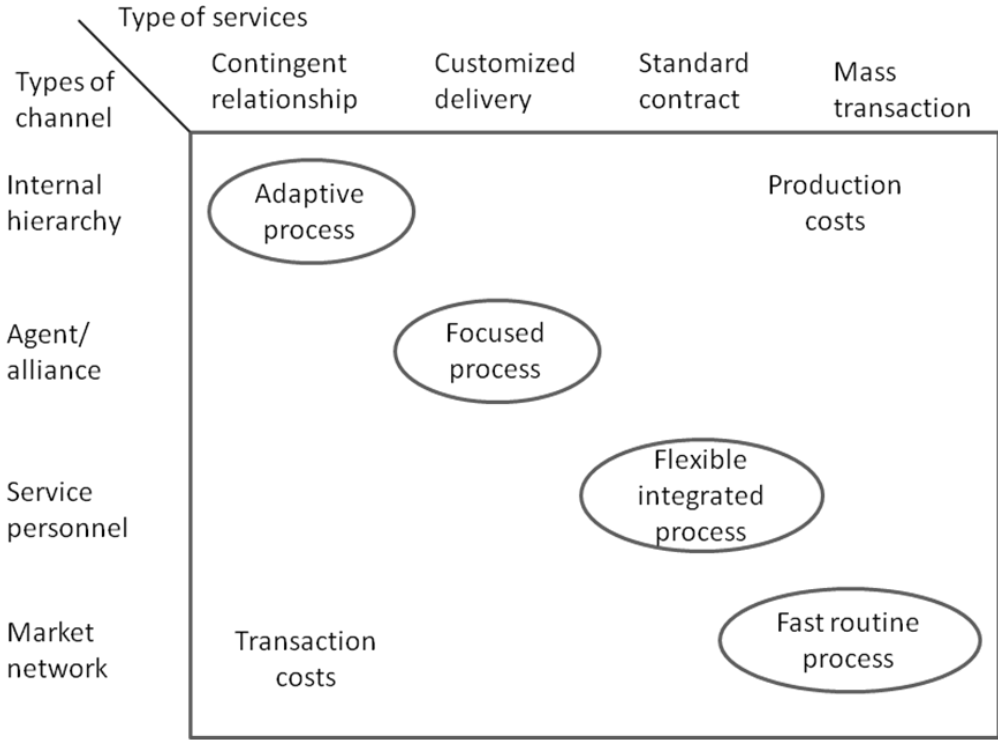
Figure 2.2.1. Service process analysis matrix with generic processes. Source: adapted from Tinnila and Vepsäläinen (1995)

2.3. Diffusion of innovations in society

In the previous chapter we saw how quality of service can be improved by matching types of services with the best fitting service channel. Now we will continue with analysis of how adoption of innovative services evolves over time in society.

Research on adoption of innovations has long history in academic literature. Innovations originating from information technology are frequently analyzed with theories earlier developed for anthropology, sociology, marketing, economics and other sciences.

Some authors discuss it from the perspective of factors affecting user acceptance, diffusion of innovations theory (Rogers, 1983; Moore & Benbasat, 1991). Other models emphasize the importance of user perception, behavioral intentions and attitudes towards the system, e.g. in theory of reasoned action (Ajzen and Fishbein 1969; Ajzen and Fishbein 1973; Fishbein and Ajzen 1975), technology acceptance model (Davis et al., 1989) and theory of planned behavior (Ajzen 1991). Another approach defines success of IS innovations through

different perspectives of evaluating IS systems: information, system and service quality, (intention to) use, user satisfaction, and net benefits (DeLone and McLean 1992; DeLone and McLean 2003). More recent researchers have made an attempt to unify earlier theories in order to explain user intention to use and subsequent behavior: four key constructs determine user intention and behavior, performance expectancy, effort expectancy, social influence, and facilitating conditions, which, in turn, are influenced by gender, age, experience, and voluntariness of use (Venkatesh et al. 2003).

We believe that Diffusion of Innovations theory (DOI) satisfies best the needs and goals of our study: for us, it is important to understand what factors affect users acceptance and how Tax Administration, as a powerful change agency could influence those factors. We will first review Diffusions of Innovations theory, and then describe Bass Diffusion Model – a quantifying model which is based on DOI and help forecast adoption of innovations curve.

Diffusion of Innovation Theory, or Innovation Diffusion Theory, was first developed by Lazarsfeld et. al. (1949) and Rogers (1962). According to the 5th edition of "Diffusion of Innovations" by Rogers (2003 p.5), *"diffusion is the process in which an innovation is communicated through certain channels over time among the members of social system"*, where innovation is an idea, practice or object which is perceived new by potential adopters (individuals, organizations, etc), communication channel is the means of transmitting information from one individual to another, and social system is a set of several units involved in joint problem solving with a common goal.

DOI has been widely used as a basis for academic and applied research, for example in analysis of adoption of technology in households (Brown and Venkatesh 2005), adoption of enterprise-resource planning systems in organizations (Bradford and Florin 2003), and fashion-bias in management and IS research (Baskerville & Myers 2009) and others.

According to Rogers (2003), diffusion of innovations happens through innovation-decision process when individuals go from gaining initial knowledge of innovation to seeking confirmation for his decision to use innovation. In this process individuals pass five stages. First, individuals learn about innovation and its basic function (knowledge), then they form either favorable or unfavorable attitude (persuasion), which is followed by decision to accept or reject the innovation (decision), after that individuals put the new idea into use

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(implementation) and finally seek acceptance for the decision made (confirmation) and may either persist with the decision or reverse it depending on the reaction of his environment.

The author identifies five key variables determining the rate of adoption of innovation (see Figure 2.3.1): perceived attributes on innovations, type of innovation-decision, type of communication channels, nature of the social system, and extent of change agents' promotion efforts.
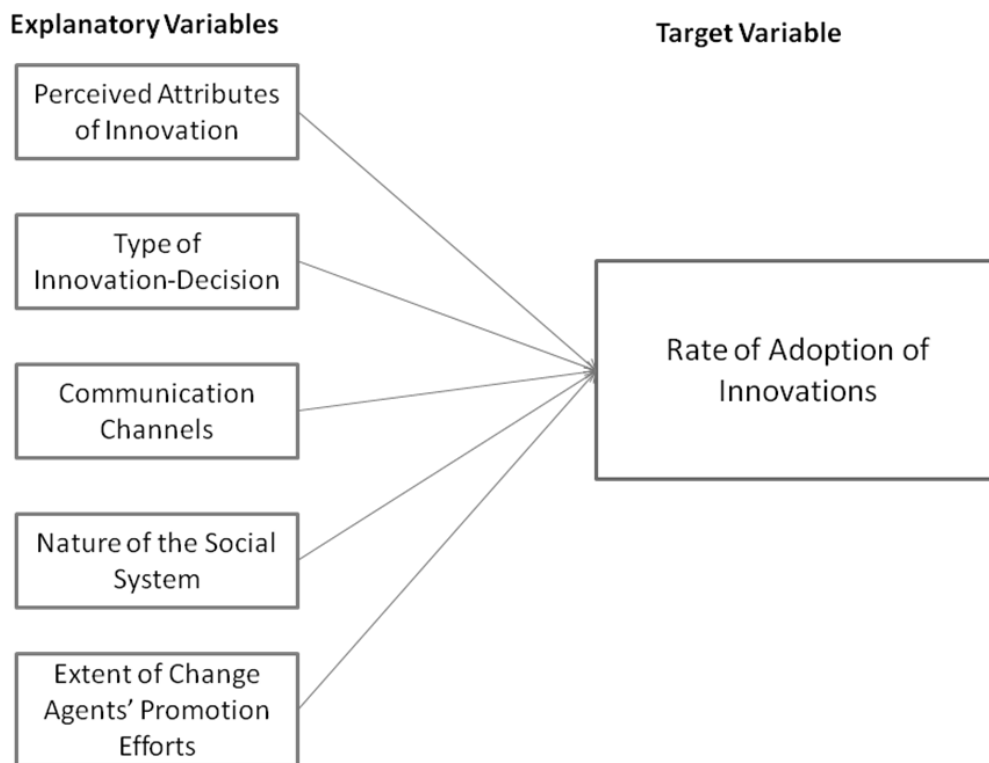
Figure 2.3.1. Variables determining the rate of adoption of innovations. Source: adapted from Rogers E.M. "Diffusion of Innovations" 5th edition Free Press 2003

Perceived attributes of innovations

First and one of the most widely discussed variables is perceived attributes of innovations. It can be further categorized into 1) *relative advantage* of the innovation compared to its predecessor; 2) *perceived complexity* or ease of use; 3) *compatibility* with existing values, past experiences and needs of adopters; 4) *trialability* prior to final decision and 5) *observability* of results to others.

Moore and Benbast (1991) emphasizes the importance of values of innovation characteristics as perceived by potential adopters rather than by innovation providers, similar

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to Technology Acceptance Model where it is one of the major constructs. However, Karahanna, Straub. & Chervany (1999) have criticized Diffusion of Innovations Theory for insufficient explanation of how attitudes to innovation are formed and eventually influence the decision to accept or reject innovation and how innovation characteristics affect this process. In addition, they have found difference among various innovation characteristics in terms of predicting power of adoption and usage behavior. Their results suggest that for adoption important attributes are relative advantage, ease of use, trialability, results demonstrability, and visibility; for usage, however, only relative advantage and image were significant.

It is important to note that Moore and Benbasat (1991) introduced additional attributes: *voluntariness* in accepting innovation and effects of innovation decision on individual's *image*, and split the original observability into *result demonstrability* with respect to individual's acceptance of innovation and *visibility* of acceptance of innovation in community.

Type of innovation-decision

The second variable is type of innovation-decision, which can be further categorized into optional, collective or authority. Optional innovation-decisions are made by potential adopters independent of the decisions of the other members of the system. Collective innovation decisions are made by consensus among members of the system; and authority innovation-decisions are made by relatively few members of the system who are distinguished by their power, social status or other characteristics.

Type of communication channels

The third variable is the type of communication channels used by change agent, such as mass media and interpersonal channels. Communication channels can be categorized as a) mass media versus interpersonal channels and 2) localite versus cosmopolite channels.

Mass media channels are better at reaching a large audience in a short time span, creating basic knowledge and influencing weakly held attitudes. On the other hand, interpersonal channels are more effective in providing two-way information exchange and affecting strongly held attitudes.

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Localite channels are those linking individual to sources inside his/her social system while cosmopolite channels link individuals to sources outside his/her social system. Mass media are almost entirely cosmopolite channels while interpersonal channels can be both localite and cosmopolite. Generally, cosmopolite channels are more important at the knowledge stage while localite channels become more important during persuasion stage in the innovation-decision process.

It is important to notice that mass-media channels are more important for early adopters while interpersonal channels take the leading role with later adopters. Similarly, cosmopolite channels are more effective with early adopters and later adopters need localite channels.

Nature of the social system

The fourth variable is the nature of the social system which introduced the boundaries of innovation diffusion and also affects it through its structure and norms. Social structure describes how units are arranged within a social system and what type of communication exists between them and norms describe established behavioral patterns among the units.

Extent of change agents' promotion efforts

The fifth variable is the extent of change agents' promotion efforts. Change agents are those units that influence potential adopters' innovation-decision process in the direction desirable for them. It is believed that success of innovation diffusion is positively related to the amount of effort change agents put into contacting clients. However, it is interesting that, while in the early stages of diffusion innovation heavily relies on change agents' efforts, the situation changes considerably once critical mass has been achieved – diffusion becomes almost completely self-sustainable, under further impetus of opinion leaders.

Rogers adopts a popular approach in classifying potential users of innovation: innovators, early adopters, early majority, late majority and laggards. Following the Central Limit Theorem, provided that the number of potential users is large enough, the probability distribution function follows normal distribution and cumulative distribution function is an S-shaped curve: i.e. after initial slow take-off, the number of adopters rapidly increases until it reaches half of the population of potential adopters, after which the adoption rate gradually slows down and levels off.

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As we can see from the previous discussion, DOI theory provides valuable insights into the nature of adoption of innovations; however, it fails to offer a mathematical model that can be used for forecasting future adoption. Therefore, we would like to continue our analysis by looking into mathematical models that build on DOI and can be used for forecasting.

One such model is Bass Diffusion Model, which was first introduced by Frank in his paper "A new product growth model for consumer durables" in 1969, and is frequently used to add mathematical basis for DOI.

Bass (1969) defined two major groups of adopters: innovators and imitators. Innovators are not influenced in the timing of their adoption by social pressures, i.e. the number of people who have already bought the product; imitators, on the other hand, are influenced by the number of previous adopters. In addition, Bass Diffusion Model assumes that potential adopters of an innovation are influenced by two types of communication channels: mass media and word of mouth, where mass media represent external influence and affect mainly innovators and word-of-mouth (internal influence) almost exclusively imitators (Mahajan, Muller, Bass 1990). The importance of innovators is very high in the beginning, but drops eventually over time. Figure 2.3.2 graphically illustrates this statement.
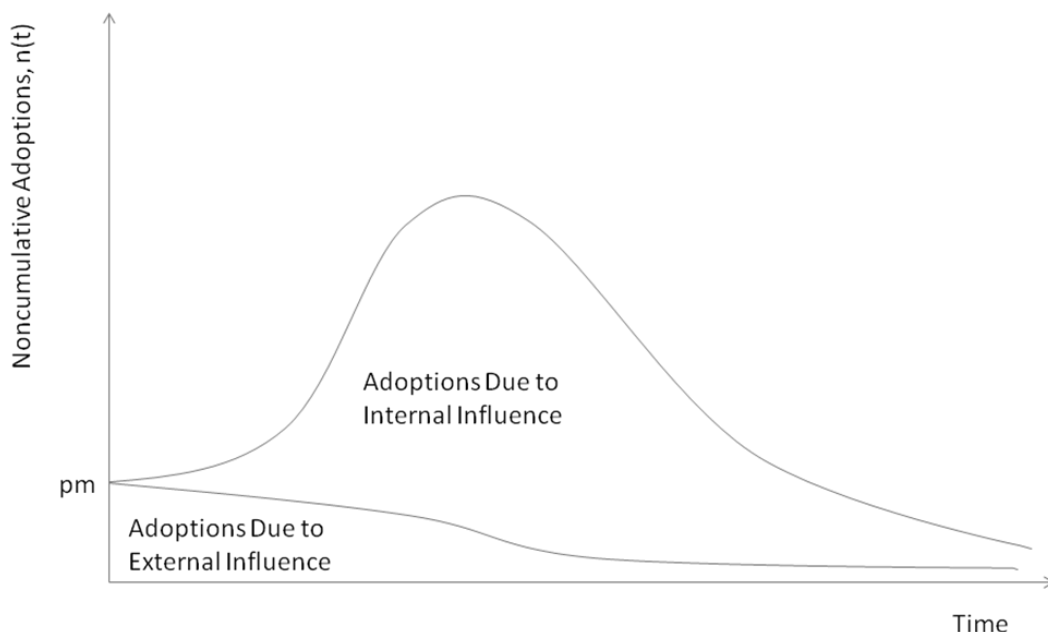
Figure 2.3.2. Adoption due to external and internal influences in the Bass Diffusion Model. Source: adapted from Mahajan, Muller, Bass (1990)

