E-Accounting Systems Use in Finnish Accounting Agencies

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Abstract

Technological innovations such as electronic banking systems, electronic reporting to authorities (Tyvi) and customers, electronic invoicing, electronic document management systems and electronic storing provide possibilities to maintain and store financial accounting records electronically. Drawing on the diffusion of innovations theory (Rogers 1995), a survey data on the adoption and use of these technologies in small and medium-sized accounting agencies in one region of Finland were used to explore the current state of the art of critical mass in the diffusion process. The findings indicate that the critical mass has been obtained for e-letters, electronic bank statements and electronic reporting to authorities and customers, whereas electronic invoicing and electronic storing of accounting records are at the take-off stage. The most important obstacle to the adoption seems to be the lack of time for the entrepreneurs. The most important communication channels in influencing the rate of diffusion were training sessions, consulting and the Internet.

Keywords

electronic accounting, accounting system, diffusion, adoption, technology use

Introduction

New information technology and innovations, such as electronic banking systems, electronic reporting to authorities (Tyvi) and customers, electronic invoicing, electronic document management systems and electronic storing have emerged. These technological capabilities are in this study referred to as electronic accounting systems (e-accounting systems). Dahlberg (2004) points out, that the purpose is the automation of all stages of work and data processing in the economic administration of an organisation and between organisations and the elimination of all unnecessary functions. According to the Accounting Board (2000), the new technology offers advantages such as increased speed, greater productivity, and convenience of operation. The latest Accounting Act (1336/1997) in Finland has taken note of the changes taking place in information technology (IT). The Act makes it possible to use machine-readable data records when setting up and archiving bookkeeping entries (BA 2:8§); an exception to this is the Balance Book referred to in BA 3:8§ (Accounting Board, 2000, 3). Consequently, it is legally possible, but there is no compulsion, to handle financial accounting electronically. No matter how sophisticated and how capable the technology is, its efficiency depends upon it being used.

Despite the legal approval of the use of electronic data media in financial accounting already in 1997, the current use of e-accounting systems is quite low, and the adoption rate has been slower than expected. At the moment, it seems as if the level of usage varies a lot between

different organisations, and that mostly big companies have adopted or have intentions to adopt an electronic invoicing system or e-accounting system in the near future.

Bookkeeping and preparing the annual financial statements and connected fiscal documents, are still a major source of turnover for accountancy firms. In Finland about 80 to 90 percent of the financial accounting and reporting is handled by bookkeeping agencies (Mäkinen, 2000, Mäkinen & Vuorio, 2002). According to Statistics Finland there are some 3800 bookkeeping agencies, and most of these agencies are small and medium-sized enterprises (SMEs) with an average of 2,1 employees. A survey by OECD in 1998 shows how the percentage of Internet connected SMEs is directly proportional to the company size. Even if the adoption rates are much higher in Finland, the same tendency can be seen in a study of Internet use that was conducted by Statistics Finland in 2000. Considering these facts, the small and medium-sized bookkeeping agencies seem to be a relevant and interesting group to conduct a study on.

The key questions of this paper are: What is the state of the art of e-accounting systems use in Finnish accounting agencies? What are the obstacles facing Finnish accounting agencies in adoption of e-accounting systems? What future plans do Finnish accounting agencies have regarding e-accounting systems?

Literature review

Lack of spread or diffusion of an innovation is a commonly observed problem in practice, and both researchers and practitioners from various fields have studied the diffusion of innovations within and across organisations (for example Damanpour 1992; Premkumar & Ramamurthy 1994; Robertson 1967; Van de Ven et al. 1989). Everett Rogers (1962) is one of the pre-eminent researchers and theorists on the diffusion of innovation, and he has over the past forty years incorporated the work of many other scholars into the diffusion of innovations theory. Rogers' (1995) research and theory have primarily focused on the diffusion of innovations among individuals, although he does address innovation diffusion within organisations. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers 1995).

