

**LEARNING TO LIVE WITH AN EVOLVING  
INNOVATION:  
Reflections on the adoption of eCommerce by automobile  
dealers<sup>1</sup>**

Juhani Iivari

Department of Information Processing Science  
University of Oulu, P.O. Box 3000, FIN-90014 Oulun Yliopisto, Finland

Marius Janson

Department of Information Systems  
University of Missouri-St. Louis, St. Louis, MO 63121, USA

**Abstract** This paper analyses electronic commerce (eCommerce) as an innovation. It makes several contributions to traditional theories of diffusion of innovation. Firstly, electronic commerce exemplifies an evolving innovation that is subject to continuous research, social (re)construction and (re)interpretation. Secondly, adopting an evolving innovation is conceptualized as living with an innovation, implying an adoption trajectory rather than a one-time decision to acquire and to deploy the innovation. Thirdly, we discuss knowledge in innovation claiming that technological and strategic understanding is an integral component of adoption rather than being conditions of or barriers to adoption. Finally, we offer an innovation adoption model in the form of a learning process. The paper's contributions are based on the qualitative analysis of eCommerce in automobile distribution.

**Keywords** Electronic commerce, innovation, diffusion of innovation, adoption of innovation

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## 1. INTRODUCTION

Rogers' (1995) theory of Diffusion of Innovations (DOI) is a widely recognized framework for understanding innovations. He applies a broad interpretation of an innovation defining it to mean any idea, practice or object that is new to the adopting organizational unit. Diffusion then refers to the process by which the innovation spreads over time in the social system of adopters. DOI theory has also been widely applied to the adoption, implementation and diffusion of Information Technology (IT) innovations (Prescott and Conger, 1995). At the same time, however, research into IT innovations has triggered considerable criticism of (Attewell, 1992; Bayer and Melone, 1989; Fichman, 1992; Markus, 1987; Nambisan and Wang, 2000) and extensions to (Swanson, 1994; Grover et al., 1997; Fichman and Kemerer, 1999) traditional DOI theory. This poses the question whether there is something special about IT innovations that cannot be explained by DOI theory. Swanson's (1994) framework suggests that IT innovations do not form a homogenous category of innovations but instead should be classified into a number of types. Attewell (1992), and Nambisan and Wang (2000) draw attention to the complexity of many IT innovations and to the technical know-how necessary for their successful adoption.

Although we concur with these ideas we suggest an additional aspect, which is that many IT innovations are highly evolving innovations. The technology that underlies these innovations is often under continuous (re)development, social (re)construction, and IT itself tends to have high interpretive flexibility (Orlikowski, 1992). The evolving nature of an innovation further implies that its adoption process is not just a one-time decision whether to deploy or not to deploy an innovation (Fichman and Kemerer, 1999), but a continuous process of living with the evolving innovation. To formulate adoption as a process rather than a one-time decision leads to questions concerning the nature of this process. In accordance with Attewell (1992) and Nambisan and Wang (2000) we propose that living with an evolving innovation is a learning process. However, in contrast to the aforementioned authors we do not emphasize the role of knowledge as a condition for or a barrier to innovation adoption. Instead we stress knowledge as an integral component of adoption and emphasize the significance of a proactive adoption strategy. These contributions are theoretical reflections that arise from a qualitative study of eCommerce in the automobile distribution industry. Section two introduces the empirical background that will be used to illustrate the theoretical ideas elaborated in section three. Finally, section four is the conclusion.

## **2. ADOPTION OF ELECTRONIC COMMERCE IN THE CAR DEALER BUSINESS**

### **2.1 Introduction**

Many predict that eCommerce will radically influence the value chains and business processes of industries (Benjamin and Wigand, 1995; Kalakota and Robinson, 1999; Kalakota and Winston, 1997; Malone et al., 1989). Especially the position of retailers in the supply chain is in question because of the likelihood of disintermediation and reintermediation (Chircu and Kauffman, 1999). Our research focuses specifically on retailers in order to understand their eCommerce strategies and actions. For several reasons we selected the automotive industry as the focus of our study.

The potential of the Internet for the automotive industry has received attention in the academic and professional literatures. Many authors predict that eCommerce will restructure the industry's business models (Seltz and Klein, 1997; Kalakota and Robinson, 1999). There already are several widely known examples of electronic market places for new and used automobiles (Marshall et al., 2000; Seltz and Klein, 1997; Seltz and Klein, 1998). These electronic markets demonstrate that eCommerce is a realistic option and it should make auto manufacturers, importers and retailers conscious of the potential changes. A recent NUA Internet Surveys (Foley, March 2000) report mentions that in excess of 80% of new car dealers in the US have interactive websites that enable customers to obtain information to help purchasing decision making or indeed accomplish the entire car purchase online. The report also states that over 40% of customers used the Internet for obtaining information concerning their car purchase. On the other hand, just 5% of those purchasing a new car did so entirely online.

These points illustrate that much uncertainty exists concerning the size and direction of changes in automobile purchasing. Despite these uncertainties it is evident that eCommerce constitutes a considerable challenge to auto dealerships because their role and position are at stake in the emerging new electronic market place. On the whole automobile dealers do not know if the Internet represents an opportunity or a threat, whether one will be disintermediated or remain part of the value chain but in a different capacity (Seltz, and Klein, 1998). In view of this uncertainty we decided to focus our research on automobile dealers, how they perceive their competitive situation, to what extent they have adopted eCommerce and which actions, if any, they plan to undertake to counter the threats or to capitalize on the opportunities presented by the Internet.

