

1998

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Recommended Citation

Saarinen, Timo and Tuunainen, Virpi Kristiina (1998) "Research Challenges in Electronic Commerce," *Scandinavian Journal of Information Systems*: Vol. 10 : Iss. 1 , Article 18.

Available at: <http://aisel.aisnet.org/sjis/vol10/iss1/18>

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Research Challenges in Electronic Commerce

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Abstract

In this paper we look at different research topics that will be interesting and important challenges in the area of electronic commerce (EC). These topics include benefits of EC for different stakeholders, changing consumer behaviour, changing basis for services, restructuring of service processes and changing logic of business and industries in the global market space. We identify relevant topics for further investigation in all these topics. We believe that the Scandinavian environment together with the tradition of high quality in-depth research, offers the Nordic countries a great opportunity to be in the frontline in developing services and business structures for the new order of economy and society coming together with the rapid diffusion of electronic commerce.

1. The promise of EC – benefits for everyone?

For many the term “electronic commerce” (EC) denotes the simple transaction occurring when a consumer orders goods and services on the Internet and has them delivered home. This basic EC model means a fairly straightforward communication between the buyer’s and producer’s computers, making intermediaries such as retailers and wholesalers unnecessary. This has often been described as the ideal for consumers, who are expected to have all the choices in the world conveniently and inexpensively on the screens of their home computers. The idea sounds good, but careful examination reveals that some issues are often overlooked; in reality, this EC model would mean separate orders from each seller, uncoordinated deliveries leading

ultimately to higher costs, and in the worst case, consumers spending considerable amounts of their time at home to receive and accept the deliveries. The idea does not sound so good after all! (Tuunainen 1999)

Electronic commerce is a process, where electronic connections facilitate remotely made order for products or services, or other transaction (such as electronic banking) (Kallio *et al.* 1997). Keeping this definition in mind we can look at EC of digital products, physical products or different types of services without excluding any possible technology or business arrangement from our attention. We believe that wide enough definition is important, taking into account the rapid development of this field.

EC is driven on both buyer and supplier sides by a number of factors: access to an affluent customer base, lower information dissemination costs, lower transaction costs, broader market reach, increased service, additional channels for customer feedback, and consumer and market research (Auger & Callagher 1997). EC has the potential to create benefits for different stakeholders, but it may also have serious draw-backs for them.

These benefits and drawbacks can be illustrated by looking at electronic grocery shopping (EGS). Generally, consumers look either for lower prices or better service from EC. For instance, from EGS the consumers might hope to be better able to compare different offerings for groceries and get them in lower prices than from a traditional store; or, the consumer might hope to save time and effort, gain access to a broader selection of goods, and take use of a number of value adding services only offered in the electronic media (Heikkilä *et al.*

1998a). On the down side, the perceived amount and quality of customer service might be lower, and the prices of goods and services sold through this new channel might be higher, at least in the beginning. Moreover, EC can create greater inequality between people with and without possibilities to use EC.

Facilitated by the all-digital data on customers' purchases, the EGS retailer, in turn, can enjoy benefits from improved information on markets and customers. Also, when operating an EGS build on top of a physical store, advantages can be gained from better shop floor utilisation and human resource levelling (Heikkilä *et al.* 1998b). However, there are potential drawbacks as well, particularly if the EGS is based on current infrastructure: there will be some redundant work, as the goods are first stored in the shelves of the store or wholesale outlet, from where they are collected for further delivery to the customers. This means additional costs for the retailer. There are a number of issues related to for instance legislation and logistics that have to be resolved before consumer-oriented EC of physical goods will gain serious momentum.

The above results describe the current situation. New innovations and developments will advance EC and create new solutions and forms not available today. Research and experiments are needed to understand the future benefits of new forms of EC and their impacts for all stakeholders.

The key research questions on this topic are:

- What are the stakeholder groups and their roles that need to be studied?

- What are the potential benefits for each stakeholder group?
- What are the drawbacks for each stakeholder group?
- What priorities different stakeholder groups place to emerging EC services?
- What measures are needed to ensure the preferred services to different stakeholder groups?

We believe that this is a key topic to be studied and understood about EC, as the existing benefits can form a roadmap and shape priorities for the future developments of our society.

2. EC is changing the logic of business

Electronic networks can replace the whole value chain from production to delivery for digital products, but the case of physical products is more complex. Depending on the types of products and services as well as business practices, different types of intermediation are still needed. In many industries the value chains from production to consuming will have to be reorganised in order to make EC feasible and cost effective (Tuunainen 1999).