An *innovation*, according to Rogers' theory (1995), is an idea, thing, procedure, or system that is perceived as new by whomever is adopting it. The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. The *characteristics* which determine an innovation's rate of adoption are: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability (Rogers 1995). As each of these increases, it is hypothesized that the rate of adoption will increase (with the exemption of complexity for which a decrease is hypothesized to increase the rate of adoption). **Relative advantage** is the degree to which an innovation is perceived as better than the idea it supersedes. The degree of relative advantage may be measured in economic terms, but social prestige, convenience, and satisfaction are also important factors. It does not matter so much if an innovation has a great deal of objective advantage. What does matter is whether an individual perceives the innovation as advantageous. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be. **Compatibility** is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. An idea that is incompatible with the values

and norms of a social system will not be adopted as rapidly as an innovation that is compatible. The adoption of an incompatible innovation often requires the prior adoption of a new value system, which is a relatively slow process. **Complexity** is the degree to which an innovation is perceived as difficult to understand and use. Some innovations are readily understood by most members of a social system; others are more complicated and will be adopted more slowly. New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings. **Trialability** is the degree to which an innovation may be experimented with on a limited basis. New ideas that can be tried on an instalment basis will generally be adopted more quickly than innovations that are not divisible. An innovation that is trialable represents less uncertainty to the individual who is considering it for adoption, who can learn by doing. **Observability** is the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it. Such visibility stimulates peer discussion, as friends and neighbours of an adopter often request information regarding the evaluation information about it. (Rogers 1995)

Communication is the process by which participants create and share information with one another in order to reach a mutual understanding. A **communication channel** is the means by which messages get from one individual to another. Mass media channels are more effective in creating knowledge of innovations whereas interpersonal channels are more effective in forming and changing attitudes toward a new idea, and thus in influencing the decision to adopt or reject a new idea. Most individuals evaluate an innovation, not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation. (Rogers 1995)

The *time* dimension is involved in diffusion in three ways. First, time is involved in the innovation-decision process. The **innovation-decision process** is the mental process through which an individual (or other decision-making unit) passes from first gaining knowledge of an innovation to forming an attitude toward the innovation, to making a decision to adoption or rejection, to implementation of the new idea, and finally to confirmation of the decision. An individual seeks information at various stages in the innovation-decision process in order to decrease uncertainty about an innovation's expected consequences. The second way in which time is involved in diffusion is in the innovativeness of an individual or other unit with regards to adoption. **Innovativeness** is the degree to which an individual or other unit adopts new ideas before other members of a social system. There are five adopter categories, or classifications of the members of a social system on the basis of their innovativeness: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. Innovators are the first 2.5 percent of the individuals in a system to adopt an innovation. Venturesomeness is almost an obsession with innovators. The innovator must be able to cope with a high degree of uncertainty about an innovation at the time of adoption. Early adopters are the next 13.5 percent of the individuals in a system to adopt an innovation. Early adopters are open to change, but are more closely connected to and respected within the social system, and are not quite as risk-taking as innovators are in their adoption decisions. Early majority is the next 34 percent of the individuals in a system to adopt an innovation. The early majority adopt new ideas just before the average member of a system. The early majority may deliberate for some time before completely adopting a new idea. Late majority is the next 34 percent of the individuals in a system to adopt an innovation. The late majority adopt new ideas just after the average member of a system. Like the early majority, the late majority

make up one-third of the members of a system. Adoption may be the result of increasing network pressures from peers. Innovations are approached with a sceptical and cautious air, and the late majority do not adopt until most others in their system have done so. Laggards are the last 16 percent of the individuals in a system to adopt an innovation. They are suspicious of new ideas, processes, products and services. Resistance to innovations on the part of laggards may be entirely rational from the laggard's viewpoint, as their resources are limited and they must be certain that a new idea will not fail before they choose to adopt. The third way in which time is involved in diffusion is the rate of adoption. The **rate of adoption** is the relative speed with which an innovation is adopted by members of a social system. The rate of adoption is usually measured as the number of members of the system that adopts the innovation in a given time period (see Figure 1). An innovation's rate of adoption is influenced by the five perceived attributes of an innovation. (Rogers 1995)