## 2.2 Research method

We applied a multiple case study design (Yin, 1994) to examine eCommerce adoption among car dealerships. The selection of cases followed purposeful maximum variation sampling (Patton, 1990). The cases were selected to cover dealerships that are fairly advanced in their eCommerce adoption and dealerships which are just in the beginning or have not yet adopted eCommerce at all. Patton (1990) notes that when selecting a small sample of great diversity, research may yield two kinds of findings: (1) detailed descriptions of each unique case, and (2) shared patterns that cut across the heterogeneous cases. This paper focuses on contributions of the latter type. The uniqueness of cases is discussed in more detail in a different paper (Iivari and Janson, 2001).

For practical reasons, namely to keep research costs within budgetary limits, the dealerships selected were headquartered in the City of Oulu, Finland. We chose to conduct our investigations in Finland because the Finnish population is highly educated, prosperous and quite homogeneous, thus controlling for these factors, and the country is one of the world's most networked countries (Lyytinen and Goodman, 1999). These characteristics make Finland an ideal "laboratory" for experimenting with alternative approaches to eCommerce. This is exemplified by a US-based automobile manufacturer, which, according to one of our informants, presently experiments in Finland with two alternative eCommerce business models. These considerations led us to select Finland for our investigation into the response by automobile dealers to the Internet.

To ensure that our results would reflect alternative responses to the opportunities and threats of the eCommerce we first contacted by phone the CEOs of the dealerships with and without websites. Next we checked whether dealers would agree to be interviewed. The results of our phone conversations were positive because none of the contacted dealers declined to participate in our study. Our approach yielded a sample of seven from among the eleven major automobile dealers operating in the city of Oulu, Finland.<sup>2</sup> The goal was to select both adopters and non-adopters. Five of the seven dealers had adopted eCommerce to varying degrees of sophistication. Two dealers were non-adopters of eCommerce. However, one of the non-adopters had opted to use eCommerce between our first contact and the subsequent interview. Thus, our sample consisted of six adopters and one non-adopter. As Patton (1990) points out the objective of purposeful sampling in qualitative research is not statistical representativeness but to select information-rich cases to study in depth. Therefore we do not consider it correct to discuss the

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<sup>2</sup> We do not count here diverse "dealers" that sell only used cars.

representativeness of the seven cases, but in our judgement they cover the diversity of eCommerce adopters and non-adopters in Oulu.

Our aim was to uncover how members of top management experienced and appraised their situation and the extent to which they acted according to their appraisal. In keeping with this aim we chose semi-structured interviews guided by interview guidelines to enable interviewees to tell their own story. We carefully constructed separate interview guidelines for adopters and non-adopters. The themes identified in the guideline for adopters concerned the history and implementation of eCommerce in the respective organizations, strategies of its development, expectations concerning its impact, perceived changes in the business, business models and organization, perceived success and critical success factors, and future plans. The interview guideline for non-adopters asked, after having briefly introduced eCommerce, whether the respondent had considered owning a website, reasons for non-adoption, his or her views of business implications of eCommerce, his or her knowledge of underlying technologies, and his or her understanding of required investments and future plans.

A few days before our interview visits we sent dealers a copy of our semi-structured interview guideline. This enabled dealers to reflect on their situation and formulate opinions on topics they might have been unaware of. Having the questions before the interview also avoided embarrassing individuals by asking questions they would otherwise have been unprepared to answer. Furthermore, at the start of each interview we attempted to put individuals at ease by social small talk. Additionally, as much as possible, we would let individuals tell their “story” without interruption.

A case study may apply several data gathering methods: observation, interview, and document review (Cassell and Symon, 1994; Stake 1995; Yin, 1994). Because understanding the human situation and human action are key to our project, an interview-based research method suited our purpose best (Lacity and Janson, 1994). We conducted one hour-long, on-site, open ended, and semi-structured interviews with company chief executive officers (CEO). The interviews were audio taped and then transcribed into text. Some interviews were conducted in English, others in Finnish, depending on dealer preference. During all interviews one interviewer was a Finn whereas the second interviewer was English-speaking.

Klein and Myers (1999) point out that a case study can be positivist, interpretive or critical. They characterize research as positivist when there is evidence of formal propositions, quantifiable variables, hypothesis testing, and drawing inferences about a phenomenon from a representative sample of a stated population. Research is critical if the main task is being one of social critique, and it is interpretive if it is assumed that knowledge about reality is gained through construction such as language, consciousness, shared meanings, documents, tools and artefacts (Klein and Myers, 1999). According

to these characterizations, our study is closest to interpretive, even though it resulted in outcomes that may be subjected to a more positivistic testing. Our interest in the interviews centered on how top management of the selected dealerships appraised the opportunities and challenges of the eCommerce, how they saw its business meaning and implications and what plans do they had for its development. The object of study, eCommerce, was a socially constructed artifact and top management's appraisal of it is essentially about consciousness, meanings and action. Also our interpretations of the cases are exclusively based on language, tape-recorded interviews, web pages of the participant dealerships and to a minor extent on other company materials

Case studies can be "intrinsic" or "instrumental" (Stake, 1995). Intrinsic case studies lead to learning something about a particular case. They do not result in knowledge that can be generalized to other cases nor do they lead to theory building. Thus, intrinsic case studies are undertaken because the case itself is of interest (Stake, 1995). Instrumental case studies result in learning that extends to other cases. The cases examined provide knowledge about certain issues or a refinement of theory (Stake, 1995). The present study is an instrumental case study. We aim to sharpen the DOI theory by examining the adoption of eCommerce by seven dealerships in the automobile industry.

### **2.3 The case descriptions**

During the spring of 2000 we interviewed the CEOs of six dealerships and the liaison manager of the seventh dealership. Table 1 shows dealership characteristics: company background, website presence, website initiator, technology base, and eCommerce comments. Annual turnover in terms of monetary value, and new and used cars sold annually vary considerably among the seven dealerships.

All dealerships except one (A) had their own website that we subjected to an extensive walk-through analysis. Website implementation costs are distorted by one dealership (B) that had its site built by two students from a local educational institution. Because they did the work free of charge the dealership claimed it had a zero-cost website. In all other instances where a dealership had an Internet website it had been built at the CEO's initiative.