Figure 2.3.3. presents the analytical structure of the Bass Diffusion Model developed by Mahajan, Muller, Bass (1990). According to it, noncumulative adopter distribution starts at a certain level (pm – a constant) and peaks at time T*, which is also the point of inflection of the S-shaped cumulative adoption curve. Adoption curve is symmetric up to 2T*, i.e. the distribution between T* and 2T* mirrors the one below T*.
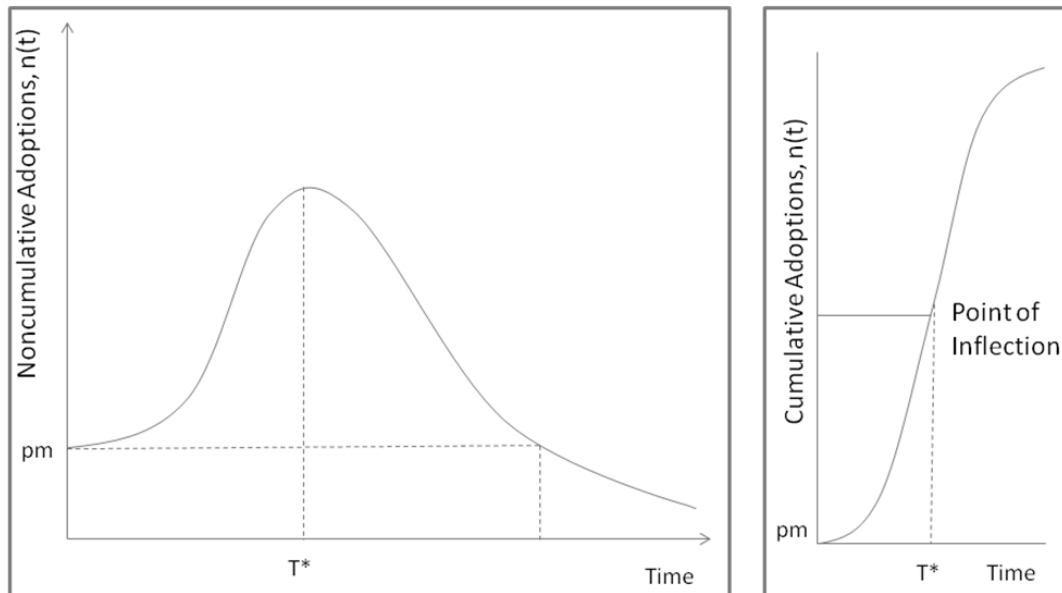
Figure 2.3.3. Analytical structure of the Bass Diffusion Model. Source: adapted from Mahajan, Muller, Bass (1990)

Mahajan, Muller and Bass (1995 p.80) formulated the central proposition of Bass Diffusion Model as:

The probability of adoption at time T given the adoption has not yet occurred =

*=p+q*cumulative fraction of adopters at time T*,

where q is coefficient of imitation and p is coefficient of innovation.

Based on earlier studies (Sultan et al. 1990, Jeuland 1994) the authors state that average value of p= 0.03 and the average value of q= 0.38. In addition, p is often 0.01 or less and q rarely exceeds 0.5 or goes below 0.2. Value (p + q) represents usually varies between 0.3 (slightly contagious product/service) and 0.7(highly contagious product/service) (Lawrence and Lawton 1981).

In our study we used the model formulation as suggested by Mahajan and Sharma (1986):

The probability density function for a potential adopter making an adoption at time t is:

$$f(t) = (p + qF(t))(1 - F(t))$$

The corresponding cumulative density function is:

$$F(t) = \frac{1 - e^{-(p+q)t}}{1 + (q/p)e^{-(p+q)t}} \text{ "}$$

If q= 0, then f(t) follows negative exponential distribution. If m is the potential number of ultimate adopters, then the *number of adopters at time t* will be:

$$n(f) = mf(t)$$

and the *cumulative number of adopters at time t* will be

$$N(t) = mF(t).$$

In order to use Bass Diffusion Model for forecasting, we need to estimate parameters p and q for e-return. Various authors have suggested different procedures for estimation: Bass (1969) suggested to use an ordinary least square procedure, while Schmittlein and Mahajan (1982) developed their maximum likelihood estimation procedure and Srinivasan and Mason (1986) further improved this approach and created their nonlinear least squares estimation procedure.

Others have recommended algebraic procedures involving a certain number of estimation based on managerial experience, comparison and market data: for example, Lawrence and Lawton (1981) to estimate p + q (believed to be easier for managers to estimate than p and q separately, as p values are small), first year sales s and market potential m, and then algebraically solve for p and q from the formula for sales, where sales is the monetary interpretation of the number of adopters, i.e. S=m*f(t).

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A different algebraic estimation procedure was suggested by Mahajan and Sharma (1986). Assuming that the point of inflection occurs when F*is equal to a certain known value, and we can calculate n*, N* and t*. Based on this one can algebraically estimate all other parameters by solving the system of simultaneous equations in order to express the needed parameters with N*, n* and t*. The final equations are presented below:

$$p \cong \frac{n*(m-2N*)}{(m-N*)^2},$$

$$q \cong \frac{n*m}{(m-N*)^2}$$

3. Taxation in Finland

In this section of our study we will introduce the system of personal income taxation in Finland, to aid understanding of the environment where the new service was introduced.

Majority of Finnish taxes are derived from the following two categories: taxes on income, profits and capital gains; and taxes on goods and services. Individuals contribute 65.1% to all state income taxes and corporate bodies – 34.9 %, respectively (Finnish Tax Administration 2009a). Maximum marginal tax rate for individuals is 56.1% and 26% for corporations.

According to the Ministry of Finance (2009 p.15), tax ratio in Finland is the sixth highest among OECD countries, "*in 2006 the ratio of total taxes to GDP at market prices was 43.5 in Finland compared with 35.9 in the OECD area as a whole*". Tax legislation is similar to the tax legislation in other Scandinavian countries.

In this section we will, first, discuss why studies of innovations affecting productivity of Tax Administration are important for state economy. As the innovation studied concerns an important element of personal income taxation in Finland – tax return filing - we will continue with a detailed introduction of personal income taxation system in Finland to gain better understanding of the whole domain. Lastly, we will review the modes of tax return filing existing to date.

3.1. Public value of improved taxation

Analysis of performance of public value drivers (efficiency, democracy and effectiveness) in taxation processes is important as taxation represents the major revenue-generating government unit, especially when it comes to personal income taxation. Moreover, its operations significantly affect all individuals and organizations operating inside and sometimes even outside the country. It is especially important at the times of deep economic crisis, when the amount of taxable income shrinks and government spending increases.

In addition, increase in public value can lead to huge aggregated cost saving due to the volume of operations, even if individual savings can seem minor and thus unattractive for independent agents. For example, savings worth 1€ per person are usually neglected by individual taxpayers; however, their sum is approximately 4 500 000 Euros in Finland. In the

case of tax return filing online, already during the first year after launch the service saved the work of approximately 14 full-time equivalent employees altogether in the mailing, handling and storing stages (Finnish Tax Administration 2008 p.16).

One way to deliver more public value is to increase the variety and quality level of automated electronic services available from any location to reduce service times and service personnel. Growing number of online tax cards submitted by individual customers and usage of e-filing services for corporate customers and palkka.fi[3] for small enterprises (Finnish Tax Administration 2008) shows that customers are also welcoming these changes.

To implement these improvements Tax Administration needs advanced information technology systems and, in fact, it is among the largest users of IT in Finnish public sector and IT expenses are second only to labor costs (Finnish Tax Administration 2008). More importantly, Tax Administration needs to critically review current service delivery processes and service content, so that it could improve its performance in all value drivers – efficiency, democracy and effectiveness.

3.2. Personal tax return filing in Finland

According to Tax Guide for Individuals (Finnish Tax Administration 2009b), individual taxable income consists of two parts: capital income and earned income. Capital income includes all income generated through possession of wealth; and earned income covers all others types of income, including but not limited to wages, salaries, pensions, and others.

Personal income taxation procedure starts with separation of capital income and earned income concerning business income, farming income, the income of a shareholder in a consortium, and the receipts of dividend from a non-listed company.

Capital income is taxed at flat rate of 28%. However, only 70% of the receipts of dividend are taxable income, and the remaining 30% are tax-exempt income; therefore, the actual tax payable for dividend income is 19.60%. Tax Administration performs automatically separates taxable and tax-exempt portions during tax assessment procedure.

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[3] Palkka.fi is an electronic service provided by Finnish Tax Administration for contractors where they can calculate workers' wages and optionally directly submit deduction for costs of domestic help.

For tax assessment purposes, tax-deductible amounts are subtracted from gross income, and then the remaining amount of earned income is assessed according to the progressive scale of state taxation. In addition, there are two flat-rate taxes applicable to earned income, namely municipal tax (usually 18% to 19%) and church tax (1% to 2%).

Upon completion of initial tax assessment procedure, taxpayers receive decision and notice of assessment (verotuspäätös), which shows the amount of tax owed (in the case of a tax deficit) or alternatively, the amount of the tax refund (in the case of too high withheld tax), and pre-filled income tax return forms for all taxpayers.

If a taxpayer agrees with the decision, he/she needs to follow instructions given in the assessment regarding payment or receiving additional tax.

However, if a taxpayer believes that changes need to be made to the assessment of tax-deductible income, they need to make adjustments to the pre-completed income tax return form (tax return filing) before a certain deadline (in tax year 2008, the deadline for Helsinki region was May 07, 2009 and for the rest of Finland – May 14, 2009). Tax return process is an important part of personal income taxation, as it allows individual taxpayers correct the amount of their tax liability; the final net taxable income is used as a basis for the final tax assessment.

In Finland, there are two types of deductions: those which are offered on demand, i.e. by special request made by taxpayers, or granted ex officio, i.e. taxpayers do not have to request them specifically. Examples of the latter include study grants, basic deduction in municipal taxation and pension income deductions.

Generally, income deductions are related to expenses associated with acquiring and maintaining of income (for capital and earned income) and social purposes (for earned income only). In addition, natural and other deductions can be granted if certain requirements are satisfied. Deductions are made to each type of income separately. Also, certain deductions are tax credits, i.e. directly subtracted from the amount of tax (usually state tax), not the amount of income.

Upon receiving income tax return, Tax Administration revises the assessment and issues a new tax statement by the end of October of the following year. According to the Annual Report 2008 of Finnish Tax administration, only 30% of all taxpayers make

deductions in a single year. Figure 3.2.1 summarizes personal income tax assessment procedure in Finland.

```
                        ┌──────────────┐
                        │ Gross Income │
                        └──────┬───────┘
               ┌───────────────┴───────────────┐
               ▼                               ▼
       ┌──────────────┐               ┌──────────────┐
       │Capital Income│               │ Earned Income│
       └──────┬───────┘               └──────┬───────┘
              ▼                               ▼
   ┌───────────────────┐           ┌───────────────────┐
   │ Ex oficio deductions│         │ Ex oficio deductions│
   └─────────┬─────────┘           └─────────┬─────────┘
             ▼                               ▼
   ┌───────────────────┐           ┌───────────────────┐
   │ Net capital income –│         │Net earned income – taxed│
   │ taxed at 28% (19.6%)│         │ at progressive scale │
   └─────────┬─────────┘           └─────────┬─────────┘
             └───────────────┬───────────────┘
                             ▼
                 ┌───────────────────────┐
                 │ Decision and notice of tax │
                 │      assessment       │
                 └───────────┬───────────┘
                             ▼
                 ┌───────────────────────┐
                 │      Tax return       │
                 └───────────┬───────────┘
                             ▼
                 ┌───────────────────────┐
                 │Revised decision and notice│
                 │  of tax  assessment   │
                 └───────────────────────┘
```

Legend:
- ☐ completed by Tax Administration
- ☐ completed by taxpayer
- ⌐ ⌐ happens only if taxpayer does not agree with Initial tax decision
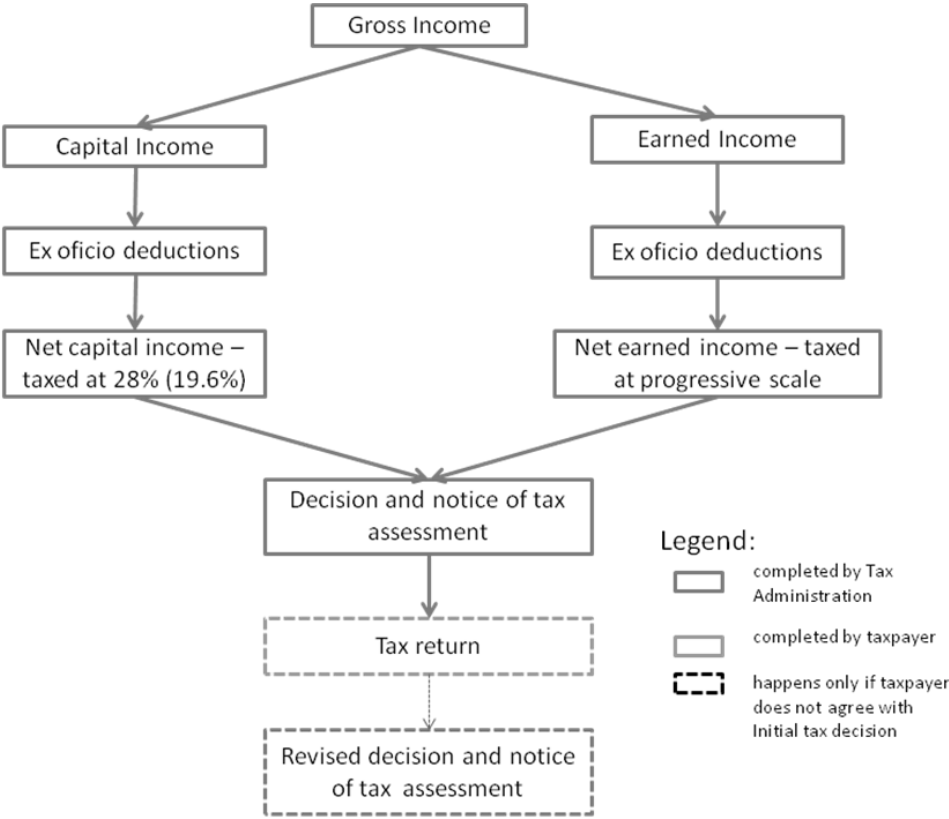
Figure 3.2.1. Personal income tax assessment procedure in Finland

3.3. Modes of tax return filing

Historically, taxpayers have been using paper tax return form, which is automatically sent with decision and notice of assessment. Since 2006 Finnish Tax Administration has been issuing pre-completed tax return forms based on information collected from third parties, such as employers, banks, and others; and users only need to make necessary adjustments (e.g. if for a legitimate reason one spent more money on commuting between home and work than pre-calculated).

In 2008, Finish Tax Administration introduced online income tax return service for majority of deductions available through website (http://www.vero.fi/veroilmoitus). Possibilities to make deductions online were limited to deduction for commuting costs between home and work (asunnon ja työpaikan väliset matkakulut), the deduction for paid maintenance of children (maksetut elatusmaksut), deduction for costs of domestic help (kotitalousvähennys), deductions from earned income (ansiotuloista vähennettävät

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tulonhankkimiskulut), deduction for temporary quarters (työasuntovähennys), deduction from capital gains and losses (luovutusvoitot ja –tappiot), transfer tax refund to spouse (veronpalautuksen siirto puolisolle), Åland deductions (Ahvenanmaan vähennykset). To access the service users needed to use bank access codes[4]. Users could save their session to finish later and individual session could last maximum of 1 hour. In addition, if a taxpayer had more deductions than it was possible to submit online, he could submit paper return for those deductions that were not covered online.