Instead of current supply chains linking vendors, distributors, resellers, and customers, the businesses can be restructured in a new way based on channels connecting producers and consumers, and bypassing the intermediaries. This thinking can be illustrated by customer channel model that separates four different types of channels between production and consumers: marketing, financing, ordering and transferring channels

(Vepsäläinen & Saarinen 1998; Heikkilä *et al.* 1998d). With the help of this model we can illustrate four different, possible types of EC solutions:

1. *Electronic storefronts* based on current stores that offer new services and restructure the processes and responsibilities of the customer and the retailer.
2. *Dedicated electronic stores* with specialised logistics systems and services, requiring mastering of more than just one echelon of the supply chain.
3. *Services co-ordinated within separated channels*, for example, universal ordering or delivery services offering one customer interface and operations connected to a large number of service providers.
4. *Automated or smart shopping channels* offering customers services such as repeated orders, pooled deliveries, pooled payments via direct money transfers or automatic scanning of new product or service offerings.

These different EC models will change the basis for competition, cost levels, value chains and industry structures. These changes will further lead to changes in the competencies of organizations, in job tasks and in the requirements of individuals. New opportunities increase the power of buyers, leading to changing customer behaviour, which in turn can have a further impact on issues such as environment, traffic, and infrastructure. This evolution will lead us gradually towards the new order of economy or of society as a whole (see e.g. Shapiro & Varian 1998).

The main research topics that open up within this theme include:

- Evaluation of development paths leading to the different modes of EC.
- Development of new systems, applications and services, and their interaction with each other and with legacy systems.
- Linkage of the EC systems and services to the backbone systems of the society (e.g. taxation and customs).
- Evaluation of the impacts of different modes of EC for relevant stakeholder groups.
- Analysing the basis of competition for both the traditional and emerging businesses.
- Identification and analyses of the opportunities to enrich the life of citizens and to influence the society level changes (e.g. concentration of population to larger cities) with the help of new modes of EC,
- Analyses of the logic of transformation towards the new order of economy and society.

The roles of businesses, organisations and consumers will change with the evolution of EC. Research efforts should be directed to predict, analyse and evaluate proactively the new structures. To make EC possible and efficient, also the societies have to actively develop infrastructure and offer electronic linkages to the backbone systems.

3. EC is changing basis of services

EC is creating alternatives to universal channels that traditionally offer the same

kind of service to all customers. The new technological possibilities enable reacting to different customer preferences: some customers prefer lower prices, while some give higher priority to better information or service level (Heikkilä *et al.* 1998d). If the market mechanisms are working effectively, the differentiation of customer requirements is likely to lead also to differentiation of services offered.

A good example of this is the development of banking industry in Scandinavia, which can serve as an analogy for predicting the future of EC. In the 1980's all banking services, no matter how simple or complicated, were offered through branch offices. Today new technologies have enabled extensive use of self-services via computer networks. This has decreased the spectrum of services offered through the bank branches as well as the number of branch offices and employees. At the same time, many new more complex services for corporate finance, for example, have been designed and are offered by specialised banks or, in some cases, through internal financial services departments of the companies. EC can create feasible response to different customers needs, and services can be transformed from self service to new types of services provided by the producers, wholesalers or retailers (Apte & Vepsäläinen 1993).

We can question if the same evolution is going to happen in other service industries such as travel industry, or value added services of traditional retail and wholesale industries as well. If so, the research questions we should address include:

- What forms of services different types of customers prefer?
- Which channels will be preferred and which will be effective in distributing products and services to customers?
- What will be the effective ways to organise services for customers?
- What will be the basis for service providers to organise their businesses?
- What will be the logic of transferring businesses to the new forms?

Although the example from banking industry seems possible also in other areas of EC, the services related to physical goods, for instance, are different. Particularly the logistic systems require thorough analyses.

4. To be of value EC has to change processes

EC can change the processes of both organisations and consumers. In organisational level an example of this is Hansel, a state owned Finnish company serving public sector organisations. Hansel offers a new universal channel for ordering and delivery, utilising EC in procurement. As a result, Hansel has been able to halve the procurement costs of their customers, who have also experienced significant time-savings, enabling them to redirect their capacity into more efficient use. However, although process changes are extremely important, they usually affect only two consecutive parties in the value chain, keeping the supply chain otherwise untouched.

A good example of restructuring the processes and responsibilities of both

supply and demand side can be found in the Finnish experiments of EGS for elderly and disabled people (Heikkilä *et al.* 1998c; 1999a). With EC, tasks and responsibilities related to the grocery buying process can be divided in a new way between the customer (i.e. the elder or disabled person), the retailer, and the home helper assisting the customer, among other things, with her daily shopping. By saving home-helpers time considerably, EC creates savings also for the society, which is responsible for providing the services.