Even though all dealerships used information systems before the advent of eCommerce, they varied with respect to their technological maturity. In all companies salespersons rather than secretaries prepared all sales documents using computers. As Table 1 shows most of the dealerships were geographically distributed, having a presence in several cities. Three of these dealerships (E, F and G) had networked the geographically distributed sites with fixed lines.

Table 1a: Case Summaries

	Company A	Company B	Company C	Company D	Company E	Company F	Company G
<b>Company background</b>	Revenue: < 10 m€  New Cars: 100 to 500  Used Cars: 100 to 500  Personnel: < 20  Company Locations: 1	Revenue: < 10 m€  New Cars: 500 to 1000  Used Cars: 1001 to 2000  Personnel: 21 to 50  Company Locations: 2	Revenue: 10 to 50 m€  New Cars: 100 to 500  Used Cars: 501 to 2000 (est.)  Personnel: 21 to 50  Company Locations: 2	Revenue: < 10 m€  New Cars: 100 to 500  Used Cars: 100 to 500 (est.)  Personnel: < 20  Company Locations: 1	Revenue: 10 to 50 m€  New Cars: 1000 to 2000  Used Cars: 2001 to 3000  Personnel: 51 to 100  Company Locations: 5	Revenue: 50 to 100 m€  New Cars: 1000 to 2000  Used Cars: 2001 to 3000  Personnel: 101 to 200  Company Locations: 5	Revenue: 50 to 100 m€  New Cars: 1000 to 2000  Used Cars: 2001 to 3000 (est.)  Personnel: 101 to 200  Company Locations: 5
<b>Web-site</b>	No Website	Implemented: 2000  Investment: 0 €  New cars: Link to the importer's website  Used cars: Link to an electronic market place which gives a list of used cars with links to details of each car.  Personnel: Photos with contact information	Implemented: 1998  Investment: < 10000 €  New cars: Link to importers' website.  Used cars: Simple list by location.	Implemented: 1998-99  Investment: < 2000 €  New cars: Link to importers' website, when available.  Used cars: Simple list.	Implemented: 2000  Investment: < 16000 €  New cars: Links to importers' web pages  Used cars: A search engine; from the result list links to details of each car; integrated with Automaster database  Service: Booking through internet  Personnel: Photos with brief introductions	Implemented: 1998-99  Investment: < 35000 €  New cars: Link to an electronic marketplace  Used cars: Link to an electronic marketplace with a search engine  Service: Booking of time (proposals)	Implemented: 1995-96  Investment: -  New cars: No links to importers' websites  Used cars: A search engine; from the result list links to details of each car

Table 1b: Case Summaries

	Company A	Company B	Company C	Company D	Company E	Company F	Company G
<b>Web-site Initiator</b>	N/A	CEO plus two students from a local educational institution.	CEO plus one salesperson.	CEO plus sales manager.	Local Manager with support from CEO.	Liaison Manager (Direct report of CEO).	
<b>Technology base</b>	All salespersons use computers daily for preparing sales and insurance documents.  Internet connection	All salespersons use computers daily for preparing sales and insurance documents.	All salespersons use computers daily for preparing sales and insurance documents.	All salespersons use computers daily for preparing sales and insurance documents.	All salespersons use computers daily for preparing sales and insurance documents.  All locations networked by fixed lines	All salespersons use computers daily for preparing sales and insurance documents.  All locations networked by fixed lines	All salespersons use computers daily for preparing sales and insurance documents.  All locations networked by fixed lines
<b>Remarks concerning eCommerce</b>	No specific future plans, eCommerce adoption likely within next five-year period.	Website used to gain eCommerce related experience. No specific future plans.	Website used to gain eCommerce related experience. Auto service bookings using the Internet as a future plan.	Website used to gain eCommerce related experience. Auto service bookings using the Internet as a future plan.		Planned investment for further development 13000-17000 Euro Developing extranets specific to each company customer	Service booking through internet Developing extranets specific to each company customer Application of the mobile phone technology so that, for example, when service is complete the system sends automatically a short message to the customer's mobile phone that the car is



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With respect to the future role of the Internet in automobile distribution the opinions of dealers varied widely. Although managers of all seven dealerships agreed that the Internet would impact automobile industry considerably, they differed with respect to timing. Several managers enunciated the belief that the Internet will eventually become an important distribution channel but they saw no immediate need to plan for it. Other dealers felt that the Internet was important already but only as a marketing channel. Finally, the most sophisticated dealership insisted that actions of the national sales offices of the large automobile manufacturers would in effect determine whether the Internet would be an opportunity or threat for dealers.

None of the six companies with an Internet presence collected systematically statistics about customer contacts, sales and feedback initiated by e-mail. However, in the case of three dealerships (C, F and G) the interviewees were well informed about customer website use, either because all customer contacts and feedback were mailed to them directly or else forwarded. Dealerships B and E did not have sufficient experience at the time of the interview to provide any statistics. Dealerships C and D reported that they quite consistently received ten to twenty customer contacts and some feedback each month. However, dealership G reported the number of customer contacts to be considerably higher, in the order of one hundred per month, and estimated that it sold sixty to seventy used cars during the last six months through referrals originating from the Internet. The CEO of dealership F estimated customer contacts in the order of forty per month and claimed that he had done much business that had originated from the Internet.

Given that CEOs have the responsibility to appoint individuals who take charge of the dealerships eCommerce effort, they all agreed that new and young employees are better for this purpose. One CEO stated that it is not so much technical prowess that makes a new-hire preferable over a current employee. Rather, it is the fact that the new-hire has not yet settled into any particular way of doing things and, hence, can start learning the Internet-mediated way of doing business immediately without any prior bias.