In case individual taxpayer had additional deductions, which were not possible to file online, supplementary information could be delivered via paper form.

Even though the number of adopters has increased from the previous year (there were 146 000 users of e-return in 2008 (Finnish Tax Administration 2008) versus 272 556 users in 2009[5]), the result was lower than the targeted level of 301 826 users (the target was achieved by approximately 80%). The situation was better in Uusimaa region, where the goal was achieved by 93% and even as high as 109% in Helsinki region alone.

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[4] Access Codes are offered by Finnish banks and usually include User ID, one-time codes and confirmation codes; they are widely used for personal identification for internet banking and other services provided by companies and public sector. (Adapted from Nordea Bank www.nordea.fi, accessed November 24, 2009)

[5] Data provided by Finnish Tax Administration

4. Methodology

In this section we will explain how we will respond to our research questions:

1. What factors affect the process of diffusion of online tax return filing and how it will develop in the coming years?

2. How to increase public value of tax return filing?

For this purpose we used two different methods to analyze online tax return filing in Finland (see Table 4.1 for summary).

First, we studied data provided by Finnish Tax Administration in order to find major relationships between diffusion, and individual's demographics such age, income level, social status and others, and attributes of innovation. In addition, we used the data to predict future adoption of tax return filing and identify categories of taxpayers with respect to personal income taxation filing – knowledge that will help us identify means for improving efficiency of the service.

Second, we conducted cross-examination to support the results from the first stage by benchmarking tax return filing in Finland against leading practices in other countries and similar Business-to-Consumer (B2C) services. Our case countries were Finland, the Netherlands, Estonia and Denmark, which have been at the edge of innovation in government services in recent years. Speaking about B2C services, we believe that e-invoice provides good basis for comparison: both tax return and bills have long been in usage of individuals and there is a strong habit of using them in paper form; both require additional routine manual work if produced and processed in paper form and both provide large cumulative savings when switching to electronic mode, but are marginal in individual cases. We conducted an interview with Hannu Savolainen, the Head of Billing at TeliaSonera, one of the largest telecommunication companies in Northern Europe.

Table 4.1. Roadmap of the study

Method	Data	Theory	Research Question	Outcome
Quantitative Data Analysis	User satisfaction survey conducted by Tax Administration	DOI	1	Relationships among diffusion, user characteristics and innovation attributes
		Bass Diffusion Model	1	Adoption forecast
		Service Process Analysis	2	Personal income taxation classification by user needs
Cross-examination	Benchmark reports about tax return filing in the Netherlands, Estonia and Denmark and Finland	N/A	2	Comparison of e-return in Finland, Estonia, Denmark and the Netherlands
	Case TeliaSonera (interviews with Hannu Savolainen, Head of Billing)	DOI	1	Comparison of e-return and e-billing

4.1. Quantitative data analysis

4.1.1. Relationships among diffusion, user characteristics and innovation attributes

We started with analyzing the results of survey organized by Finnish Tax Administration where respondents were asked to give feedback to e-return service for tax year 2008. The survey was offered to individual taxpayers in Finnish as a link on the leaving page of e-return service (www.vero.fi/veroilmoitus) between April 6, 2009 and May 15, 2009. The survey form is presented in Appendix 2.

Original dataset included 26 049 unique observations and 59 variables which were cleaned to eliminate missing values and inconsistencies. The final set included 21 245 observations and 65 variables. We used SAS 9.1 for data mining and statistical analysis in this study.

The dataset included observations from all regions and major municipality types in Finland, income groups from under 10 000 Euro per year to beyond 70 000 per year, both genders and ten major professional designations. However, since this dataset had information about static population we can perform only enumerative study.

It is important to note that the data was heavily skewed towards users of e-return caused by the approach to distributing survey form: almost 90% of respondents used e-return completely or in combination with submitting paper forms, which is much higher than 24% total e-return usage rate in 2009. In other words, those who never tried the service were not present in the dataset; and the dataset includes only those paper form users who consciously rejected e-return after trying it, as opposed to those, who had no experience with e-return. However, even though the number of those who filed income tax return in paper is only 1.35% of the whole sample, the number of matching unique observations (287) is large enough to reflect the population of paper-return users at confidence level of 95% and confidence interval of +/-0.053.

It is also important to notice that even though we performed tests for statistical significance for all the most important classification variables and reported relevant conclusions, analysis included data from only one source. Therefore, when similar satisfaction surveys will be repeated in the coming years, it is recommendable to perform tests for statistical significance in order to prove findings from this study.

We also analyzed respondents' plans on switching between different tax return filing modes in the year 2009 as opposed to the mode selected in 2008. We observed tendency towards switching to more electronic modes. Over 98% of those who used e-return this year wanted to continue using it next year; of those, who submitted electronically and in paper, 68% wanted to switch to e-return next year; 57% of those who used paper this year wanted to switch to e-return next year and another 17% would use electronic and paper form. We can see that those who preferred paper this year had the lowest propensity to switch to e-return.

Speaking about satisfaction rate, we saw that 97% of users were satisfied, which clearly shows that service quality, as such, was not the major cause of relatively slow adoption rate. Another interesting fact is that 77%[6] of all e-return service usage sessions resulted in submitting a tax return, which can be further adjusted to account for those users who might have needed several sessions to submit the final tax return or decided not to submit any tax return. Even more so, e-return users requested additional help, outside the basic guidelines provided in the service, only in 0.54% of usage sessions.

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[6] Data provided by Finnish Tax Administration

4.1.2. Adoption forecast

Next, we decided to use the data to determine the type of adopters prevalent at this stage of innovation diffusion, i.e. we aimed to understand whether the new adopters of the service in the coming year will be innovators or early majority or even laggards as this can affect the choice of communication channels.

After that we used Lawrence and Lawton method for Bass Diffusion Model to forecast future adoption. For that we requested the management of Uusimaa Regional Tax Administration to estimate how contagious is the innovation (p+q values). Other parameters were obtained from reports.

4.1.3. Personal income taxation classification by user needs

We continued with analyzing personal tax return filing process from the perspective of Service Process Analysis model. Even though tax return filing process is a viewed as a single process at the moment, we believe that there are several major interaction patterns between Finnish Tax Administration and its customers. Such patterns can be defined as sub-services and viewed individually, which in turn requires identification of optimal servicing approaches for each one of them and will eventually lead to improved efficiency and effectiveness of the service. In this case, it is more important to analyze the process from the perspective of customer needs rather than technical properties of delivery channel.

In order to create subcategories, we split the whole population into four groups depending on their income level and number and diversity of deductions submitted. After that we calculated percentage shares for each of the groups.

4.2. Cross-examination

4.2.1. E-return in Finland versus Estonia, Denmark and the Netherlands

In our analysis we compared usability design and functionality of electronic tax return filing systems in several countries, namely, Finland, the Netherlands, Estonia and Denmark. The choice was motivated by similarities in legislation and culture in these countries. Information about tax return filing systems in these countries was obtained from respective national Tax Administrations. We concentrated on the following characteristics: service adoption up to date, service access, technical functionality of service and range of service offering.

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4.2.2. E-return versus e-billing

After that we decided to compare e-return with another widely used business-to-consumers or government-to-citizen service – e-billing. E-bills are defined as e-invoices sent to consumers.

E-invoices are invoices transmitted through electronic means. Some further narrow the definition only to those types of electronic invoices that are directed straight to payment system via open standards in xml-form, such as Finvoice or TEAPSSXML in the Finnish context, thus excluding pdf email attachments (Lompolojärvi 2010), we will call such e-invoices "true invoices".

5. Empirical Study

5.1. Quantitative data analysis

5.1.1. Relationships among diffusion, user characteristics and innovation attributes

In order to understand how various factors affect the progress of diffusion of online tax return filing, we decided to view it from three different perspectives: rate of adoption of tax return filing online mode, percentage of satisfied users and propensity to switch to paper mode from electronic mode (see Table 5.1.1.1).

Table 5.1.1.1. Major relationships among diffusion, user characteristics and innovation attributes

Effect on / Factors	Adoption of tax return filing online mode	Percentage of satisfied users	Propensity to switch from electronic mode to paper in the following year
Prior experience with online service of Tax Administration	Positive effect	Positive effect	Negative effect (those who have not had prior experience tend to switch from electronic to paper modes most)
Prior experience with online tax card	Highest: use online tax card once a year (perhaps permanently employed)	Highest: use online tax card once a year (perhaps permanently employed)	Lowest: use online tax card once a year (perhaps permanently employed)
Exposure to communication channels	Positive effect Most effective: word of mouth (91.27%) Least effective: Tax Office personnel (81.39%)	Positive effect Most effective: tax return filing instructions (97.94%) Least effective: Street ads (93.48%)	Highest: Tax Office personnel (0.83%)
Gender	Men - 88.36% Women - 91.20%	Men – 97.69% Women - 97.13%	Men – 0.33% Women – 0.30%
Age	Highest: younger individuals Lowest: older individuals	Highest: mid-aged Lowest: older people	Middle-aged have lower propensity compared to younger or older.

Effect on / Factors	Adoption of tax return filing online mode	Percentage of satisfied users	Propensity to switch from electronic mode to paper in the following year
Income level • **in the current year** • **expectations about the following year**	Highest: 25 000-35 000 and 35 000-40 000 in the current year (these groups represent highest contribution to income tax and are among the largest earner distribution groups)	Highest: 30 000-50 000 euro/year in the current year Lowest: – under 15 000 euro/year However, slight dependence found only with expected income level in 2009 (p=0.0049), not 2008	No effect
Residence • **region** • **municipality type**	Regions: Highest: Kymenlaakso Lowest: Åland Municipalities: Highest: large municipalities outside Helsinki Lowest: countryside	Regions: Highest: Etelä-Karjala Lowest: Åland Municipalities: Highest: countryside Lowest: Helsinki region	Regions: Highest: Pohjanmaa Lowest: Kymenlaakso, Itä Uusimaa Municipalities: Highest: Rural Lowest: Urban
Professional designation	Highest: blue-collar workers Farmers and private entrepreneurs choose to send both electronic and paper forms.	Highest: housewives, lower members of staff and blue collar workers Lowest: students, pensioners and private entrepreneurs On average, satisfaction rate was 97%	Highest: unemployed, students Lowest: farmers, housewives

We can see that prior experience of using taxation-related online services has positive impact on diffusion of online tax return filing in all three perspectives. Similarly, those who use online tax card once a year tend to be more positive towards e-return.

Exposure to communication channels has positive relationship with diffusion of tax return filing online. It is interesting that, while the most effective channel in terms of convincing individuals to use the service is word of mouth, those who were introduced to the service through tax return filing instructions have the highest satisfaction rate which could be caused by the fact that tax return filing instructions set more adequate expectations of the service compared to other communication channels. Surprisingly, Tax Office personnel were the least effective communication channel.

Speaking about individuals' characteristics, we saw that women have more positive attitude towards e-return. Also, younger individuals tend to be faster adopters than older ones; however, middle-aged people tend to have higher satisfaction rates and stability of choosing e-return over other modes. It is also interesting that the groups with the highest tax contribution and largest share of earners are among earlier adopters with higher satisfaction rates. Also, there is a surprising relationship between different municipality types: while urban population is more eager to adopt e-return and continue with this mode in the following year, rural population has higher satisfaction rates. Speaking about professional designation, we noticed that groups with presumably easier taxation process, e.g. blue collar workers, tend to be among earlier adopters, while those with special needs, like framers and private entrepreneurs are among later adopters. In addition, it is difficult to identify one particular trend in satisfaction: while individuals with average level of technical expertise and social status (e.g. housewives, lower members of staff and blue collar workers) tend to have the highest satisfaction rates, groups with technical skills much higher or lower than average (e.g. student and pensioners) or more complex tax filing process (e.g. private entrepreneurs) were less satisfied.

In general, we can see that in many cases groups which had the highest adoption rate in the current year have lower than average switching rates. As it has been discussed earlier, such tendency could be cause by the fact that the groups with high adoption rate need less time to acceptance/rejection decision and most of the group members have made their final decision this year. On the contrary, groups with lower adoption rates in the current year have members who need more time to make decision and have higher propensity to imitate.

We will continue with a discussion of distribution of usage time, experienced problems and workload associated with tax return filing online.

Distribution of time of usage

In the survey we have information only about the point of time people responded to the questions; however, since the survey was offered at the leaving page of e-return service, this time distribution can be used as proxy for e-return submission distribution. Analysis of time distribution of service usage can help predict fluctuations in service usage in the following year and adjust the service accordingly. This factor naturally led to the fact that the

curve had two peaks before deadlines with the highest one being before the first deadline (see Figure 5.1.1.1).
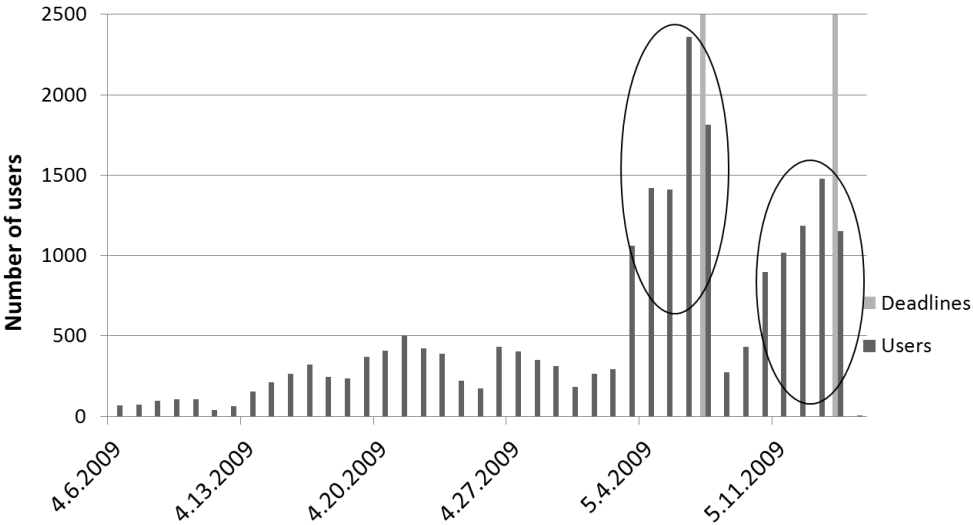
Figure 5.1.1.1. Distribution of time of e-return usage