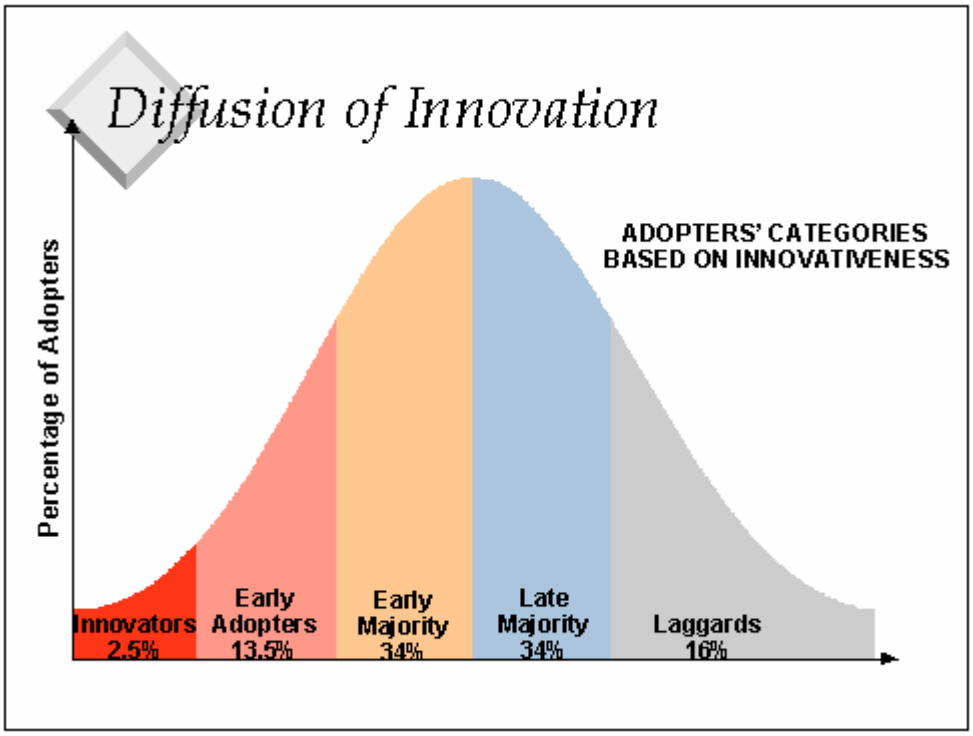

Figure 1. Adopter categorization on the basis of innovativeness (Rogers 1995, 262)

The fourth main element in the diffusion of new ideas is the *social system*, defined as a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems. The social system constitutes a boundary within which an innovation diffuses. A final crucial concept in understanding the nature of the diffusion process is the *critical mass*, which occurs at the point at which enough individuals have adopted an innovation that the innovation's further rate of adoption becomes self-sustaining (the shaded area in Figure 2 depicts the critical mass). The critical mass point in the diffusion process is generally expected to occur approximately between 10 % and 20 % adoption (Rogers 1995; Valente 1995). Early adopters are instrumental in getting an innovation to the point of critical mass, as they are often opinion leaders and serve as role-models for many other members of

the social system. Thus, efforts should be focused on the early adopters, the 13.5 percent of the individuals in the system, in the successful diffusion of an innovation. (Rogers 1995)