### **3. ADOPTION OF ELECTRONIC COMMERCE AS AN INNOVATION**

#### **3.1 General observations**

Table 1 shows that the six car dealers with Internet presence had quite similar websites. This might lead one to conclude that the companies were also

similar with respect to the adoption of Internet in support of their business. However, it became clear that this conclusion would be very superficial and, in fact, misleading. The interviews revealed that the companies differed in their understanding of the possibilities of the Internet and with respect to their eCommerce strategy. After several readings of interview transcripts it became clear that CEOs' understanding of eCommerce as a phenomenon could be comprehended in terms of *strategic understanding* of the impact of eCommerce on the business models and the consequences and in terms of *technological understanding* of the functionality of eCommerce. To several CEOs their company's website was very much an external artifact. Even though the interviewees understood the functionality of their website they did not demonstrate that they really comprehended its business implication.

In the case of eCommerce development strategies, it became clear that some companies had adopted a passive strategy whereas others were much more proactive. Companies with a passive strategy either had not yet adopted eCommerce or had adopted it only to learn and to be ready if eCommerce were to seriously impact their business. Proactive companies considered eCommerce a business opportunity that they had to actively embrace. By reflecting on company differences, it became increasingly clear that being proactive was pivotal to a company initiating the learning process needed to create a strategic and technological understanding of eCommerce.

These reflections led us to reconsider some assumptions of extant theories of diffusion of innovation. Because of space limitations we limit our review of theories of diffusion to the DOI theory of Rogers (1995). However, we will complement Rogers' (1995) DOI theory with ideas from several other theories (Attewell, 1992; Fichman and Kemerer, 1999) where appropriate.

### **3.2. The evolving nature of an innovation**

Rogers (1995) defines an innovation as "an idea, practice, or object that is perceived as new by an individual or unit of adoption." The DOI literature also identifies several characteristics of innovations to explain their diffusion. Of these, five characteristics, relative advantage, compatibility, complexity, trialability and observability have received most attention (Rogers, 1995; Tornatzky and Klein, 1982; Moore and Benbasat, 1991). With respect to the complexity dimension it is widely recognized that the literature on diffusion of innovations (Rogers, 1995) has focused on quite simple innovations with individuals as adopting units (Attewell, 1992; Fichman, 1992). On the other hand, complex innovations with organizations as adopting units have received much less attention.

Electronic commerce clearly represents a complex innovation with organizations as adopting units. It also illustrates one additional characteristic of innovations not usually discussed, namely, *dynamicity*. eCommerce as an innovation is clearly an evolving concept, under intensive research, continuous (re)interpretation, social (re)construction and expansion. In fact, the very concept of eCommerce is still being debated (Beat et al., 1999). We chose a quite broad interpretation for our exploratory study; assuming that it is eCommerce when a business transaction is effected in whole or in part by using computer-enabled communication. This broad interpretation has a drawback, however, that all telephone-mediated business transactions, for example, can be interpreted as eCommerce, when telephone calls are computer mediated. Actually this is already a borderline case in Finland where the penetration of mobile phones is very high. It is a matter of interpretation whether mobile phones such as Nokia Communicator are considered primarily as phones, or as personal digital assistants or as computers.

The above question demonstrates that eCommerce as a phenomenon is still in a formative stage and under social (re)construction in a very real sense. For example, as explained by one of our informants, a major US-based automobile manufacturer is presently experimenting in Finland with two alternative eCommerce business models. It is still an open question which business model will prove successful in the market place. This created considerable uncertainty among auto dealers. As one CEO commented:

“It is certainly so that every [automobile] importer has its own style and one just must learn to live with it and to look at it in the long run. I believe that after five years or whatever it takes, after that there [will be] one single reasonable way everybody [will] select. Now there are different variations [of the business model] that are [being] experimented [with]. [One of these] will be superior.”

As far as we are aware the dynamic nature of an innovation has not received proper attention in the literature. In fact, innovation characteristics mentioned by Zaltman et al. (1973) and Tornazky and Klein (1982) do not even mention an innovation's dynamism directly. Among the characteristics identified by Zaltman et al. (1993), only reversibility and susceptibility to successive modification include some flavor of dynamicity. Of the thirty characteristics identified by Tornazky and Klein (1982) in their meta-analysis of seventy-five articles, only flexibility can be interpreted to address the dynamicity aspect of an innovation. Rogers (1995) points out that adopters may reinvent (modify) the innovation during adoption. The literature on the topic however fails to capture the inherent dynamicity of the very concept of an innovation.

The characteristic of dynamicity is particularly significant in the case of IT innovations because most of these are very dynamic and have high

interpretive flexibility (Orlikowski, 1992).<sup>3</sup> To take a simple case, it is evident that the concept of word processing as understood today is quite different from that twenty years ago. Thus, with respect to dynamicity the question is whether the DOI literature should center on versions of an innovation (e.g., Microsoft Word version x versus version y) or whether it should focus on the specific technology such as word processing as an evolving concept. However, in the case of eCommerce there are not easily identifiable product versions or stages. In short, we have selected to analyze eCommerce as a specific technology or phenomenon. More fundamentally, it is also obvious that the adoption of a product of version n+1 by adopting unit x is influenced by x's adoption history of version n. Hence, one cannot forget the earlier adoption trajectory of the technology when studying adoption of a single version or stage.

### **3.3 Adoption as living with an evolving innovation**

Rogers (1995) defines adoption as “a decision to make full use of an innovation as the best course of action available.” Fichman and Kemerer (1999) distinguish between acquisition and deployment in the adoption process. Both references view adoption events as dichotomous decisions, and they do not take into consideration the extent of the adoption. Cooper and Zmud (1990) introduce the concept of “infusion” to address the problem of the extent of adoption. They interpret infusion of the product as the extent to which the innovation is applied in terms of its fullest potential. The problem with this definition in the case of evolving innovations is that it is often extremely difficult to determine the innovation's fullest potential. Often no one knows it in advance. This is specially so in the case of eCommerce where imagination may be a major constraint to its deployment.