Analysis showed that a similar curve was repeated for different age subgroups and municipality types. One interesting abnormality was, however, that starting from income level 20 000 - 25 000 euro/year the ratio between first and second peak is directly proportional to income growth. E.g. for income group 20 000 - 25 000 first peak is only 6% higher than the second peak, however, for income group 70 000+ the difference is 145%. We believe that there may be two reasons explaining this situation: first, the fact that tax return filing deadline was earlier for Helsinki region and the proportion of more affluent individuals is higher than in the rest of Finland (see Figure 5.1.1.2), and, second, richer people may be generally more inclined to submit their tax deductions earlier rather than later.
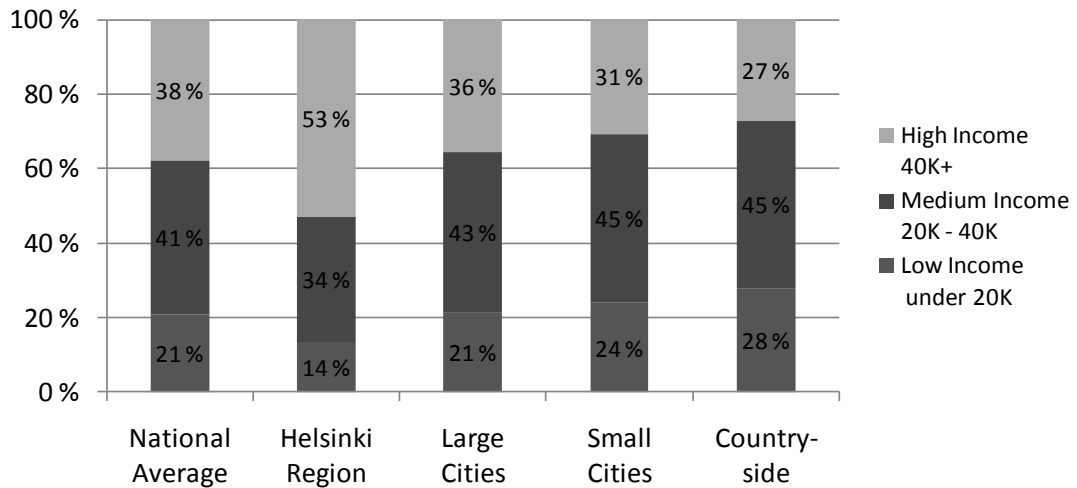
Figure 5.1.1.2. Income distribution in different municipalities in Finland. Source: Statistics Finland (2008)

One interesting finding is that even though there does not seem to be any dependency between the time of usage and preferred tax filing mode or expected switching, there was a strong dependency with satisfaction rate (p= 0.7209). Further analysis shows a growing dissatisfaction trend over the period of service operations (see Figure 5.1.1.3). This also corresponds with feedback received Tax Administration Help Desk: 61% satisfaction rate during the first week decrease to 58% during the first peak and further fell to 57% during the second peak.
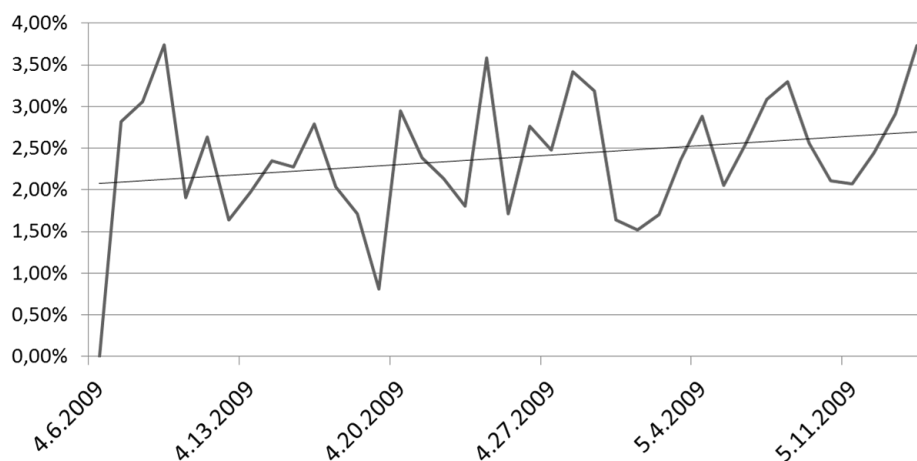
Figure 5.1.1.3.Changes in percentage of dissatisfied users over time

Problems while using e-return service

Next, we decided to analyze how problems encountered by individuals while using e-return service were related to preferred tax return filing mode, switching rate, and satisfaction. In general, 73% of people either did not have any problems or had unique problems.

Of those who had encountered common problems, 21% felt that the service was missing important information, 18% expected more instructions; another 14% found vocabulary difficult, 10% felt that the service required information which is difficult to know

Among those who were satisfied with the service, over 70% did not experience any problems, while only 37% among unsatisfied users did not have any problems. We can clearly see relationship between the number of problems and overall satisfaction rate.

Among those dissatisfied, the largest problems were: narrow range of service offered (more than 30% of cases), insufficient instructions (4%), disorganized user interface (UI) (3%) and difficult instructions (2%).

The range of difficulties encountered by satisfied users is somewhat different. Those satisfied had much fewer problems with service range (less than 5%), even though it was also the most widespread problem. The second most popular problem is vocabulary difficulties (2%), insufficient instructions (2%) followed by instruction question complexity (1%).

Chi-square test identified dependencies between preferred tax return filing mode and problems experienced by e-return users. Specifically, complex questions (p= 0.3758) and difficult vocabulary (p=0.6145) seemed to influence individual's decision whether to use the online service or not. Surprisingly, no dependencies were found between experienced problems and switching or satisfaction rate, which could mean that individuals were willing to use the service only when it was not cumbersome and in all other cases switched to paper mode and were not willing to reconsider the decision.

Among those who requested help, satisfaction rate was 58%[7] and individuals believed that they had obtained sufficient help to continue online tax return filing in 69% of cases. In addition, Tax Administration's reports show that there was improvement in Help Desk

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[7] Data provided by E-return Service Help Desk of Finnish Tax Administration

performance during year 2009 compared to year 2008. Generally, 59% of all requests were related to online service and 33% were about deduction for commuting costs between home and work.

Effects of amount of workload associated with tax return filing

Number of deductions submitted by an individual online was used as proxy for amount of workload necessary to submit income tax return. However, it is important to note that multiple-choice options offered in the survey did not include the types of deductions which were not available online.

We divided workload patterns in 4 broad types: type 0 – those who did not submit any deductions online (1.5%), type 1 – those who submitted 1-2 deductions online (93.9%), type 2 – those who submitted 3 deductions online (3.9 %) and type 3 – those submitted 4 and more deductions online (0.7%).

Top 5 combinations cover 90% of taxpayers. If individuals chose to make only 1 deduction, it was usually either deduction for commuting costs between home and work (58% of all cases) or deduction for costs of domestic help - 11%. In addition, 79% of all taxpayers included commuting costs as deductions.

If individuals chose to make two deductions, in 10% of cases it was a combination of the above mentioned deduction types. Other popular combinations included deductions from earned income - 6%, work-related only -3% and transfer of tax refund to spouse - 3%.

Interestingly, when respondents were asked which categories they were not able to submit online, in most cases they named the same deductions, as when they were asked which deductions they successfully submitted online.

Surprisingly, chi-square test distinguished only two deductions as explanatory variables for income tax mode preference. Those were deduction for paid maintenance of children (p=0.3654) and other deductions from capital gains and losses (p=0.0013).

Similar results were observed when dependency between deduction and switching rate was tested. Surprisingly, more dependencies between types of deduction and satisfaction rate were discovered. In addition to the above mentioned ones, there was dependency with such

deductions as work-related (tulonhankkimiskulut) (p= 0.7349), work-related housing (työsuhdeasuntovähennys) (p= 0.5698), and transfer to spouse (p=0.7930).

Figure 5.1.1.4 shows the relationship between different workload types and number of problems experienced. We can see that among those who submitted 1 or more deductions, the number of problems grew with the number of deductions.
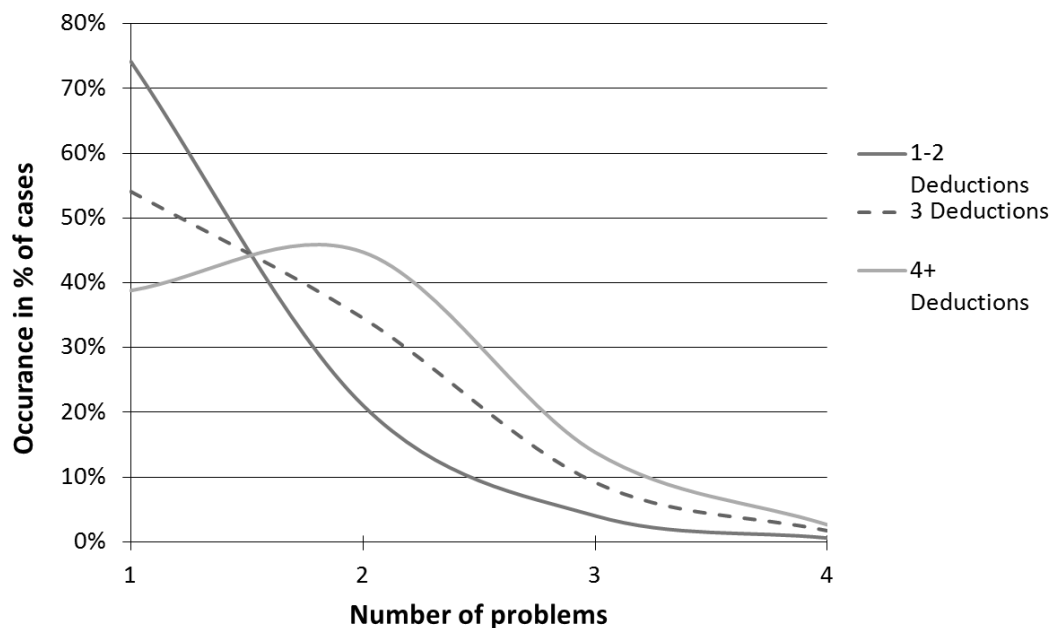
Figure 5.1.1.4 Relationship between workload and number of problems experience by users

The single biggest problem was narrow range of service, which could be also accompanied by other unique problems. However, we saw that even though major problems repeat across categories, their popularity differed.

For people who made the largest number of deductions, the second biggest problem was lack of instructions followed by difficult vocabulary. For people with medium number of deductions, the second biggest problem was difficult vocabulary followed by lack of instructions, then complexity of questions. For those who made few deductions the second largest problem was difficult vocabulary, followed by complex questions, insufficient instructions and messy UI.

In addition, the more deductions a person needed to make, the higher was the tendency to use paper return. Similarly, the number of deductions negatively influenced people's willingness to switch to more electronic means of submitting e-return. While there was no significant change among those, who used complete e-return or mixed electronic- and paper-

return in 2009, analysis shows that for those who selected paper return in the current year, the more deductions they submitted, the more they preferred to select paper mode (complete paper or mixed electronic- and paper) during the following year.

Our analysis proved that the number of deductions made by an individual is related to his/her professional designation. We observed smallest number of deductions among blue collars workers, housewives, students and pensioners; and highest for managers, farmers and upper members of staff.

Even though one might think that easiness of electronic form might prompt taxpayers to submit more deductions, it actually did not happen.

5.1.2. Adoption forecast

In this section we will present the findings we obtained from applying Bass Diffusion Model to survey data in order to predict future adoption of the service.

First, we attempted understand the category of potential users which are currently adopting e-return. For that, we placed cumulative adoption on the adopter categorization distribution curve suggested by Rogers (2003) (see Figure 5.1.2.1).

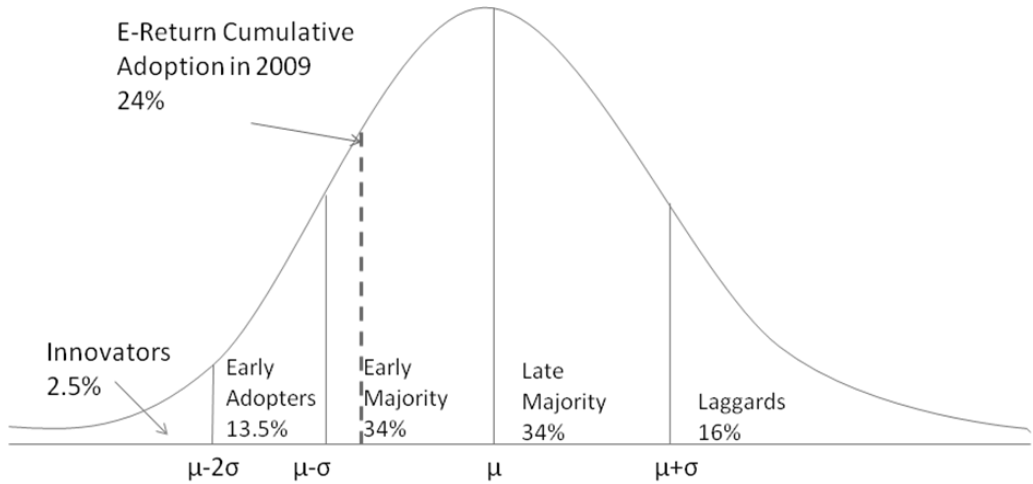Figure 5.1.2.1. Type of potential users currently adopting e-return

We can see that Tax Administration will need to promote the service to early majority of potential adopters, assuming that majority of individuals who have adopted tax return filing online will continue using it in the following year. This finding will help us identify appropriate communication channels for marketing campaign for the following year.

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Second, we used algebraic estimation procedure suggested by Lawrence and Lawton (1981) to forecast adoption curve for tax return filing online. Due to considerable changes in the service structure which happened after the first year of introduction, there is a possibility of various interpretations of the current state of the service. Therefore, we developed three different scenarios, as described below:

- in **scenario 1**, we assume that 2009 was the first year of the service, and market potential includes all taxpayers, and there was no effect from the previous year;

- in **scenario 2**, we assume that 2009 is the second year of the service and the total number of users was generated over two years, market potential is the same as in the previous scenario;

- in **scenario 3**, assume that 2009 was the first year of a new generation of the service, and 50% of last year's users would decide to stay with the service anyway - so they are included in the market potential for this generation of the service.

We believe that scenario 3 is the most adequate representation of the current state, as it takes into account effects of both generations of e-return in Finland and at the same time adjusts for the fact the service has changed significantly during the second year.

We obtained estimation about degree of contagiousness of the service from management of Uusimaa Regional Tax Office: according to them, tax return filing online is moderately contagious, i.e. $p+q=0.5$. Speaking about estimation of market potential, we used the total number of taxpayers (4 535 992) estimated by Finnish Tax Administration (2009a) as the basis for modification for different scenarios. We used the total number of taxpayers rather than number of potential users[8] in a given year (as it is otherwise used by Tax Administration), because an individual can be a potential user in one year and then change her profile in the next year. In addition, those taxpayers who do not make any deductions and just review their tax decision are not calculated as potential users, while in reality, there needs could have been satisfied by the means of online service. Appendix 2 presents a detailed overview of our calculations.

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[8] Potential users represent taxpayers who could be completely served through tax return filing online in a given year as opposed to other modes

Speaking about estimation of market potential, we used the total number of taxpayers (4 535 992) estimated by Finnish Tax Administration (2009a) as the basis for modification for different scenarios. We used the total number of taxpayers rather than number of potential users[9] in a given year (as it is otherwise used by Tax Administration), because an individual can be a potential user in one year and then change her profile in the next year. In addition, those taxpayers who do not make any deductions and just review their tax decision are not calculated as potential users, while in reality, there needs could have been satisfied by the means of online service. Appendix 2 presents a detailed overview of our calculations.