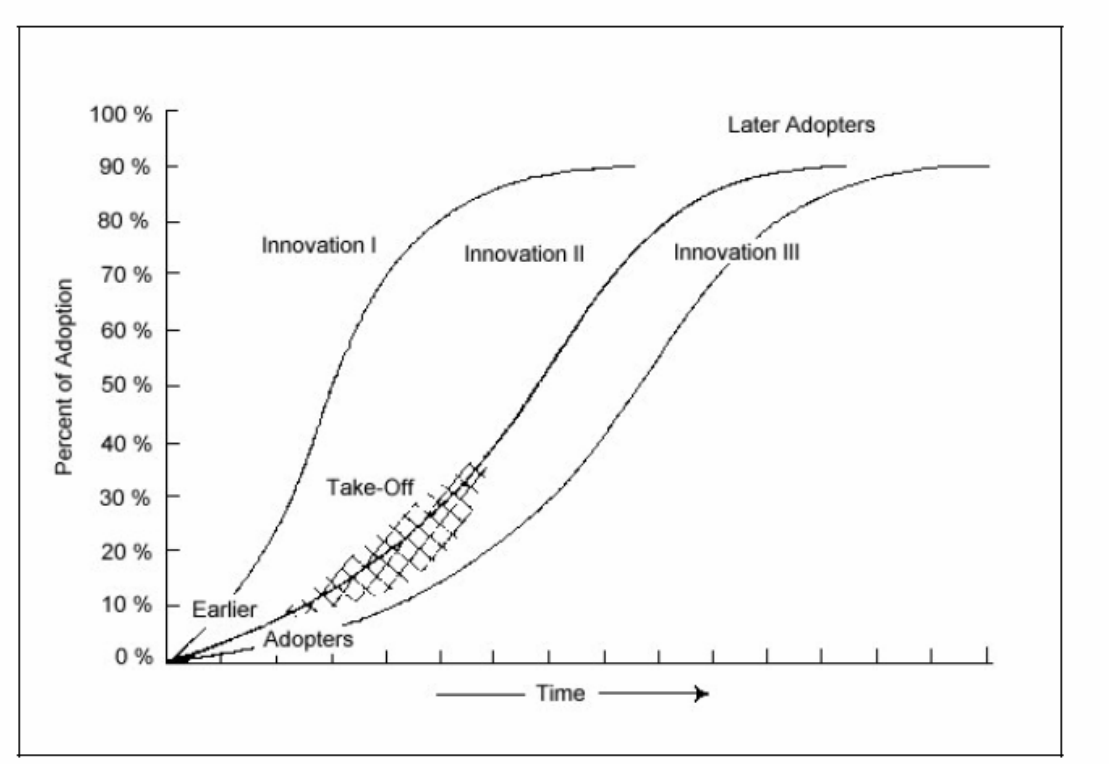

Figure 2. The Rate of Adoption (Rogers 1995, 314)

Research methods

The survey instrument was designed to measure the research constructs discussed earlier. The items in the questionnaire were derived after the literature review, and the questionnaires were pre-tested by students and two accountants. Feedback was obtained and considered for the redesigning and refining of the questionnaires. Multi-item indicators were used for measuring the various research variables. The items were measured using a five point Likert-type scale ranging from not at all important (1) to very important (5). Demographic variables, such as company age, turnover, amount of employees, were ascertained using single-item questions.

The data for this research was collected by means of a questionnaire in January 2005. The study was, for practical reasons, limited to a certain region of the country. The total sample frame consisted of all accounting agencies in the region, a total of 333 firms. After a couple of weeks a reminder questionnaire was sent out. Finally a total of 89 responses were received generating a response rate of approximately 26 per cent. To ascertain whether there was any non-response bias, comparisons were made between responses to the first mailing and those to the second mailing on each study variable (Armstrong & Overton 1977). This test revealed statistically no differences in mean responses.

The characteristics of the sample indicated that the majority (85 %) of the firms are very small, with 1-4 employees. Eleven firms have 5-9 employees' and only two of the agencies

have 10 or more employees. The accounting agencies were fairly evenly distributed across different ages with an average age of approximately 17 years. The majority (81%) of the agencies has a yearly turnover in the range of 0 - 199 999 euros. The demographic findings are in-line with findings from statistical data about the total population, and thus confirm this to be a representative sample.

Results

This section gives a brief summary of the main results. The emergence of new innovations regarding e-accounting systems varies. One of the first innovations was electronic bank statements, which has been in use since 1992, whereas electronic invoicing has been available since 1999. Similarly, electronic reporting to the authorities is a more recent innovation.

Electronic reporting to authorities (Tyvi) is the most used electronic innovation among the e-accounting technologies. About 58 per cent of the respondents have adopted it, although the average time of use has only been one year. About half of the agencies (47 %) receive electronic bank statements and the average time of use is four years. One third of the accounting agencies send electronic reports to their customers by using the Internet or e-mail. Electronic storing is used by some 16 per cent of the respondents, and electronic document management systems, e-invoicing and outsourcing by only 5 per cent.

As presented earlier, the critical mass point in the diffusion process is generally expected to occur approximately between 10 % and 20 % adoption. Table 1 presents the length of time since the innovator group (2,5% of the whole sample) has adopted various electronic accounting technologies. In addition, table 1 provides information on which technologies have achieved the critical mass point. Furthermore, the table gives direction on the adoption rate of different innovations.