Therefore, instead of a one-shot binary event we suggest that adopting an innovation is a dynamic process of living with an evolving technology. Adoption thus becomes a trajectory over time. This adoption trajectory may be related to several innovation decision processes that in turn guide the adoption trajectory. The adoption trajectory may be conceptualized in terms of the adoption of the functionalities provided by the innovation. At any moment, the adopting unit makes use of a set of functionalities provided by the techno-

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<sup>3</sup> Pinch and Bijker (1989) interpret the ‘interpretive flexibility’ to cover both flexibility in how artifacts are designed and the flexibility in how people interpret the designed artifacts. The former flexibility is more than obvious in the case of IT artifacts. We construe the interpretive flexibility to refer to the latter flexibility, which becomes closer to its initial meaning of ‘interpretive flexibility’ of experimental data in the “Empirical Program of Relativism” (Collins, 1981).

logy. Nambisan and Wang (2000) in some way recognize this by identifying three broad levels of web technology adoption: (a) information access, (b) work collaboration, and (c) core business transactions. One cannot assume, however, that the adoption of all technologies follows some hierarchy of functionalities, because the technology may actually allow much more flexibility. Henderson and Cooperider's (1990) functional model of CASE technology illustrates one careful attempt to define such a reference model for one specific technology. In view of the evolution of technology, the reference model may also evolve because one cannot know all possible uses and functionalities that the innovation may take.

To get a sense of the degree of eCommerce adoption among auto dealers we analyzed their websites (Table 1). In order to achieve a more complete picture one should focus on adoption trajectories instead of a snapshot view of the degree of adoption. Even though the study reported in this paper does not attempt to be a longitudinal analysis, the interviews made clear that adoption is a dynamic and continuous process. The CEO of Company F, for example, commented on his web pages as follows:

"Yes, in my view [they have] collected dust. It has not been touched for a couple of years. They were pretty good when they were installed, but now they definitely (are outdated)."

Practically all retailers' eCommerce development strategies were based on the view that adoption of eCommerce is evolving. We wish to be able to repeat the interviews within a reasonable time limit in order to understand the dynamics of the adopter process in greater detail.

### **3.4 Knowledge and adoption of innovations**

Rogers (1995) defines diffusion as the process by which an innovation is communicated over time among the members of a social system. This view emphasizes knowledge in the sense of the adopting unit's awareness of the innovation as a precondition to its adoption. Thus, the innovation-decision process starts during the knowledge stage where the adopting unit is exposed to an innovation and gains understanding of how it functions. Rogers (1995) identifies three types of knowledge about the innovation: awareness-knowledge about the existence of an innovation, how-to knowledge about how to use an innovation properly, and principles-knowledge about the principles underlying the innovation. His main focus is, however, on awareness knowledge.

Attewell (1992) makes a distinction between signaling versus technical knowledge, proposing that the technical knowledge may be a more severe limiting factor than the signaling knowledge. He also suggests that this technical knowledge may be immobile, difficult to transfer. It often has to be

recreated by the user organization, by reinventing and learning by doing. Despite this, he mainly focuses on supply-side institutions' means of lowering the knowledge burden of customers such as service bureaus, consultants, and simplification of technology. Attewell (1992, p.15) also identifies two informal knowledge areas where the above mechanisms are not effective. Firstly, "there remains the not-inconsequential task of learning how best to apply the technology in the business context" and a "final area of skill-acquisition occurs when users find ways in which technology can change how their firm does business." He notes that applying computer applications to business tasks requires a surprising depth of skill and knowledge. He further stresses the significance of informal computer experts as owners of this expertise.

Analysis of our interviews with CEOs of auto dealerships confirmed Attewell's view. Thus, all six retailers with web pages had used external experts to develop these and therefore had not tried to acquire technical knowledge concerning technical implementation. However, the interviews led us to emphasize more two forms of "informal" knowledge, i.e. *technological understanding* of eCommerce and *strategic understanding* of eCommerce. We discovered that the six companies differed radically in their strategic and technological understanding of eCommerce.

### **3.4.1 Strategic understanding of eCommerce**

Underlying business models have received considerable attention in the context of eCommerce. Timmers (1998) defines a business model as the architecture for product, service and information flows, and business actors and their roles, plus a description of the benefits for each actor. Electronic commerce is claimed to affect business models, possibly enabling new business models through a process of disintermediation and reintermediation (Chircu and Kauffman, 1999).

Business models feature prominently in the process of reengineering of the auto industry. Because they define the role of dealers in the supply chain, business models are significant to the auto dealer's survival. As mentioned before, a major auto manufacturer recently launched an eCommerce application in Finland that allows direct buying of new cars from the importer, thus enabling customers to bypass the auto dealer. eCommerce may also lead to other industry changes such as the separation of new car and used car markets.

In fact the business models emerged as a clear point of concern during our interviews with auto dealers. Because of their strategic importance to dealers we call the knowledge and comprehension of business models underlying eCommerce *strategic understanding*. Generally speaking, auto dealers faced considerable uncertainty with respect to the likelihood of alternative

business models. On the other hand some interviewees articulated definitive ideas concerning the likelihood of certain business models. The CEO of Company G immediately led the discussion to business models as is evident from the following excerpt:

“The way organizations, especially car importers, perceive eCommerce [influences] whether it is perceived a threat or an opportunity. There are two different views in our case, Manufacturer G1 with its [view] and Manufacturer G2 with a totally different view. This is essential because it affects whether there will be competition in the field, if one sees eCommerce as a threat and starts to ”put sticks between the spokes” to compete or whether one sees it as an opportunity and immediately starts to make use of it.”<sup>4</sup>

Company F’s interviewee gave evidence of considerable strategic understanding. He described his company’s situation as follows:

“We sell F1, F2 and F3 cars. At the moment there is nothing special [going on]. None of these [companies] will start an Internet business to bypass dealers. If you presently look at their pages, for example [www.F2.yy](http://www.F2.yy), you will find a country and then the closest dealer [to the customer within the country]. But a big question is how this model will change in the future. In fact, there are distribution systems that deliver cars directly to the customer’s front door. In England, [for example] Volkswagen sells two [car models] through Internet that are 900 English pounds cheaper [than if they were sold the traditional way]. The cars are delivered to the dealer who [then] gets a nominal payment for car preparation and final delivery [to the customer].”