Figures 5.1.2.2 and 5.1.2.3 present the resulting adoption curves for tax return filing online. Based on the estimation, we can expect that the service will have the largest number of non-cumulative adopters in a single year between 2012 and 2015. Based on scenario 3, we can expect that in year 2010 the number of new noncumulative adopters will be slightly less than 350 000 individuals, representing 8% of the total market potential.
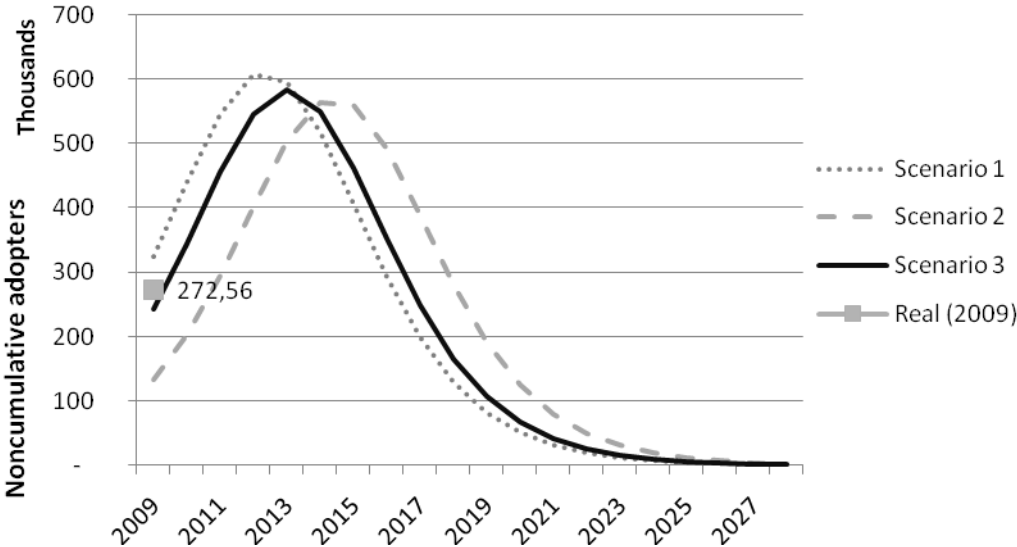
Figure 5.1.2.2. Noncumulative adopters of e-return

Speaking about total number of adopters, we can see that cumulative adoption starts to level out around year 2019. For 2010 calculations based on scenario 3 suggest that the total number of adopters will be close to 500 000 individuals. It is interesting to see that the total

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[9] Potential users represent taxpayers who could be completely served through tax return filing online in a given year as opposed to other modes

number of cumulative adopters in a given year is less than the sum of new noncumulative adopters, which can be explained by the fact that some adopters change their adoptions decision towards non-adoption.
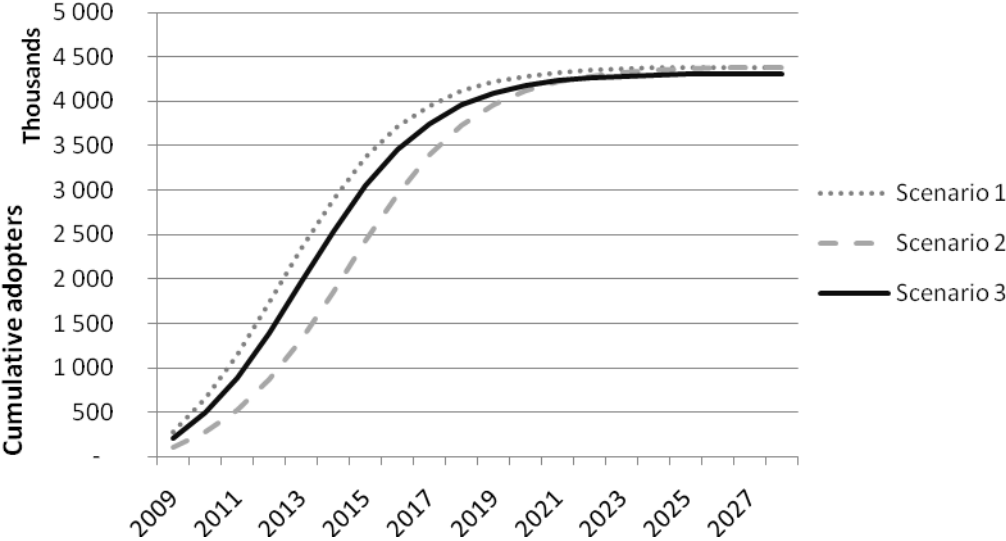
Figure 5.1.2.3. Cumulative adopters of e-return

It is important to note that this forecast has two major assumptions:

- First, the service should stay identical over the years of existence;

- Second, market should stay the same, both in terms of quantity and quality (i.e. total number of taxpayers should stay stable as well as their characteristics).

Even though, these assumptions are likely to be unrealistic at least in the long run, we believe that estimates for the next few years can be useful for evaluating public value of e-return. First, it helps measure efficiency of e-return in terms of cashable financial gain: both from the perspective of completed investments and also evaluating the potential of new improvements. Second, our forecast helps promote democracy in terms of increased openness, transparency and accountability, as it eases communication between Tax Administration and relevant stakeholders. Finally, this forecast helps determine potential of service effectiveness in terms of inclusiveness of public services.

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5.1.3. Personal income taxation classification by user needs

In this section we will present the results of our analysis of how customers of personal tax return filing processes can be arranged into categories based on their needs. In order to create subcategories, we split the whole population into four groups depending on their income level and number and diversity of deductions submitted. After that we calculated percentage shares for each of the groups. Based on our analysis, we were able to identify four major categories of taxpayers.

The **first category** consists of individuals who do not make any alterations to the pre-completed tax filing form, i.e. there exists only one-way informative service; this category represents 60% of all taxpayers (Finnish Tax Administration 2009a) and completely corresponds with the definition of fast routine processes.

The **second category** comprises those taxpayers who make few simple deductions. Here, customers need to make some alterations, which could be offered as multiple-choice options and require almost mechanical evaluation process on the side of Tax Administration. Similar services in other industries are self-service online airline ticket price estimation based on basic itinerary information or public transportation scheduling services. This category lies between fast routine process and flexible integrated process, closer to the former.

The **third category** unites individuals who make less common deductions and often seek advice from professional services (e.g. tax office personnel) or their personal network (e.g. colleagues, friends and family), especially those involving judgmental estimation or even speculation, for example, health care deductions, professional expenses and others. We would expect such individuals to have medium, medium-high level of income and higher educational level or professional status compared to the previous category. This process is most comparable with standardized insurance product and, thus, best falls into the category of flexible integrated process.

In the **fourth category** customers are wealthy individuals with complicated taxation process who use professional advisory services, for wealth management and taxation, frequently administered by third parties as proxies. In many cases such individuals have capital income higher than earned income. We estimate that there are approximately 75 000

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individuals in Finland who fall into this category[10]; on average, they own 600 000 euro in assets. Such taxation process is best described as focused process and requires close co-operation between Tax Administration and third-party service providers.

Since personal tax return filing process concerns only external customers, we omit adaptive processes from the modified model. Based on this categorization we suggest the modified model for personal tax return filing in Finland which is summarized in Figure 5.1.3.1 (original model was presented in section 2.2.).
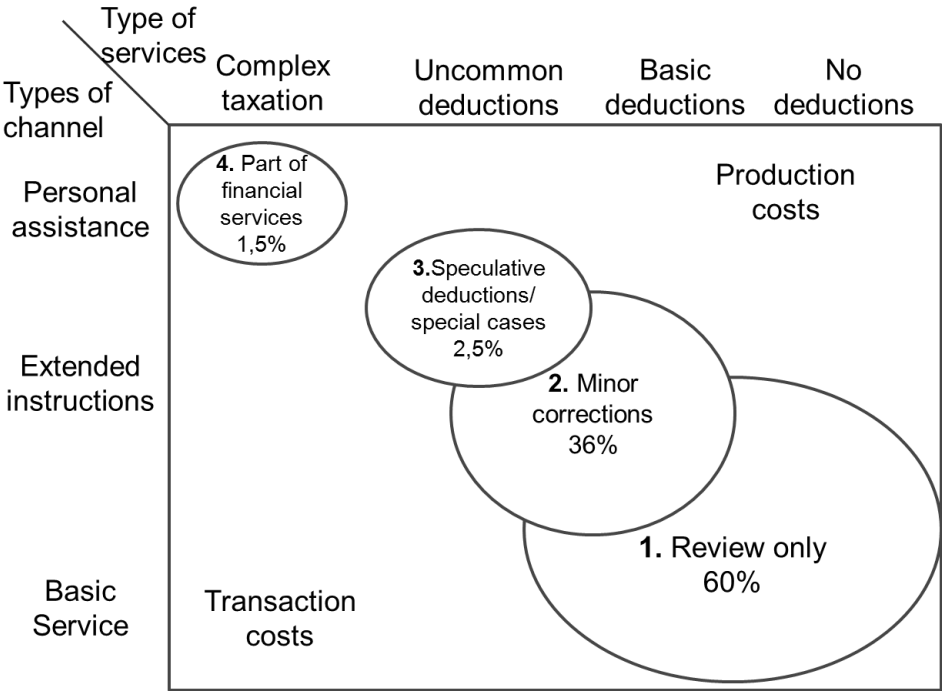
Figure 5.1.3.1. Service process analysis matrix for Personal Tax return filing

5.2. Cross-examination

5.2.1. E-return in Finland versus Estonia, Denmark and the Netherlands

In our analysis we compared usability design and functionality of electronic tax return filing systems in several countries, namely, Finland, the Netherlands, Estonia and Denmark. The choice was motivated by similarities in legislation and culture in these countries. Information about tax return filing systems in these countries was obtained from respective national Tax Administrations. We concentrated on the following characteristics: service

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[10] Based on the number of private banking customers published in Q3 2009 Report of Nordea www.nordea.fi

adoption up to date, service access, technical functionality of service and range of service offering. The analysis is summarized in Table 5.2.1.1 and we can clearly see that Finland has room for development in virtually all characteristics of e-return.

Table 5.2.1.1. E-Return in Finland versus other countries

	Finland	Estonia	Denmark	The Netherlands
Launch	2008	2000	2004	2005
Usage	24%	88%(2007) 91% (2008)	90% (2007)	NA
Mode	Online	Online	Online	Software
Multiple log-in options	Yes	Yes	No	No
Prefilled	Yes	Yes	Yes	No
Tax statement published electronically	No	Yes	Yes	Yes
Personal archive	No	Yes	Yes	Yes
All deductions online	No	Yes	Yes	Yes
Open 12 months /year	No	Yes	Yes	Yes
Killer features	NA	Tax return in 5 days	Instant tax assessment Tax return in 4 days Customizable UI Re-use of personal tax information	Submit several entries before deadline
Bundling with	NA	Customs operations Tax card	Common login to public authorities Tax card	National insurance contribution
Other			Ordinary and extended tax return	Several people can use the same software

5.2.2. E-return versus e-billing

We conducted an interview with Hannu Savolainen, Head of Billing at TeliaSonera[11]. TeliaSonera is a leader in promoting e-invoices in Finland – both in terms of volume (over 3.5

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[11] TeliaSonera, one of the largest ICT companies in Finland, provides diverse mobile, fixed line, TV and Internet connection service to businesses and consumers. At the same time, TeliaSonera is the largest invoice provider in Finland, issuing 20 million of invoices per year (both business and consumer invoices).

million invoices already in 2009) and innovative approaches used, such as "virtual barcode", which allows simple copying of billing information from pdf email bills to internet bank. At the moment approximately 50% of e-bills are sent as email attachments and the rest as true e-bills.

For TeliaSonera, introduction of e-invoicing was a part of a larger effort to eliminate non-value-adding processes and accelerate the adoption of ICT innovations among its customers – an indirect support to its core business. TeliaSonera first introduced email attachment bills in 2004 and first true e-bills were introduced in January 2008. During the first 5 years (2004-2008), only 6% of its consumers adopted e-bills.

In order to motivate its consumers to switch to electronic bills, TeliaSonera has been using both positive and negative incentives. Speaking about the former, TeliaSonera has outlines the major benefits of switching to e-bills on its website www.sonera.fi (in Finnish). It also introduced an innovative digital printing technology which allows customization of individual paper invoice's appearance and includes a short marketing message promoting e-bill on each paper bill. (See Appendix 1for an example of such a bill). In addition, TeliaSonera closely monitors customer reactions through its customer service centers and can promptly react to early-stage signs of dissatisfaction among consumers.

Despite these efforts, adoption of e-billing remained slow until beginning of 2008, when on February 11, 2008, TeliaSonera announced that due to the costs associated with processing paper bills it will have to charge 1€/paper bill fee from its broadband consumers. This decision came after a long discussion within the company, as many were concerned with potential loss of customers and negative image in the public. The price of 1€ was derived from both cost factors and psychological concerns associated with introducing such fees.

e-Billing for Consumers
Two choices: e-bills via banks and pdf-bills by email

	12/2007	02/2008	04/2008	12/2008	10/2009	12/2009 (estimate)
All	5 %	6 %	10 %	14 %	15,10 %	16 %
Broadband	6 %	9 %	23 %	35 %	39,20 %	40 %

Pdf-bill by email introduced in 2004

E-bill introduced 01/2008

Press Release Feb 11, 2008 and Notifications to customers of consumer broadband paper bill price tag started

Consumer broadband paper invoice price tage effective from 1.4.2008 (1,00 € / paper bill)

Total 15,10%. (Broadband ja Mobility) Broadband 39,20%.

Figure 5.2.2.1. Adoption of e-billing among consumers of TeliaSonera. Source: Data from TeliaSonera (2009)

Surprisingly, none of the fears was realized and, on the contrary, the company has witnessed a dramatic increase in adoption rate: over the following 10 months 35% consumers were using e-bills – a sharp increase from 9% in the early 2008.

Following its success, TeliaSonera introduced a 5€/paper invoice fee for its corporate customers. At the moment adoption curve among consumers is gradually leveling out around 40%, and the company is considering new ways to convert potential adopters.

6. Discussion

The present research conducted quantitative and qualitative analysis of tax return filing online in Finland – a relatively new innovation in the sphere of personal income taxation. In this study we were aiming to respond to the following two research questions:

1. What factors affect the process of diffusion of online tax return filing and how it will develop in the coming years?

2. How to increase public value of tax return filing?

Since the innovation we are studying belongs to domain of e-Government, we started by analyzing the possible areas of how e-Government can develop. This helped us identify the niche for our research and gave a more holistic view of the phenomenon. After reviewing several theoretical frameworks for analyzing e-Government, we selected Lee, Tan and Trimi (2005) for its simplicity and ability to explain most areas of e-Government. Based on this model we can identify two major perspectives on understanding personal tax return filing.

The first, and probably the most obvious one, is Government-to-Citizen perspective. Electronic tax return filing enables faster taxation process and eliminates a large proportion of mistakes which can potentially occur during paper form processing. This naturally leads to higher satisfaction rate among citizens.

The second equally important perspective is Cross-Cutting effect of electronic tax return filing. Implementation of e-return requires improvement in intragovernment co-operation and communication which in turn leads to overall increase in process reliability. Introduction of e-return can help decrease amount of time required to process personal income taxation files and decrease variability in the process.

An interesting contradiction comes from the fact that tax return filing online came first as a Cross-Cutting initiative, as a means of improving efficiency of income tax process. In the annual report Finnish Tax Administration (2008 p.16) states *"according to a cautious estimate, this (tax return online service) saved the work of approximately 14 full-time equivalent employees altogether in the mailing, handling and storing stages."* At the same time, however, success of this initiative is completely dependent on citizens' willingness to

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adopt this initiative, which, in turn depends on the perceived value of this initiative from Government-to-Citizen perspective.

