Electronic Retail Markets

We refer to the sale of goods and services to end consumers (i.e. a mass of clients with small quantity requirements) as retail markets. These normally include private clients, households and small businesses. Therefore, the cost of transactions in retail markets tends to be rather high compared to those encountered with institutional clients. Building upon the potential that electronic markets have on the reduction of those costs, this article presents the concept of the electronic mall.

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The economic system has created a number of institutions which should, from the transaction cost point of view, assure the most advantageous distribution of goods to the retail client. These forms of distribution are fundamentally correlated with the means of transport and communication chosen. In former times, retail markets for food and items of everyday life were based on several levels of distribution, leading from the producer to the wholesale dealer to a number of retail dealers and finally to the client. Nowadays, the development of efficient transportation services and information systems along with modern warehouses have reduced the number of mediators to a single one: producer-warehouse-client. This development is further fueled by modern means of telecommunication. For example, virtual warehouses, as found on the Internet, are offering delivery directly from the producer to the retail client. This will be expanded upon later on.

Other domains, such as banking, still cling to a highly vertical integration. They provide their banking services and distribute them themselves, or as in retail banking, through their branches. At the bottom end of the value chain, however, we find a new situation. Important products are increasingly being purchased from external entities (e.g. financial information - from such information brokers as Reuters, Dow Jones, Knight Ridder, etc. - electronic exchanges and clearing institutions) as opposed to being produced internally. The retail distribution of services is also currently available to private clients via electronic network, worldwide (see Bank of America in CommerceNet [3]).

Electronic Markets

Markets are institutions or mechanisms that allocate resources needed by the demanding entities. While the allocation of resources in a hierarchy - such as is common in firms and in centrally planned economies - is based on planning, the characteristic of a market is free trade. The trading subjects are not attached to any external planning or the like; they select and decide freely, they evaluate the offers according to their individual needs. Thus the price can become a means of information, indicating the collective situation of supply and demand, according to microeconomic theory. Today's market places are much more complex, remotely located and supported by mail and telecommunication.

What exactly is the difference between a market, or market mechanism (i.e. an institution which, in an abstract sense, functions as a market place) and an electronic market? It is a very specific use of information technology, which literally annuls space. The merging of computer and telecommunication connects two substantial infrastructures of our information technology. Electronic markets are markets realised with the help of this mature telematic form. They contain supply and demand, in the form of virtual information objects, which are available instantly and equally for all sellers and buyers all over the world.

But the construction of virtual market places in global telematics media, according to the pattern of traditional market places or mechanism, does not exploit the potential of electronic markets at all. Furthermore, an electronic market's capacity to add, upon request, additional services to basic transactions opens up entirely new possibilities. This is especially the case with banking services, as well as with insurance and logistics services. Even entirely new services may arise in the electronic markets (e.g. products which are custom-made for very specific client groups in order to comprehensively solve their problems).

Electronic Retail Markets

It is characteristic of an electronic retail market that the retail customers shop at an electronic market. One may assume that an electronic retail market supplier buys in electronic markets as well, or at least uses them if they are available. At the very least, EDI supported procurement will be the accepted practice.

Basic products or commodities are goods or services, standardizised as much as possible, from specialized producer enterprises, as are consumption goods, airplanes, train or ship travel, overnight stays in hotels, logistics services, financial transactions and insurance for carriers, travel, automobiles, etc. Normally these are offered on global electronic markets and are accessible via EDI.

The next step is the bundling or *assembling* of such basic products into entire *packages* which provide the solution to a particular client's problem. A tour operator, for instance, may design an individual package containing airplane ticket, hotel reservation, subway tickets for the towns visited, entrance tickets for desired shows and concerts, travel insurance and payment facilities. The *assembling process* may evolve in one or more steps. The organizational unit assuming the assembling task may be independent, or it may belong to a producer of basic products, or to the manager of an electronic retail market. In the long run, the most successful solution will be the independent one. Such packaged solutions are being offered on specific problem or customer-oriented markets, the electronic retail markets.

Electronic markets may also incorporate affordable services. Some of these include product ratings (e.g. from magazine test reports or rating agencies), interactive product demonstrations (e.g. software demonstration programs), ordering products enriched with numerous services from an electronic catalogue (e.g. linkages to further offers and/or performance services presumably relevant in the context of the original product).

Electronic retail markets will change product profiles as much as, if not more than new technologies did in the past. In former days, for instance, to prepare a meal, one had to buy the necessary ingredients one by one, by pounds or by ounces. Today, one can purchase fractions of ingredients and precooked meals as needed. Electronic retail markets will generate new products and a new clientele with electronic money and new necessities.