He also grasped the potential of reintermediation, as exemplified Auto-By-Tell’s attempt at invading the Finnish market.

Representatives of the remaining three companies demonstrated a lesser strategic understanding with regard to eCommerce. They recognized that eCommerce is likely to make it easier for customers to compare prices (Company D), to decrease price differences among different regions of the country (Company B and Company E), to force regional car dealers to become more national in scope (Company C and E), and to separate new and used car markets (Company C). However, none of the CEOs demonstrated a systematic understanding of eCommerce’s strategic significance.

### **3.4.2 Technological understanding of eCommerce**

Technological understanding refers to the respondent’s knowledge and comprehension of eCommerce as a technological phenomenon, how it can be supported by information and communication technologies, especially by the world-wide-web, and the functionalities it may have. The respondents’ technological understanding by and large followed a pattern similar to their strategic understanding. Thus, the CEO who admitted that he had never used e-mail and who did not know what the term world-wide-web meant, explained his lack of knowledge as follows:

“It is mainly because I do not have language skills that I’m behind, I master these basic programs [for car dealers] but this side is a little [weak]”

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<sup>4</sup> For the sake of anonymity the real names of manufacturers are concealed.

Companies C, D, and E had their own web pages. But even though the interviewees were aware of their websites functionalities, the websites remained quite external artifacts to them. They regarded eCommerce as an external factor that they needed to adapt to (Company C), as an opportunity (Company E) to be exploited, or just as a new marketing channel (Company D). They did not demonstrate a more sophisticated understanding of business meaning of their websites in the sense of the potential functionality in supporting eCommerce as did respondents from companies F and G.

The representative of Company F strongly emphasized the nature of Internet as a two-way information channel between the customer and the seller. In fact, he considered this two-way nature as exceedingly important:

“In my opinion the Internet serves to make customers more loyal. Through internet you can get “frequent customer” benefits and special offers and be in contact [with the customer] directly through e-mail”

This view is clearly at odds with the statement that “open IT network architectures lower prices and benefit buyers as dependence on supplier hierarchies is reduced” (Grover and Ramanlal, 1999). In the case of prices, this CEO stated that after the Internet’s implementation prices have clearly started to become more equal between different parts of the country.

The CEO of Company G on the other hand provided his own definition of eCommerce right at the start of the interview:

“To me eCommerce is not a business transaction conducted electronically [in its entirety]; there is eCommerce if a customer during some stage of the process is in contact with us electronically, using an electronic media. In my opinion that is eCommerce. Often eCommerce or Internet commerce is assumed to cover the whole process from the beginning (A) to the end (Z) electronically.”

To summarize, we experienced strategic and technological understanding of eCommerce to be so intimately intertwined with the actual adoption of eCommerce that we do not see knowledge as merely a condition of or a barrier to its adoption but as a part and parcel of it.

Applying Rogers’ (1995) distinction between hardware aspects of technology and software aspects of technology, we suggest that strategic and technological understanding form the “software aspect” of eCommerce.<sup>5</sup> Without proper strategic and technological understanding the application of eCommerce to business seems to be difficult especially in the long run.

### **3.5 Adoption of an innovation as a learning process**

Attewell (1992) sees the development of technical knowledge as organizational learning, and organizational learning as a means of overcoming

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<sup>5</sup> Not to be confused with the computer software used to implement websites supporting eCommerce.



knowledge barriers. As pointed out above, his major focus lies, however, in technology services (as a contrast to knowledge transfer), taking the burden of learning off from the back of potential users. Inspired by Attewell (1992), Nambisan and Wang (2000) suggest an organizational learning perspective to analyze knowledge barriers to web technology adoption and the roles of supply side institutions. The roles of supply side institutions may range from “training the organization’s members to create the new knowledge themselves and to being active participants in the knowledge creation process” (Nambisan and Wang 2000, p.134). They analyze the web adoption at two levels: (1) establishment of the company’s website to facilitate information access (dissemination) and (2) the establishment of the company’s Intranet to support work cooperation. They distinguish three knowledge barriers: a technology-related knowledge barrier, a project-related knowledge barrier, and an application-related knowledge barrier. Technological understanding and strategic understanding as discussed above correspond to the application-related knowledge barrier, i.e. “the lack of knowledge regarding the business objectives that will be served by the Web-based application, the value of the various technology features for the adopting unit, the key business assumptions required to be made for deploying the technology, the potential for integrating the application with the existing IT applications, and the impact of the Web application on the current organizational structure and system.” (p. 133).

In the empirical part of their study, Nambisan and Wang (2000) found consistently that knowledge barriers and especially application-related knowledge barriers had significant impact on the adoption time of the company website and the company intranet: The higher the barrier was, the later the adoption took place in both cases. They also found that the degree of involvement of supply-side institution shortened significantly the adoption time. However, they did not analyze whether there was any interaction effect between the degree of involvement of supply-side institution and the type of knowledge barrier as Attewell’s discussion would suggest. Most notably, Nambisan and Wang (2000) did not analyse the relationship between the two adoption levels. If one assumes a logical or empirical order between the two levels (establishment of the company’s website and the establishment of the company’s intranet) one could assume that the timing of the latter adoption depends on the timing of the former adoption.