We believe that it is relatively obvious for service-providers, such as Tax Administration, that this type of initiatives cannot solely serve internal purposes and have to meet customer needs – hence this study. However, it is much more complex to communicate the importance of initiatives targeting internal organizational efficiency to customers, especially when such initiatives address consumer customers and requires change in their behavior without offering significant benefits over the previous state.

This observation raises the question of how taxpayers view tax return filing online, which factors affect their perception and willingness to adopt, and what trends in diffusion can we expect in the future – concerns that were summarized in the first research question. In order to respond to this question we performed quantitative analysis of user satisfaction survey performed by Tax Administration in 2009 and benchmarked the service against leading world e-return practices and e-billing. We will discuss our findings in more detail in section 6.1.

Another important question is how to increase public value of e-return, which could include such aspects as financial and organizational value (driven by improved efficiency), political value (driven by improved democracy) or constituency value (driven by improved effectiveness). To this end we identified 4 major categories of customers of tax filing service. In section 6.2 we will triangulate our categorization with other empirical data and discuss implications of this categorization for public value.

6.1. Adaptation of Diffusion of Innovations theory for e-return

At this stage of our research we would like to synthesize our finding and adapt the generic DOI model (presented in section 2.3) for the purpose of our study. Below we will present our perspective on each DOI explanatory variable in relation to e-return. We will review each explanatory variable and apply our findings from empirical analysis. The final adapted model is summarized in Figure 6.1.

Explanatory Variables   **Target Variable**

| Perceived Attributes of E-Return |
| Interpersonal Communication Channels |
| Performance of Related Services |
| Extent of Tax Administration's Promotion Efforts |

| Rate of Adoption of E-Return |
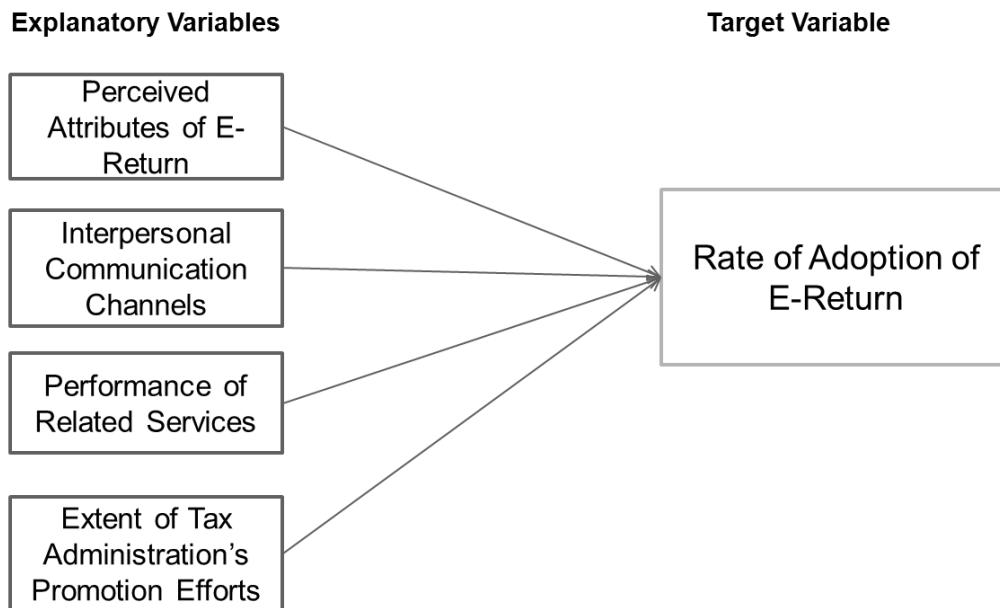
Figure 6.1. Variables determining the rate of adoption of tax return filing online

6.1.1. Perceived attributes of e-return

Relative advantage

In the case of e-return, relative advantage is the perceived benefit e-return provides compared to tax return in paper. At the moment, the electronic service does not provide clear relative advantage: processing times are the same for all possible modes, all notifications are received via regular mail and there is no access to personal data outside service period nor there is any access to personal archive. Therefore, we decided to view how relative advantage could have changed the picture by reviewing e-return cases in other countries and the story of e-billing in TeliaSonera. We believe two examples are most illustrative for this issue:

1) After Danish Tax Administration introduced instant tax assessment in 2007, adoption increased by 21% in 1 year compared to the average of 8% per year.

2) After TeliaSonera started the initiative of charging 1euro/paper bill for broadband consumers, adoption increased by 26% in 10 months – from 9% to 35%, and the first 9% were achieved during 4 years through marketing campaigns that targeted positive aspects (green values, convenience, and others).

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We believe that these two cases show that in case of services which offer marginal benefits to individuals, change agents need to use a combination of carrots (relative advantage) and sticks (relative disadvantage).

The more appealing is the benefit of the service for an individual, the more change agencies should emphasize them in communication with consumers. With respect to e-return some examples of relative advantage include faster processing time and money reimbursement or higher accuracy of the service.

The opposite is also true: the less appealing benefit seems to an individual, the more effective relative disadvantage becomes, such as extra monetary expenses, shorter service availability and others.

However, we believe that communication cannot be solely confined to relative disadvantages and, in general, relative advantages provide a basis for more sustainable relationship with consumers. This opinion is somewhat supported by empirical data: by using mainly relative advantages Danish Tax Administration was able to achieve 90% e-return adoption rate, while the effect relative disadvantage seems to be leveling out at 40% for TeliaSonera.

Compatibility

Discussion of compatibility raises some contradiction in terms of interpretation.

On the one hand, online services are highly compatible with current behavior of Finnish population: in 2009 over 80% of Finns between the age of 16 and 74 use Internet and of those over 80% use it on daily basis; in addition, 80% of households own personal computers (Kohvakka 2009).

On the other hand, it requires individuals to forgo an old habit: most taxpayers have been exposed to the older paper form of tax return filing for a number of years and have developed certain routines regarding this process and expectations towards how relevant instruments should look like (in this case, tax return form).

We believe that improving the degree of perceived compatibility of the service will have a positive effect on overall diffusion. Examples of initiatives that could improve

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perceived compatibility include bundling e-return with other online government service services (cases Estonia and the Netherlands), later access and pdf storage (case Denmark).

Analysis of e-return satisfaction survey discovered interesting implications for compatibility. Surprisingly, some users stated that they were unable to submit online even those categories of taxes which were available through the service, including the most popular ones. This could be caused by some loopholes or missing information related to the given deduction which users are used to have access to in paper format but which was not available online.

In addition, chi-square test distinguished only two deductions as explanatory variables for income tax mode preference. Those were: deduction for paid maintenance of children (p=0.3654) and other deductions from capital gains and losses (p=0.0013). The cause may lie in the fact that those individuals who make such deductions needed to submit additional information which was not possible to do online, thus making the service incompatible with user needs.

Lastly, it is important to notice that e-return and paper forms had completely different design and questions. Even though, we do not have empirical data whether it affected diffusion or not, we believe, it had negative impact on perceived compatibility and, hence, diffusion in general.

Complexity

In our opinion, perceived complexity will have significant effect on the rate of adoption of e-return. There are two major factors that contribute to perceived complexity of e-return overall: taxation perspective and information systems (IS) perspective. From taxation perspective it is important to ensure that all terms and instructions are intuitive, whereas from IS perspective it is necessary to minimize potential adopters' effort to access the service, transfer between different stages and others.

We used the number of problems, users experienced while using the service, as a proxy for the degree of perceived complexity of the service. As we expected, Chi-square test identified dependencies between preferred tax return filing mode and problems experienced by e-return users. Specifically, complex questions (p= 0.3758) and difficult vocabulary (p=0.6145) seemed to influence individual's decision whether to use the online service or not.

Surprisingly, no dependencies were found between experienced problems and switching or satisfaction rate, which could mean that individuals were willing to use the service only when it was not cumbersome and in all other cases switched and never reconsidered the decision. We believe that these findings refer to the taxation perspective of complexity.

Speaking about IS complexity, we believe that such factors as the number of log-in attempts, speed of service operations and several others, contributed to perceived complexity. As we have described earlier, the number of users of the service was growing just before submission deadlines, and we assume that at those times IS complexity increased due to congestion. This increased complexity may have affected both users' decision in terms of adopting e-return in the current year, switching to paper mode in the following year and satisfaction rate. Further analysis showed that, even though there did not seem to be any dependency between the time of usage and preferred tax filing mode or expected switching, there was a strong dependency with satisfaction rate (p= 0.7209). This may be explained by the fact that during peak times the system probably underperformed which considerably affected users' satisfaction.

These observations lead us to conclusion that taxation perspective on complexity is more significant than IS complexity for potential adopters of the service: while individuals were willing to tolerate imperfect quality in terms of IS; they were much stricter with the content of the service.

Trialability

Unfortunately, trialability was limited this year: even though users were offered a demo and could save their partially completed tax return forms without sending, the service was available only during the official tax return period and thus, potential users who became interested in the service, could not try it earlier or later, which may lead to lower adoption rate in the coming years.

Analysis of e-return practices in other countries has shown that other Tax Administrations attempt to increase trialability by making the service available throughout the year. However, since potential market for government service presents a limited community (i.e. Finnish taxpayers can use only Finnish tax services and cannot submit through Swedish services instead) the importance of trialability diminishes over time. For example, due to high

adoption rates Danish Tax Administration has not been updating its online demo for several years.

Observability

Another weak point of e-return is observability, since personal taxation is perceived a routine private matter thus decreasing result demonstrability of the service. As a result taxpayers generally limit their discussions on this topic to a very closed circle of people, especially when it comes to how one submitted his tax return; nor is it a sign of social status or otherwise attractive action in itself.

Tax Administration could, however, attempt to change the situation by focusing on visibility of the service. This could be achieved by publishing statistics on adoption and explicitly stating the relationship of e-return with green values and potential tax savings in the marketing campaigns, and communicating positive results already achieved through e-return.

6.1.2. Type of innovation decision

Speaking about type of innovation decision, we believe that, in case of e-return, it is clearly an optional decision for all potential adopters, and, therefore, we do not include it in the adapted explanatory model for e-return.

Naturally, Tax Administration can change the situation by making e-return the only option for income tax return. Even though this option will almost definitely lead to dramatic increase in adoption, it will probably lead to a public uproar, which makes it an unattractive option for a government unit.

6.1.3. Communication channels

We have seen that exposure to communication channels has a positive effect on diffusion of tax return filing online. Even more so, communication channels have positive effect in both attracting new adopters, and keeping them in consecutive years.

It is interesting that the communication channel which is the most effective in bringing new adopters (word of mouth) is different from the one whose followers have the highest satisfaction (tax return filing instructions). This can be explained that the latter is able to set more adequate expectations of the service.

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Speaking about future selection of communication channels, our analysis of the data (Figure 5.1.2.1) suggests that e-return is now being adopted by early majority of its potential users. With respect to this, we would claim that, e-return is at the transition stage at the moment, where the potential effects of mass media are still high, but interpersonal media are gradually taking the place of the most effective media.

6.1.3. Nature of social system

The next variable suggested in DOI is "nature of social system". Generally speaking, the nature of social system in Finland is favorable towards adoption of e-return: majority of people use Internet on daily basis and a wide range of online services is available: for example, Internet banking, e-invoices, web stores, and others.

However, shortfalls of similar services represent a potential hazard for the success of e-return adoption. For example, Tax Administration personnel noticed that some potential adopters rejected e-return solely on the basis of failures in other online service, such as downtimes in Internet banks or electronic voting systems.

Our analysis discovered also the relationship between diffusion of innovation and taxpayers' individual demographics, such as gender, age, income level, place of residence and professional designation. For example, younger people tend to be earlier adopters than older people. Macro-level overview of such characteristics in a social system can help understand how a given innovation will be accepted in a society.

6.1.4. Extent of change agency's efforts

Speaking about the variable "extent of change agents' efforts", we believe that it could be modified to "extent of change agency's efforts", in this case Finnish Tax Administration. The reason behind such modification is that in case of e-return, innovation comes from one single body rather than a union of many and this body has sufficient authority to affect a large number of adopters, even without their direct consent.

In addition, influence happens impersonally, which is proven by the fact that up until now, the major personal channel customers could communicate with Tax Administration is Tax Office personnel. However, our study suggests that this particular channel was the least successful whether it was related to convincing individuals to choose e-return, decreasing switching rates or improving service satisfaction levels.

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6.2. Adaptation of Service Channel Analysis for e-return

Earlier in our study (see section 5.1.3) we developed an adapted model for Service Channel Analysis. There were identified four major categories of tax return filing:

- **Category 1**, representing 60% of the whole population, where taxpayers accept the first tax assessment decision and do not make any deductions;

- **Category 2**, covering 36% of population, where taxpayers make few (usually one or two) minor deductions;

- **Category 3**, consisting of 2,5% of population, where taxpayers have special circumstances or make a large number of deductions or have speculative deductions;

- **Category 4**, covering 1, 5% population, where taxpayers are exceptionally wealthy and use third party services in taxation.

At this point we would like to compare this model with our empirical findings. In general, we have found support for this model in our data.

First, our analysis proved that the number of deductions made by an individual is related to his/her professional designation. We observed smallest number of deductions among blue collars workers, housewives, students and pensioners; and highest for managers, farmers and upper members of staff. This supports our earlier hypothesis that the complexity of income taxation process is negatively related with e-return adoption. We believe that individuals with less complex taxation belong to category 2 of tax return filing.

Second, we have seen that among those who were satisfied with the service, over 70% did not experience any problems while the percentage is only 37% for those dissatisfied. We can clearly see relationship between the number of problems occurred and overall satisfaction rate. Combined with another finding, stating that the amount of workload was positively related to the number of problems an individual experienced, we can see that increasing amount of workload required to submit tax return (categories 3 and 4) go along with a larger number of problems experienced by an individual and lower satisfaction rates. This indicates that service delivery channel for this type of customers should be modified to deliver more tailored service.

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We have seen that Danish Tax Administration has already adopted a similar approach in the e-return service delivery: they distinguish between ordinary and extended tax return.

However, it is important to note that it is rarely possible to satisfy the needs and expectations of all possible customer groups. To prove that we can take the example of individuals' professional designation (which was not included directly in our Service Process Analysis, but it is related to the level of income). We assume that professional designation is related to the level of education and technical expertise of individuals. Analysis showed that the customers who have the most common characteristics, have highest satisfaction rates, while those who considerably differ from the average, either by having much higher or much lower level of education and technical knowledge are less satisfied.

Moreover, we would like to highlight that our classifications of taxpayers are subject to change on yearly basis, as an individual with the same needs and characteristics may choose to submit some deductions in one year and do not do anything in another year. However, we believe that such changes mainly happen between category 1 and category 2 users due to their closeness.

As we have mentioned earlier, the reason for developing customer categorization was to discover opportunities to increase public value of e-return. Now we would like to discuss the implications of our findings with respect to each value driver: efficiency, democracy and effectiveness.

Speaking about efficiency, we believe that customer categorization helps increase cashable financial gains by limiting excessive service delivery. For example, if Tax Administration can estimate the number and types deductions a person is likely to make, and concentrate on delivering those deductions, rather than ensuring extensive instructions for the whole range of possible deductions. Moreover, customer categorization can help streamline organizational and IT architectures by serving as a clear guideline for optimization of taxation assessment process.