The Electronic Mall

We define the electronic mall as a virtual shopping and service center wherein several electronic retail markets are situated with highly uniform and easy-to-use interfaces. Electronic malls will target different groups of clients and of course there will be competition. They will differentiate themselves from other retail markets by the quality of their assortment. The electronic mall, in principle, allows the realization of a global warehouse, which presents electronically all goods and services produced around the world and grants free access to everyone from anywhere to sell or buy therein at will and to be supplied with the ordered items at home. Considering the potentially huge amount of suppliers and offers, essential functions of a good electronic mall will be

its *filter function* and its successful *navigation aid* through the ocean of offers.

A further strategic element will be the *confidence* the customer exhibits towards the electronic mall. Confidence is a result of how much the client can rely on the information presented by the electronic mall and how it manages erroneous or overdue deliveries. Along with CompuServe and CommerceNet electronic malls are beginning to establish themselves. There are three key elements of the electronic mall:

- *Free access and competition for the suppliers.* This means, taking the example of banking services, the ability to function as a multibank system. Every supplier of goods or services should be granted access to the system and be free to offer its products and services, as long as it belongs to a specific group and observes the system guidelines.
- *Open competition market for agencies.* Every agent who observes the rules (especially as to standards and interfaces) may offer any services published in the system to its retail clients. The agent negotiates with the suppliers regarding the conditions surrounding the services and the means of transport from supplier to customer.
- *Free market for the clients software.* Every software company is free to implement services offered in the electronic mall in its software, or to develop client software. The company negotiates with one or a group of agents on market modalities and the appropriate means of transportation, or it develops the software upon the agent's request.

The openness of this system, given free competition, are to be considered in a context of a growing economy. Such a system will be very flexible and superior with regard to the creativity of the client software profile and as to the services of agencies. Therefore, a relatively fast growing transaction volume can be expected. ■

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Modelling Interorganizational Trade Procedures Using Documentary Petri Nets

Global information infrastructures are rapidly becoming a reality. Such worldwide networks help companies to operate not only on a local or regional level, but also on a global level. Especially for small and medium enterprises (SMEs) this would offer tremendous opportunities to do global business electronically. However, communication networks alone are not sufficient to enable international electronic trade.

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In the past it has been shown that the introduction of Electronic Data Interchange (EDI) can have tremendous benefits for the efficiency of trading both between and within organizations (see for instance the proceedings of the annual EDI conference in Bled, Slovene). On the other hand, it can also been shown that in many cases long and costly negotiations are necessary between the trading partners before they can exchange their first EDI message.

As a result, most successful EDI implementations have been realized in what could be called 'closed trading relationships', i.e. long-lasting trading relationships, involving a high number of transactions, between parties that have a high level of trust and possibly a close coordination of the parties' business processes (Table 1). In these kinds of relationships, parties can gain extra benefits by closely coordinating each others' actions, thus compensating for the extra start-up costs stemming from detailed trading partner negotiations. This process is an example of business process redesign or re-engineering.

However, when the partnership is established for a limited period, covering a few transactions only, and on an 'arms' length' basis, EDI linkages are seldom observed since the costs of the necessary negotiations cannot be recovered from the benefits. These shorter-term partnerships could be called 'open trading relationships' (Table 1). The main aim of our research is to contribute to the lowering of the barriers for using EDI in these open trading relationships.

The Negotiation Process

One of the main reasons for the complexity of the negotiation process is the fact that parties have to know about each others' 'way of doing business' before they can start exchanging data electronically. Extra knowledge about the preferred way of doing business of one trading partner has to be conveyed to the other; in other words, the parties have to agree upon the *trade procedure* they are going to follow.

A major reduction in these negotiation costs could be achieved through the availability of standardized (electronic) trade procedures, specified by industry groups such as EDIFICE, SWIFT or CEFIC or international trade facilitation bodies such as UNCTAD or the International Chamber of Commerce (ICC). Although international standards for the structuring of EDI *messages* exist (i.e. UN/EDIFACT or ANSI X12), such standardized *trade procedures* have not been developed yet. In order to build these procedures, two steps should be taken:

- The first step is the definition of a common language in which these procedures are described. This language should be formal, graphical and computer interpretable. We propose the Documentary Petri Net (DPN) formalism for that purpose.
- Second, groups of business experts should specify these standard trade procedures. The procedures that these groups define should be then registered in a repository, governed by an international body. Computer-aided support is desirable in this process, in order to assess several properties of these procedures, to simulate these procedures in a testing environment before implementing them and, finally, to support the reusability of certain parts of trade procedures.

An ISO/IEC sub-committee (ISO/IEC JTC1/SC30) is working on the definition of standards that should minimize the set-up costs for new EDI linkages. This initiative is called 'Open-EDI'. Open-EDI standards include both technical and business aspects of interoperability. In the business aspects work is being conducted on the specification of a standard formal description technique for trade procedures. The authors of this paper participate in these standardization efforts.

Documentary Petri Nets

We found Petri Nets as being one of the few acceptable candidates that offer