Our interview data led us to appreciate learning as an integral part of the adoption trajectory rather than just being the removal of knowledge barriers. Companies C and D established their websites fairly early in relation to the four other companies and they were relatively mature at the time of the interviews. However, it seems that companies C and D have not managed to initiate effective organizational learning for building strategic and technological understanding of eCommerce. Companies G and F have been

much more successful in this respect. We interpret that these differences are because of their differences in the eCommerce developmental strategy.

### 3.5.1 eCommerce developmental strategy

The seven car dealers clearly differed in their eCommerce development strategies. Company A's CEO had decided not to adopt eCommerce. In response to the interviewer's comment that many of his competitor's had adopted eCommerce, he replied:

"No, it [not having a website] does not create any pressure. We sell well and we have customers, and I don't believe that they [other dealers] are selling much through it [internet]."

and continued:

"I think it will be the next generation that will start with it [eCommerce], because I'm so much over 50. Let us see whether my sons will continue this [the business] and so on; they have more knowledge."

He further estimated that his company might adopt eCommerce within the next five years.

Company B installed its own website in 2000. Even though Company B's CEO did not state so directly, we interpret that the offer of two young students to construct the company's web pages free of charge as part of their course assignment was a significant impulse for the development of Company B's website. This CEO did not report any specific future plans and his idea that the two students would take care of the further website development, did not sound to us very realistic.

Companies C and D also adopted a passive eCommerce strategy of going along with eCommerce in order to be ready when eCommerce were to take off. In fact their web pages were fairly unsophisticated. The CEO of Company D expressed as a future plan to improve the website gradually. The CEO of Company C had in mind to develop service booking through Internet in the future.

Companies E, F and G expressed a much more proactive eCommerce development strategy. The interviewees of Company E were visibly pleased with the opportunity to discuss matters with people from university and proud of their web pages. They strongly emphasized eCommerce as an opportunity and saw noninvolvement as a major business risk. Concerning the future, one got the impression that at this point in time the company needed to slow down and take stock of its eCommerce efforts and future plans.

The interviewees from Company F and Company G also viewed eCommerce an opportunity in which they had to be involved. In addition, both interviewees expressed considerable commitment to ongoing eCommerce development. The respondent from Company F revealed planned investments into eCommerce in the range of 13,000-16,000 €. More specifically, his plans included development of extranets specific to each of the company's industrial customer. Company F had also created a managerial position responsible for further IT developments.

Company G also demonstrated considerable commitment to further development of IT in support of eCommerce. It had incorporated IT in its strategic plan and had nominated an individual with a business background as its IT manager. Company G's CEO also demonstrated great interest in and considerable understanding of IT. More specifically, he talked at length about auto service bookings using the Internet, development of Intranets for connecting geographically dispersed company units, and the exploitation of mobile telephones technology for messaging customers automatically that their cars are ready for pickup.

### 3.5.2 A conceptual model for innovation adoption as a learning process

Figure 1 describes the conceptual model of factors that we discovered as potentially relevant to the adoption of eCommerce in the car dealer business. As Figure 1 shows, we suggest that strategic understanding of eCommerce, technological understanding of eCommerce, maturity of the eCommerce website, and the eCommerce developmental strategy are causally interrelated. It is noteworthy that we suggest that organizational learning, building strategic and technological understanding of eCommerce depends not only on the maturity of the website that supports eCommerce but on a combination of website maturity and the eCommerce developmental strategy.

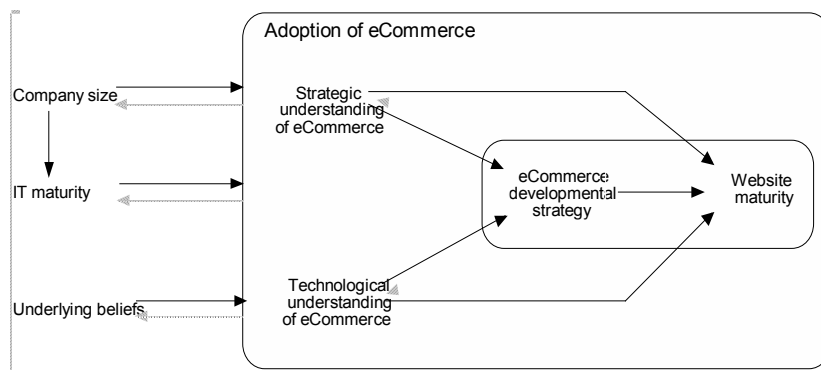


Figure 1: A conceptual model of factors affecting eCommerce adoption

Companies C and D established their websites fairly early on and they were relatively mature at that time. However, it appears that these companies had not managed to initiate effective organizational learning. This may be because of their rather passive strategy with regard to eCommerce development. Companies G and F, on the other hand, were much more

successful in this respect. An interesting question concerning the future is whether Company E, that had clearly adopted a proactive strategy and established an advanced website, will succeed in elevating its level of technological and strategic understanding as Figure 1 would suggest. The case of companies C and D also suggest that website maturity does not affect directly the eCommerce development strategy.

Figure 1 also includes “external” factors possible affecting the adoption process. It is obvious that adoption of any significant innovation in small or medium sized firms such as companies A through G requires top management’s acceptance and continued leadership. As Table 1 shows the companies that were more advanced in the adoption of eCommerce were the bigger ones. Size is one of the factors that have been found to explain the innovativeness of organizations (Rogers, 1995). An obvious explanation for the significance of size is that bigger companies have more resources to invest in the adoption of innovations such as the Internet, and eCommerce. This relationship is not deterministic, however. Company D which is the second smallest of the seven dealerships had clearly been more proactive than company B and had established its own web pages fairly early. However, company size may affect eCommerce uptake in statistical terms.