Table 1. Time of innovation adoption

	Innovators have adopted the innovation	Critical mass achieved (innovators and early adopters, 16%)	Time from introduction by innovators to critical mass
Electronic invoicing	3-12 months ago	Not achieved yet, currently at 6 % use	
E-letters	7-10 years ago	2 years ago	5 years
Electronic bank statements	11-14 years ago	4 years ago	7 years
Electronic reporting to authorities	4 years ago	1 ½ years ago	2 ½ years
Receiving electronic invoices	2-3 years ago	Not achieved yet, currently at 12 % use	
Electronic storing	10 years ago	Not achieved yet, currently at 15 % use	
Receiving electronic documents from customers	1-3 years ago	Not achieved yet, currently at 3 % use	
Electronic reporting to customers	5 years ago	2 years ago	3 years

As table 1 indicates, innovators have already adopted all new e-accounting systems, the most recent one being electronic invoicing. Only e-letters, electronic bank statements and electronic reporting to authorities and customers have achieved critical mass. In addition, it can be seen that the adoption rate of, for example, electronic bank statements has been quite long, whereas the adoption rate for the electronic reporting has been much faster. Technologies, which in the near future are expected to reach the critical mass point, are electronic storing and receiving of electronic invoices.

Lack of time is considered as one of the key obstacles delaying the adoption of the e-accounting systems among accounting SMEs. Another important factor is the readiness of the agencies' business partners. Maintenance costs of e-accounting systems and data security issues were also seen as major obstacles. The survey results indicated that the most important reasons for the development of e-accounting systems are: more efficient use of time resources as well as higher internal performances, availability of accounting information and perceived requirements from authorities.

The results also indicate that interpersonal communication channels, such as training sessions and consulting, are considered as the most useful ways to achieve knowledge of new e-accounting innovations. Internet is also considered as a useful means of providing information. For example the taxation authorities of Finland have actively provided and developed their Internet services.

With regards to investments within the next two years, the majority of the agencies do not intend to spend big sums on new technology. About 50 per cent of the agencies plan to use thousands of euros on buying new hardware and some 25 per cent plan to invest thousands of euros in software. Education and IT-support will require only hundreds of euros in investment.

Within one year 17 per cent of the respondents plan to start using Tyvi electronic filing and another 15 per cent consider adoption of Tyvi in the near future. Weather this comes true, the usage per cent of Tyvi electronic filing would increase to 90 per cent. This may be the result of an increasing pressure put forward by the authorities.

Discussion and conclusion

This paper suggested a theoretical perspective based on the diffusion of innovations theory (Rogers 1995), and explored this theory with data from a sample of 89 accounting agencies with regards to their adoption of e-accounting innovations.

We argue that e-accounting innovations are inter-organizational systems with strong network interdependencies, and as such heavily dependent on all units in the network. The accounting agency cannot utilize new technology, if their business partners do not have the technology or are not willing to adopt it. If both the accounting agencies as well as their business partners are SMEs, their time and money resources are rather limited and focused on the core business. Further, the driving force for the adoption of e-accounting innovations is not the customer need. Instead, the process must start from requirements, willingness and innovativeness of the accounting agency. The increasing requirements by authorities with regards to electronic reporting is an important factor which has had a significant impact and will have increasingly so in the future. One of the difficulties in inter-organisational systems is that full benefit of the system can be reached only if enough critical mass is achieved for data and information transmissions (Rogers 1990).

Empirical studies of EDI (for example Chwelos et al. 2001; Iacovou et al. 1995) have found that larger firms often perceive and obtain more benefits than smaller firms. This trend was partially supported by the results of this study. The results indicate perceived relative advantages such as time savings, more efficient internal processes and cost savings. However, for small company the current work process might seem as efficient and preferable as an e-accounting system, because the data received from the customers is still mainly in paper format. Thus the investment and implementation costs needed to handle the accounting process electronically may seem too high in small enterprises compared to the benefits achieved. Also, the current low usage rate of e-accounting systems is believed to make it difficult to utilize the electronic accounting to its full benefit, something that may influence the adoption.