When it comes to democracy, customer categorization can increase transparency of communication related to personal taxation. E.g. on the home page of the service users could be asked basic questions about their plans to make deductions, and then the service could offer e-return form which would based on existing user data plus answers to questions, thus

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offering a self-assigning categorization capability to citizens and making the whole service more intuitive.

Finally, customer categorization has a significant impact on effectiveness of e-return. Proper customer segmentation will decrease administrative burden of processing excessive or unnecessary forms by making the service more concise and specific. Moreover, tailored e-return service will increase user value and satisfaction and appeal to a larger portion of population.

All in all, we believe that proposed customer categorization offers good possibilities for increase in public value of e-return in all three value drivers.

7. Conclusions

This research was conducted in response to the need of analysis and improvement of tax return filing online in Finland. With our study we were aiming to address to two major questions: first, explain which factors will affect the process and predict diffusion of the service in the coming years and, second, suggest improvements for the service to increase its public value.

In the research we applied both quantitative and cross-examination methods and adapted several popular theories in information science to the needs of our research. Our major sources of empirical data included e-return user satisfaction survey conducted by Finnish Tax Administration in 2009, reports on e-return practices in Estonia, Denmark and the Netherlands and interview with TeliaSonera on their success with e-billing.

In response to the first question we adapted Diffusion of Innovations model (see section 2.3) based on empirical data and determined that further diffusion of e-return is dependent on such factors as perceived attributes of e-return, interpersonal communication channels, performance of related services and extent of Tax Administration's promotion effort, as presented in Figure 6.1. In addition, we developed a forecast of service diffusion for the following years.

With respect to the second question, we have modified Service Process Analysis framework, originally presented in section 2.2, to identify distinct customer categories of e-return service. This categorization helped us to optimize service offerings based on customer needs and match them with the most suitable service delivery channels, which was presented in Figure 5.1.3 and further analyzed in section 6.2. We believe that the proposed service segmentation leads to maximization of public value of e-return. In addition, the forecast which we have discussed earlier can be used for measuring public value of e-return, as it helps evaluating the performance of the service in all three value drivers – efficiency, democracy and effectiveness.

In general, we believe that tax return filing online is operating at a good service level; however, there are many improvements that could be made to various aspects of the service. It is worth noting, however, that many amendments are relatively easy to implement and evidence from other practices shows that sometimes even minor improvements can have big

effect. It is also important to notice that the term "improvements" does not necessarily need to refer to "carrots" offered to end-users. Some improvements can be "sticks" by nature – e.g. introduction of extra fees, changing historically habitual operational patterns, etc. – and yet bring overall benefit to society. In our opinion, combination of both positive and negative incentives will have the biggest effect on diffusion of e-return.

Now we would like to suggest implications for theory and practice based on our finding. After that we will discuss limitations of the study and outline areas for further research.

7.1. Theoretical implications

This report analyzed tax return filing online from different perspectives and discovered several implications for IS researchers. First, our study supports appropriateness Service Process Analysis for illustration and development of e-Government services.

Additionally, it has been shown that this framework can be also applied to services which are currently perceived as homogeneous, but where several distinct customer behavior patterns or customer group can be identified. In other words, the framework can be applied even to services such as personal taxation, delivery of which is frequently expected to be identical for all customer groups; whereas it is more frequently used with services that share common dimension, but are easily distinguishable from each other, e.g. in case of cash withdrawal services, insurance and personal financial advisory.

Moreover, our study demonstrates that Service Process Analysis framework can help increase public value of e-Government services by providing insights into the nature of customer needs and how those could be matched with the most appropriate service delivery channels. Application of Service Process Analysis can thus help decrease tailor service complexity and range based on the needs of particular customer segments, rather than offering a generic service which becomes too broad for certain groups and too limited for other.

Speaking about Diffusion of Innovation theory, we have seen strong evidence that this framework is helpful in understanding the nature of innovations also in e-Government, as it has been suggested by Raus et al. (2009) earlier.

We have also seen that many of the original variables can be further narrowed down to smaller sub-variables: e.g. in the case of attributes of innovation, such attribute as relative

advantage can be further split into relative advantage versus relative disadvantage when a change agent can motivate potential adopter either by offering a reward or threatening with punishment. This example is strongly related to perceived usefulness and perceived ease of use, two major factors analyzed in Technology Acceptance Model (Davis 1989).

7.2. Managerial implications

This study provides several important implications for building and promoting appealing, easy-to-use solution for personal tax return filing which will help improve internal efficiency and effectiveness of Finnish Tax Administration. Based on the findings from quantitative and qualitative analysis of the data, we developed a list of recommended initiatives presented below.

We grouped the initiatives based on the type of tax filing mode it is related (Figure 7.2.1.). In general, we believe that Tax Administration can direct its effort in two directions: the first one is to increase attractiveness of the new service, and the second one is to make the old service mode more inconvenient.

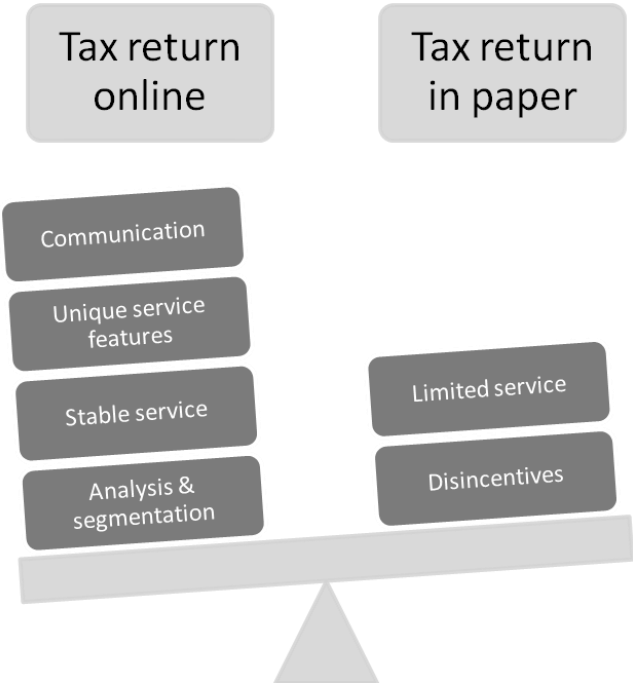Figure 7.2.1. Managerial implications

7.2.1. Communication about e-return

As it has been discussed earlier, communication plays a critical role in successful diffusion of e-return. Therefore, it is important that Tax Administration takes proper

initiatives, both in terms of communication channel selection and marketing messages. Below we will list our suggestions:

- Focus on word-of-mouth rather than mass media;

- Provide additional training to Tax Office personnel for promotion and assisting in e-return;

- When formulating marketing messages:

    o emphasize benefits/disadvantage of choosing/not choosing e-return rather than simply urging to go online;

    o emphasize green values, total savings and other positive effects of e-return adoption;

    o proactively confront negative effect of failures in other services;

- Involve opinion leaders in promotion of e-return.

7.2.2. Improved stability of e-return

In addition to communicating the benefits of the new service, it is important to ensure that it offers appealing and stable service to its customers. To this end we recommend to pay attention to the following aspects:

- Use consistent language:

    o Simple words used consistently;

- Improve e-return usage instructions;

- Improve user interface and add possibility of customization;

- Exclude web pages without added value (e.g. first and last page need to be modified);

- Allow attachments with additional docs allowed;

- Lease successful existing service platforms (e.g. instead of investing significant sums into developing a world-class platform, Tax Administration could lease the service from Denmark);

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- Third-party access to taxation data;

7.2.3. Unique features provided by e-return

However, in order to achieve significant increase in diffusion, it is not sufficient to limit initiatives to keeping current service stable and communicating its benefits. It is also important to improve service breadth and quality. Therefore, we suggest including the following features in the next generation of e-return:

- All possible deductions in e-return;

- Several e-government services in one package;

- Downloadable version of the final return;

- Opportunity to re-submit within allocated time;

- Online personal tax archive;

- Instant tax decision;

- Faster money return;

- Notification system via email/sms:

  o New tax decision;

  o Deadlines;

- Information about origins of individual's data;

- Option to entitle third parties to report tax-related data not required otherwise;

- Historical info about accepted deductions by profession, etc (e.g. for work-related deductions);

- Direct access to individual's bank account and financial advisory services:

  o E.g. to double check some information;

7.2.4. Analysis and segmentation e-return customers

It is also recommendable that Tax Administration continues its effort in understanding the needs and profiles of various customer groups. This will help make the service more attractive for potential adopters and existing users, and will lead to faster diffusion. For that, Tax Administration will need to analyze data about its customers and identify:

- Factors influencing individual's decision to submit tax deductions in a given year;

- Factors influencing individual's tax return filing patterns.

  These initiatives will enable:

- Tailored marketing communication based on customer profiles;

- Adjusted tax return form based on customer profile.

Equally important is that Tax Administration designs the new generation of e-return in a way that will enable logging system usage on individual level, i.e. so that in the future, researchers could connect individual's demographic characteristics and certain patterns of using e-return. We have developed recommendations regarding the data items that need to be gathered for analysis from sources Finnish Tax Administration's internal sources and new survey questionnaires for e-return and paper form users separately, presented in Appendices 4, 5 and 6 respectively.

7.2.5. Limiting service offering through paper mode

We will now continue with discussing how Tax Administration could make tax return filing in paper less attractive for taxpayers. Some initiatives include:

- Positioning e-return as a default form of income tax return:

  o Paper form available in special circumstances;

  o Possible exceptions based on age, disabilities and location;

- Limit filing time for tax returns in paper;

- Limit office hours for accepting tax returns.

7.2.6. Discouraging tax return in paper

Lastly, Tax Administration may reinforce diffusion by applying certain disincentives to users of tax return filing in paper. Some examples include:

- Paper-return processing fees;

- No free envelopes included with tax decision for income tax return;

- All help and guidance available only online or limited number of printed instructions in Tax Offices;

- Shorter time to pay back and all in one installment.

7.3 Limitations and further research

As with any empirical study, this research has its limitations. The primary limitation lies from the fact that the data in satisfaction survey is heavily skewed towards users of e-return. This means that we do not have enough information to analyze those who decided to file tax return in paper format rather than submitting online.

Also, due to the nature of the survey, all the respondents were self-selected and had had at least some experience of the service prior to responding to questions, which completely excludes those individuals who decided to reject e-return prior to experiencing it.

Another limitation comes from the novelty of the service. For most part, we had data only about year 2009, which means that we do not have historical information about user preferences. With respect to this limitation, it is important that validity of statistical inferences derived from the study will be tested in the future years, especially if similar user satisfaction surveys are administered in the future.

In addition, we were not able to obtain adequate data from the log of online service, which means that our analysis is reliant on individuals' responses about their behavior and not actual facts.

Speaking about mathematical model, as we have already stated earlier, there are several possible interpretations of the current state of tax return filing online, each including certain simplifications which can lead to incorrect conclusions. Besides, the model assumes

stability in the system over the course of innovation diffusion, which will not happen in reality.

Furthermore, information in case studies was obtained directly from organizations in question, which increases the risk of biased opinions in terms of evaluating success of relevant initiatives. Another concern is that our conclusions assume that the positive changes happened mainly as a result of the initiatives undertaken by organizations central to each case; however, they could have been caused by factors external to those organizations.

These limitations suggest avenues for further research. In the future it is recommendable to continue arranging user satisfaction survey with several improvements. First, such surveys should be conducted not only among e-return users but also among non-adopters, by including survey forms with tax filing instructions.

In addition, we advise to conduct studies with information that includes real usage statistics (e.g. system log) combined with personal level anonymous demographic data, so that behavioral trends could be identified. It will be also useful to organize studies aiming at identifying the factors affecting individual's decision to make tax deductions in a given year.

We also believe that it will be useful to have more research on the role of change agents especially in situations where proposed innovation offers only marginal benefits to individual potential adopters.

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Appendix 1. Example of paper bill by TeliaSonera

Appendix 2. Algorithm for developing adoption forecast

1) Bass Diffusion Model formulae used:

$f(t) = (p + qF(t))(1 - F(t))$, where p is coefficient of innovation and q is coefficient of imitation

$$F(t) = \frac{1 - e^{-(p+q)t}}{1 + (q/p)e^{-(p+q)t}}$$

$n(f) = mf(t)$, where n - number of non-cumulative adopters at time t

$N(t) = mF(t)$, where N - number of cumulative adopters at time t

2) Estimation of degree of contagiousness according to Lawrence and Lawton (1981) algebraic procedure:

$$p + q = 0,5$$

$$q/p = (\frac{1 - e^{-(p+q)t}}{F(t)} - 1)\big/ e^{-(p+q)t}$$

3) Results:

Real adoption

2008	146000
2009	272556

	p+q	0,5					
	m			N	F	$e^{-(p+q)t}$	q/p
Scenario1	1		4 535 992	272556	6 %	0,60653066	9,147572
Scenario2	2		4 535 992	272556	6 %	0,367879441	25,87809
Scenario3	1		4 462 992	199556	4 %	0,60653066	12,85968

Scenario 1					
	t	F(t)	N(t)	f(t)	n(t)
2009	1	6 %	272 556	7 %	325 538
2010	2	14 %	656 852	10 %	444 325
2011	3	26 %	1 158 751	12 %	555 267
2012	4	39 %	1 752 516	14 %	621 870
2013	5	52 %	2 378 038	14 %	616 249
2014	6	65 %	2 961 431	12 %	540 926
2015	7	76 %	3 446 877	9 %	426 691
2016	8	84 %	3 813 915	7 %	309 229
2017	9	90 %	4 071 822	5 %	210 676

	t	F(t)	N(t)	f(t)	n(t)
2018	10	94 %	4 243 855	3 %	137 588
2019	11	96 %	4 354 660	2 %	87 399
2020	12	98 %	4 424 426	1 %	54 546
2021	13	98 %	4 467 729	1 %	33 669
2022	14	99 %	4 494 366	0 %	20 641
2023	15	99 %	4 510 662	0 %	12 601
2024	16	100 %	4 520 598	0 %	7 673
2025	17	100 %	4 526 644	0 %	4 665
2026	18	100 %	4 530 318	0 %	2 834
2027	19	100 %	4 532 549	0 %	1 720
2028	20	100 %	4 533 903	0 %	1 044

Scenario 2					
	t	F(t)	N(t)	f(t)	n(t)
2009	1	2 %	106 899	3 %	132 640
2010	2	6 %	272 556	4 %	202 634
2011	3	11 %	520 192	7 %	296 405
2012	4	19 %	871 151	9 %	407 004
2013	5	29 %	1 332 710	11 %	512 656
2014	6	42 %	1 883 486	13 %	579 556
2015	7	54 %	2 469 345	13 %	580 046
2016	8	67 %	3 021 026	11 %	513 905
2017	9	77 %	3 484 018	9 %	408 540
2018	10	85 %	3 836 480	7 %	297 826
2019	11	90 %	4 085 392	4 %	203 752
2020	12	94 %	4 252 002	3 %	133 436
2021	13	96 %	4 359 559	2 %	84 913
2022	14	98 %	4 427 379	1 %	53 054
2023	15	99 %	4 469 512	1 %	32 771
2024	16	99 %	4 495 445	0 %	20 099
2025	17	99 %	4 511 315	0 %	12 274
2026	18	100 %	4 520 994	0 %	7 475
2027	19	100 %	4 526 884	0 %	4 545
2028	20	100 %	4 530 463	0 %	2 761

Scenario 3					
	t	F(t)	N(t)	f(t)	n(t)
2009	1	4 %	199 556	5 %	242 247
2010	2	11 %	492 277	8 %	346 436
2011	3	20 %	896 051	10 %	460 919
2012	4	32 %	1 408 202	12 %	557 369
2013	5	45 %	1 992 934	13 %	600 816

2014	6	58 %	2 585 462	13 %	572 332
2015	7	70 %	3 117 577	11 %	484 545
2016	8	79 %	3 546 039	8 %	371 076
2017	9	87 %	3 861 733	6 %	263 051
2018	10	91 %	4 079 446	4 %	176 481
2019	11	95 %	4 222 824	3 %	114 088
2020	12	97 %	4 314 404	2 %	71 999
2021	13	98 %	4 371 760	1 %	44 751
2022	14	99 %	4 407 241	1 %	27 553
2023	15	99 %	4 429 022	0 %	16 865
2024	16	100 %	4 442 331	0 %	10 286
2025	17	100 %	4 450 439	0 %	6 260
2026	18	100 %	4 455 371	0 %	3 805
2027	19	100 %	4 458 366	0 %	2 311
2028	20	100 %	4 460 185	0 %	1 402

Appendix 3. E-Return satisfaction survey questionnaire

Palautetta Veroilmoitus verkossa -palvelusta

Olit juuri Verohallinnon verkkopalvelussa. Toivomme, että annat meille palautetta siihen liittyen, jotta voimme parantaa palveluamme.