In addition to changing processes of existing players in a number of industries, EC can create opportunities for new businesses. These opportunities arise from two sources: new services and opportunities related to ICT (information and communications technology), and to physical handling of the goods (Heikkilä *et al.* 1999b). The electronic storefronts and various value-added information services must be designed, implemented and integrated with other information systems. After implementation, the service must be maintained. The need for these new information systems offers numerous opportunities for software and media houses of all sizes, especially in the earlier stages of wider EC adoption. As the customers' ordering information is recorded in the storefront, data analysis and interpretation of the behavioural patterns requires expertise in both statistics and consumer behaviour. The opportunities in physical handling of the goods include, for instance, tasks such as collection and delivery of ordered goods and systems support logistics chain.

When studying the new processes of EC the following issues are likely to be relevant:

- What will happen to the existing processes: will they be automated, changed, or replaced?
- How will the changing new business concepts change the industry structures and co-operation between different parties?
- What will be the impact of new processes on different stakeholders?
- What new skills and competencies are needed to manage the new processes effectively?
- How the knowledge of managing new processes will be transferred into different contexts and environments?

With EC we face the same dilemma as with other information systems earlier. Mere automation of existing processes is likely to lead to limited benefits only. The real challenge in the future is to identify and explore the new processes, like manifested in BPR (Business Business Reengineering) literature (see e.g. Davenport 1993; Hammer & Champy 1993). This requires that the researchers are also innovative, in addition to being analytical.

5. EC will change consumer behaviour

Electronic commerce enables consumers to make transactions independently from time or place: at home, at their offices, or while travelling. The need to visit the stores or offices of various service providers decreases. This may consequently have also other impacts on consumer behaviour. When looking at the changes in our everyday lives, the key issues are the frequency of store visits and EC transac-

tions, the size of buying basket, and the channels used for buying different products and services.

However, the direction or magnitude of these changes in consumer behaviour is not at all that clear and evident. This was shown in our recent study (Kallio *et al.* 1997) in which 35 managers working in retail and whole sales business and companies offering value-added services to them, were asked to predict the changes in consumer behaviour due to EC. Overall, the interviewed experts identified same or similar types of changes, but interestingly enough, the views on and reasoning for the direction of change were often contradictory. In order to be understood properly, these changes and their impacts require extensive research.

The key research questions in this area are:

- What kind of systems and user interfaces need to be designed for different consumers?
- What will be the frequency and reasons of visiting physical stores and electronic storefronts?
- What will be the size and contents of shopping baskets in traditional stores and in EC?
- What are the connections between buying behaviour of consumers and increasing use of technology also at home and in free time, in addition to work place?
- What are the social implications of changing customer behaviour?

Past studies (e.g. LTT 1995) have shown that consumers change their behaviour slowly. However, if we think about for instance diffusion of mobile phones, the changes can also occur fast. With EC, the

common predictions are rather conservative - mainly due to the long term investments of current stakeholders - but the actual development could be much faster.

6. Scandinavian environment and research tradition

State-of-the-art public telecommunications networks and highest numbers of both Internet and mobile telephone connections per capita in the world illustrate well the level of technological infrastructure in Scandinavia. In many areas such as mobile technologies, Scandinavians have been pioneer users. This depicts the people's willingness - created by high educational level, positive attitude towards technology, good technical infrastructure and well developed legal environment (e.g. in consumer protection) - to accept new technologies at fast pace.

This environment offers us as researchers a great opportunity to conduct rich case studies, in-depth analyses, action research and other types of practice oriented research in close co-operation with companies and other organisations. For instance, an important area for case studies could be the systems that combine different technologies so that the same services can be used through a number of different user-interfaces.

Furthermore, being pioneers opens up a field for experiments. Relatively small population in all Scandinavian countries and good conditions for fast adoption of new technologies offer almost "laboratory experiment" conditions for research. This competence will be of great importance in the future studies of EC. Moreover, we hope that the unique

empirical settings together with methodological knowledge within Scandinavia will also attract wider research community to participate in the studies.

7. Conclusion

We have looked at what we have identified to be the most important and interesting topics for future research in EC, offering also some examples of relevant research questions in each of the topics. In our view, Scandinavian countries will have a great opportunity to be in the frontline in both development and research of EC. EC is not only about technologies and systems; to be economically profitable or beneficial to involved parties, different business models are needed for different customers and for different types of products and services. The fundamental question for researchers of electronic commerce, as well as for those putting the results of research and development into practice, is how to find robust models and solutions for varying circumstances.

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