Also, although many agencies agree that e-accounting systems will be important in the future, they may not fully understand the implications or the importance now. The lack of understanding could have led them to dismiss the importance of e-accounting systems and led them to believe that they have plenty of time to adopt these innovations. The results indicate that quite many of the agencies considered that there was no need for e-accounting innovations, which is typical for late majority and laggards. Further, the perceptions of relative advantages may change with further system use.

The Finnish Accounting Act was on of the first legal regulations in the world in allowing and promoting the use of electronic methods in financial accounting. The act permits, but does not obligate. Thus it leaves the choice of accounting methods to the accounting agency. The revised act came into force in 1998 and may have affected the adoption rate and time of

innovations. The adoption time of innovations, such as electronic bank statements that were introduced before the act, seems to have been longer than the adoption time of more recent innovations. Moreover, change will take time. The new e-accounting innovations are not considered compatible with existing work processes, and the adoption and use may thus require considerable changes. With regards to this, it seems reasonable to expect a slow adoption rate, which the results in this study also give indications of.

This research was limited to a certain region in Finland and the sample size was small. The small sample size restricted the possibilities of statistical analysis. Further, the results may not be generalized to the whole population. However, with regards to the size and structure of the sample, it may be considered as representative for accounting agencies of the particular region, and might give some directions also for the whole accounting agency industry. Furthermore, the results are in line with previous research concerning SMEs.

Future studies could place more focus on the inter-organizational factors affecting the adoption rate. Moreover, future research could focus on the attitudes and resources of the business partners of accounting agencies.

References

Accounting Act (AA.) 1336/30.12.1997 .

Accounting Board 2000. Yleisohje koneellisessa kirjanpidossa käytettävistä menetelmistä 22.5.2000.

Amstrong, J. S. & Overton, T. S. 1977. Estimating non-response bias in mail surveys. Journal of Marketing Research, Vol 14, No 3, 396-402.

Chwelos, P., Benbasat, I. & Dexter, A. S. 2001. Empirical test of an EDI adoption model. Information Systems Research. Vol. 12. No. 3., 304-321.

Dahlberg, T. 2004. Taloushallinnon sähköistyminen muuttaa alaa. Tilisanomat, 3, 35-37.

Damanpour, F. 1992. Organizational size and innovation. Organization Studies, Vol. 13, No. 3, 375-382.

Iacovou, C. L., Benbasat, I. & Dexter, A. S. 1995. Electronic Data Interchange and small organizations: Adoption and impact of technology. MIS Quarterly. Vol. 19. No. 4., 465-485.

Mäkinen, L. 2000. Tilitoimistoala murroksessa. Tilisanomat. No. 5., 45-50.

Mäkinen, L. & Vuorio, B. 2002. Taloushallinnon nettivallankumous. Kauppakaari, Helsinki.

OECD 1998. SMEs and Electronic Commerce. Working Party on SMEs to the OECD Ministerial Conference on Electronic Commerce. October 1998, Ottawa. http://www.oecd.org/dsti/sti/it/ec/prod/sme18e.pdf (7.10.1999).

Premkumar, G. & Ramamurthy, K. 1994. Implementation of electronic data interchange: An innovation diffusion perspective. Journal of Management Information Systems, Vol. 11, No. 2, 157-187.

Robertson, T. S. 1967. Consumer innovators: the key to new product success. California Management Review, Vol. 10, 23-30.

Rogers, E. M. 1962. Diffusion of innovations. New York: The Free Press.

Rogers, E. M. 1995. Diffusion of innovations., 4th edition. New York: The Free Press.

Rogers, E.M. 1990. The 'critical mass' in the diffusion of interactive technologies. In M. Carnevale, M. Lucertini, & S. Nicosia, Modeling the innovation: Communications, automation, and information (pp. 79-94). Amsterdam: Elsevier.

Statistics Finland 2000. Internet ja sähköinen kauppa yrityksissä. Helsinki.

Valente, T.W. 1995. Network models of the diffusion of innovations. Creskill, NJ: Hampton Press.

Van de Ven, A.H., Angle, H. L. & Poole, M. S. 1989. Research on the management of innovation: The Minnesota studies. New York, NY: Harper & Row, Publishers.