1. **Oletko aiemmin käynyt Verohallinnon verkkosivuilla?**

- ○ Olen käynyt aiemmin
- ○ Tämä oli ensimmäinen kerta
- ○ En muista

2. **Entä oletko tilannut uutta verokorttia Verohallinnon verkkopalvelusta viimeisen 12 kk aikana?**

- ○ Kyllä olen, kerran
- ○ Kyllä olen, 2 kertaa tai useammin
- ○ En ole
- ○ En muista

3. **Mitä tietoja ilmoitit veroilmoitus verkossa -palvelun kautta? Merkitse kaikki sopivat.**

- ☐ Matkakuluja
- ☐ Kotitalousvähennyksiä
- ☐ Arvopapereiden luovutusvoittoja ja/tai -tappioita
- ☐ Muita luovutusvoittoja ja/tai -tappioita
- ☐ Tulonhankkimiskuluja
- ☐ Työsuhdeasuntovähennyksen
- ☐ Elatusvelvollisuusvähennyksiä
- ☐ Veronpalautuksen siirron puolison hyväksi
- ☐ Ahvenanmaan vähennyksiä

4. **Mitä tietoja et onnistunut ilmoittamaan? Jos onnistuit ilmoittamaan kaikki haluamasi tiedot, valitse viimeinen kohta.**

- ☐ Matkakuluja
- ☐ Kotitalousvähennyksiä
- ☐ Arvopapereiden luovutusvoittoja ja/tai -tappioita
- ☐ Muita luovutusvoittoja ja/tai -tappioita
- ☐ Tulonhankkimiskuluja
- ☐ Työsuhdeasuntovähennyksen
- ☐ Elatusvelvollisuusvähennyksiä
- ☐ Veronpalautuksen siirron puolison hyväksi
- ☐ Ahvenanmaan vähennyksiä

Muita, mitä?

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☐ Onnistuin ilmoittamaan kaikki haluamani tiedot

5. Kuinka tyytyväinen olet Verohallinnon verkossa toimivaan veroilmoituspalveluun ?

○ Olen erittäin tyytyväinen

○ Olen melko tyytyväinen

○ Olen melko tyytymätön

○ Olen erittäin tyytymätön

6. Mitä kehitettävää Verohallinnon verkossa toimivassa veroilmoituspalveluss a mielestäsi on?

☐ Palvelussa kysytään tietoja, joita on vaikea tietää

☐ Palvelussa ei voi ilmoittaa minulle tärkeitä tietoja

☐ Käytettyä sanastoa on vaikea ymmärtää

☐ Sivusto on sekava, on vaikea tietää miten edetä

☐ Ohjeita on vaikea ymmärtää

☐ Ohjeistus on puutteellista

Muu, mikä?

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☐ Ilmoituspalvelu toimii hyvin, mielestäni siinä ei ole kehitettävää

7. Oletko tänä vuonna ilmoittanut/tuletko ilmoittamaan verottajalle tietoja paperilomakkeella?

○ En. Ilmoitin kaikki tarpeelliset tiedot Veroilmoitus verkossa -palvelussa.

○ Kyllä. Ilmoitin/ilmoitan verottajalle osan tiedoista paperilomakkeella.

○ Kyllä. Ilmoitin/ilmoitan kaikki tiedot verottajalle paperilomakkeella.

8. Miten arvelet ilmoittavasi veroilmoitustietosi seuraavalla kerralla?

	Täysin varmasti	Melko varmasti	Melko varmasti ei	Täysin varmasti ei
Verkossa	○	○	○	○
Paperilomakkeell a	○	○	○	○

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9. **Mistä olit ennen käyntiäsi lukenut tai kuullut Verohallinnon verkossa toimivasta veroilmoituspalvelusta?**

☐ En tiennyt palvelusta ennalta, mutta löysin sen verkosta kun kokeilin (esim. Googlesta)

☐ Palvelusta oli maininta muualla Verohallinnon sivuilla

☐ Ystäviltä, tuttavilta, työtovereilta, sukulaisilta

☐ Veroilmoituksen täyttöohjeesta

☐ Verohallinnon esitteestä

☐ Verotoimistosta virkailijalta

☐ Internet-mainonnasta

☐ Radiomainonnasta

☐ Sanomalehtimainonnasta

☐ Aikakauslehtimainonnasta

☐ Ulkomainonnasta

☐ TV-mainonnasta

☐ TV- tai radiouutisista, tiedotusvälineiden artikkeleista tms.

Lopuksi kysymme vielä muutamia taustatietoja. Näitä käytetään tulosten ryhmittelyyn.

10. **Mikä on sukupuolesi?**

○ Nainen

○ Mies

11. **Mikä on ikäsi?**

○ Alle 15 vuotta

○ 15–24 vuotta

○ 25–34 vuotta

○ 35–44 vuotta

○ 45–54 vuotta

○ 55–64 vuotta

○ 65–74 vuotta

○ 75 vuotta tai enemmän

12. **Mitkä olivat henkilökohtaiset bruttotulosi vuonna 2008 suunnilleen? Entä vuonna 2009?**

	2008	2009
Alle 10 000 euroa	○	○
10000–14999 euroa	○	○
15000–19999 euroa	○	○

20000–24999 euroa	○	○
25000–29999 euroa	○	○
30000–34999 euroa	○	○
35000–39999 euroa	○	○
40000–49999 euroa	○	○
50000–69999 euroa	○	○
70 000 euroa tai enemmän	○	○
En tiedä / en halua vastata	○	○

13. Mikä on asuinpaikkakuntasi?

VALITSE ▼

14. Mikä on asuinpaikkakuntasi tyyppi?

○ Pääkaupunkiseutu (Helsinki, Espoo, Kauniainen, Vantaa)

○ Muu yli 50000 asukkaan kaupunki

○ Alle 50000 asukkaan kaupunki

○ Muu kunta, maaseutu

15. Mikä on postinumerosi?

16. Mikä on ammattiasemasi?

○ Maanviljelijä

○ Työväestö

○ Alempi toimihenkilö

○ Ylempi toimihenkilö

○ Yksityisyrittäjä

○ Johtava asema

○ Kotiäiti / kotilisä

○ Opiskelija/koululainen

○ Eläkeläinen

○ Työtön

○ En osaa sanoa

Lähetä Tyhjennä

Appendix 4. Data items accessible for Tax Administration's internal sources

Demographics

It is crucial to have personal level demographic data about taxpayers, so that special needs and behaviors can be traced and categorized (e.g. what kind of people adopt e-return faster, what kind of people require most help in the service, what kind of people become dissatisfied with the service (quit using e-return) faster, etc).

- Personal id (can be randomly generated as long as they are consistent along different data sets);
- Age;
- Sex;
- Employment status;
- Location (postal code – official, not user input);
- Profession;

Taxation

In addition to basic demographic data, we need taxation specific information.

- Income level and amount of taxes associated;
- Deductions:
  - number of deductions submitted by person;
  - total amount of money requested by person;
  - types of deductions requested by person;
- Mode of filing deductions:
  - e-return;
  - paper form;
  - e-return and paper form;
  - tried e-return but never submitted any deductions.

Service usage

We need these data items in order to connect demographical data with actual usage of the system. This information should mainly come from system log file and merged with other datasets about personal taxation, so individual's behavior could be traced across different stages of taxation.

- Completed stage of service usage:
  - successfully logged in;

- o quit after a very short period of time, i.e. how many briefly looked at the system without trying it;
- o quit after a longer period of time, i.e. started to use the service but did not finish;
- o successfully submitted their report online;
  - ▪ whether sent paper forms as well:
- o for those who quit at different stages, whether he/she sent paper forms which included deductions not available online.
- Time spent using the system an how much of it was spent in waiting for system to log;
- Number times and frequency of log-ins in the system;
- Help requested and at what stages.

Appendix 5. Electronic questionnaire

Overall, how satisfied were you with the service?
(Important question)

	1	2	3	4	5	6	7	
very dissatisfied	○	○	○	○	○	○	○	very satisfied

Which problems did you encounter while using e-return?
- ☐ complex questions
- ☐ limited number of deductions
- ☐ difficult vocabulary
- ☐ messy user interface
- ☐ confusing and/or insufficient instructions
- ☐ slow service
- ☐ Other: _____

I submitted e-return because:
- ☐ it has features which are not available otherwise
- ☐ I am used to do everything on the Internet
- ☐ it is more convenient
- ☐ I want to decrease paper waste
- ☐ we live in IT-age
- ☐ people I know submitted e-return as well
- ☐ Other: _____

How did you hear about e-return?
- ☐ TV
- ☐ newspapers
- ☐ Internet
- ☐ street ads
- ☐ radio
- ☐ instructions attached to tax assessment decision
- ☐ e-return brochures
- ☐ friends, colleagues, family
- ☐ Other: _____

Which of the following improvements to the service you believe will be most useful to implement next year?
(please choose maximum of 2 options)
- ☐ Option 1
- ☐ Option 2
- ☐ Option 3
- ☐ Option 4
- ☐ no improvements are necessary, the service is good
- ☐ Other: _____

Continue »

We would like to know more about your experience

Please rate the following statements (1=completely disagree, 7=completely agree)

Majority of my friends, family or colleagues used e-return this year

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I will/have told my friends, family or colleagues that I used e-return this year

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I had to put a lot of effort to learn how to use the service

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I was able to log in from the first attempt
Answer to this question should be available from log-file

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I use various electronic services frequently
(e.g. Netbank, e-tickets, etc)

1	2	3	4	5	6	7
○	○	○	○	○	○	○

The process of submitting tax return is completely different when it is done electronically
(I had to change the way I prepare tax return once I switched from paper form to e-return)

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I have security concerns with respect to e-return

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I think I will submit deductions online next year

1	2	3	4	5	6	7
○	○	○	○	○	○	○

E-return met my expectations

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I needed __ service sessions in order to submit e-return
(please write the number of service sessions below)

[   ]

It took me ___ to prepare tax return
(please choose the amount of time it took you)

○ Under 30 mins

○ 30 mins - 1 hour

○ 2-5 hours

○ 1 day

○ 1-3 days

○ 1 week

○ more than 1 week

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Now we would like to learn more about you.
This information should be available from internal sources

Age
- Under 15
- 15-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- over 75

Gender
- Male
- Female

Municipality
Option 1

Earned income in 2009
Here the scales need to follow official statistics, so the results are comparable
- Under 4 999
- 5 000 - 9 999
- 10 000 - 14 999
- 15 000 - 19 999
- 20 000 - 24 999
- 25 000 - 34 999
- 35 000 - 54 999
- 55 000 - 74 999
- 75 000 - 99 999
- 100 000 - 149 999
- 150 000 - 299 999
- 300 000 and more

Profession
- Option 1

Which deductions did you submit online?
- Option 1
- Option 2
- Option 3
- I did not submit/not planning to submit any deductions through e-return

If you are planning to send some deductions through paper form, what are they?

- ☐ Option 1
- ☐ Option 2
- ☐ Option 3
- ☐ I will not submit any deductions through paper form

Did you use e-return in previous years?

Yes

« Back   Submit

Appendix 6. Paper questionnaire

We would like to ask you several questions about tax return.

Overall, how satisfied are you with tax return service?

	1	2	3	4	5	6	7	
very dissatisfied	○	○	○	○	○	○	○	very satisfied

Prior to submitting tax return:

☐ I had heard about e-return and its benefits

☐ I had heard about e-return but did not know what benefits it can offer

☐ It is the first time I hear about e-return

☐ I used e-return previously and did not like it

Please rate the following statements

1=completely disagree 7=completely agree

Majority of my friends, family or colleagues used e-return this year

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I believe that learning how to use e-return requires too much effort

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I am used to submit tax return in paper and do not want to change the habit

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I think it is easier to prepare documents, if they are printed

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I have security concerns with respect to e-return

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I prefer not to use electronic services
(e.g. Netbank, e-tickets, etc)

1	2	3	4	5	6	7
○	○	○	○	○	○	○

I tried to use e-return and:

- ☐ I couldn't log in
- ☐ the service was too slow
- ☐ it was not appealing enough to use
- ☐ the service was very complicated to use
- ☐ the service felt very different from what I am used to
- ☐ I liked the service, but submitted in paper anyway
- ☐ benefits of the service were less than the effort I had to make to use it
- ☐ I had deductions which were not available online
- ☐ I have not tried e-return
- ☐ Other:

How did you hear about e-return?
(answer only if you had heard about e-return prior to submitting)

- ☐ TV
- ☐ newspapers
- ☐ Internet
- ☐ street ads
- ☐ radio
- ☐ instructions attached to tax assessment decision
- ☐ e-return brochures
- ☐ friends, colleagues, family
- ☐ Other:

Now we would like to learn more about you.
(This information should be available from internal sources)

Age

- ◯ Under 15
- ◯ 15-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65-74
- ◯ over 75

Gender

- ◯ Male
- ◯ Female

Region

- ☐ Option 1
- ☐ Option 2
- ☐ Option 3

Earned income in 2009

Here the scales need to follow official statistics, so the results are comparable

- ○ Under 4 999
- ○ 5 000 - 9 999
- ○ 10 000 - 14 999
- ○ 15 000 - 19 999
- ○ 20 000 - 24 999
- ○ 25 000 - 34 999
- ○ 35 000 - 54 999
- ○ 55 000 - 74 999
- ○ 75 000 - 99 999
- ○ 100 000 - 149 999
- ○ 150 000 - 299 999
- ○ 300 000 and more

Profession

- ☐ Option 1
- ☐ Option 2
- ☐ Option 3
- ☐ Other: [   ]

Which deductions did you submit?

- ☐ Option 1
- ☐ Option 2
- ☐ Option 3
- ☐ I did not submit/not planning to submit any deductions

If you are planning to send some deductions through e-return, what are they?

- ☐ Option 1
- ☐ Option 2
- ☐ Option 3
- ☐ I will not submit any deductions through e-return

[Submit]

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