In their recent study Nambisan and Wang (2000) did not find company size to affect the time of web adoption, guessing that the resource requirements for adopting the web were not high enough to affect adoption behavior. Also in our case, the cost of establishing the websites to support eCommerce was sufficiently low that it hardly explains differences between companies. On the other hand, bigger companies seemed to have resources to invest more on IT. For example in our cases, companies F and G had nominated managers responsible for IT. This may explain that they were in a better position to build the strategic and technological understanding and maintain the active strategy.

A third “external” factor that arose during the interviews was IT application maturity. In all the companies salespersons instead of secretaries use computers to do the paper work related to auto sales. A distinguishing factor was the use of information and communication technologies to manage the geographically distributed companies. Companies E, F and G had networked their geographically distributed organizational units. The CEO of Company G emphasized the significance of this networking as shortening the geographical distance between the units. It may well be that this networking formed an advantageous situation for establishing web pages to support eCommerce. As Table 1 shows these networked companies were the bigger ones. So, the size may explain the differences in the IT maturity.

There were also clear differences in the beliefs of the respondents concerning eCommerce. The CEOs of companies A through D stated that eCommerce may be or is coming in the future but they did not see it

significant in the business terms just now. The respondents from companies E through G saw eCommerce much more as an opportunity that is already here. Based on the interview data it is impossible to identify whether these different beliefs have influenced the adoption of eCommerce in the respective companies or whether they were just explanations for and justifications of the selected policies with regard to eCommerce.

#### **4. CONCLUSIONS AND FINAL COMMENTS**

This paper proposes a number of modifications to the dominant assumptions of DOI theory. The most obvious implication of the above analysis is that the adoption and diffusion is a much richer phenomenon than the received view (Rogers, 1995) assumes. DOI theory defines diffusion as “the process by which an innovation is communicated through certain channels over time among the members of a social system”. The adoption or rejection of an innovation is seen as a quite unproblematic binary decision. We argue that the adoption is to learn to live with an evolving innovation. The adoption in a single adopting unit takes place over time forming an adoption trajectory. This view invites a focus on learning as a determinant of the internal dynamics of the adoption process.

This paper is a part of a larger empirical project that aims to understand the way practicing executives in the retailing business react to uncertainty created by the penetration of eCommerce into their market. We selected the automotive industry and especially traditional brick-and-mortar auto dealerships for our empirical study because, based on previous research, we expected it to be heavily influenced by eCommerce. Even though we focused on auto distribution, we wished to gain insight into how the Internet and eCommerce affect the larger retail industry. We felt that automobile dealers perform functions that are representative of the tasks performed by other retail companies.

Contrary to our initial expectations, our interviews indicated that the dealerships did not perceive the possibility of disintermediation as an immediate threat. However, their reactions to the emergence of eCommerce and responses to our questions during the interviews differed strikingly from each other. This led us to focus on similarities and differences between the dealerships, which ultimately crystallized into four themes or dimensions: strategic understanding of eCommerce, technological understanding of eCommerce, website maturity and eCommerce developmental strategy. While our interviews of seven dealers evidenced that the dealerships differed considerably on these four dimensions, ranking the seven companies along them also showed considerable consistency in rankings within companies.

This led us to identify a number of adopter categories reported in Iivari and Janson (2001).

The present paper represents a further theoretical reflection of shared patterns that cut across the heterogeneous cases of seven dealerships (Patton, 1990) from the viewpoint of DOI theory (Rogers, 1995). Much of DOI theory assumes a large population of adopting units. It focuses on the macro level of analyses and includes topics such as research into earliness of knowing about an innovation, rate of diffusion of different innovations, innovativeness of units, and rate of diffusion of innovations in different social systems (Rogers, 1995). The view of innovation adoption developed in our paper calls for additional attention to *micro level* analyses of the adoption trajectory of a single innovation in a single adoption unit (Iivari, 1993).<sup>6</sup> This level aims to develop in-depth understanding of the internal dynamics of the adoption process. There are examples of this kind of study (e.g. Orlikowski, 1994), but they represent a clear minority. Among the research topics listed by Rogers (1995) studies on innovation success/failure (consequences of an innovation), adoption of an innovation, rejection of an innovation, reinvention (modification) of an innovation, and discontinuation of an innovation are compatible with this micro view because they do not presuppose any population of adopting units.

Even though we do wish to exclude cross sectional surveys, it is obvious that qualitative studies and especially longitudinal analyses are compatible with the view of proposes in this paper. This paper has advanced this path by analysing seven cases of adoption of eCommerce. It is self-evident that our study is narrowly focused in the sense that it investigated eCommerce adoption using seven cases drawn from one segment of the retailing industry. We fully recognize that generalizing results of a study involving just seven cases is fraught with danger. However, in line with qualitative research tradition the primary purpose of our multiple case study was not statistical representativeness that will allow confident generalizations from the sample to a larger population but to select information-rich cases from which one can learn a great deal about the issues of central importance to the purpose of the study (cf. Patton, 1990). The variety of the seven cases provides some evidence that we managed to identify information-rich cases. We suggest that our general findings - the dynamic nature of an innovation, an adoption trajectory of an innovation, knowledge as an integral component of the adoption process and innovation adoption as a learning process – are not

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<sup>6</sup> This distinction between macro theory of innovation diffusion and micro theory of innovation adoption (Iivari, 1993) is close but not identical to Attewell's (1992) distinction between "macro-diffusion studies" and "adopter studies". Attewell (1992) assumes the adopter studies to focus on early adopters as a contrast to late adopters (assuming in this way the diffusion to take place in a large population of adopting units).

sensitive to the sample size and its representativeness. However, some more detailed points of our paper, especially the inductively generated causal model (Figure 1) clearly requires further validation using a quantitative analysis of innovation adoption in larger population of adopting units. As a consequence, we do not see quantitative and qualitative research as mutually incompatible. It is our wish that we could continue our work on the adoption of eCommerce on both these fronts in the near future.

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