

FROM THE SCIENTIFIC SPHERE

E-Commerce in agriculture, and food industry

The international conference “The impact of ICT in agriculture, food and environment” took place in Athens on June 6–7, 2002. The conference was focussed on the influence of the information and communication technology (ICT) for the development of agriculture, improvement of the food quality and a protection of environment. The conference had two main objectives:

- To present the current research works in the area of ICT in agriculture, food and environment,
- To promote application of ICT in a wider perspective of the information society.

The conference brought together experts on ICT areas of agriculture, food and environment to share their expertise and experience in the following main directions:

- E-Commerce in agriculture, and food industry
- Precision agriculture
- Plant protection
- Land evaluation
- Hydroponics
- Sustainable agriculture
- Remote sensing and GIS
- ICT educational syllabus for agriculture, environment and food sciences.

This paper will overview the selected ideas and results presented at that conference to the first of these directions.

New technologies and their impact on agriculture

The ICT has a capability to help agricultural sector to adopt complex requirements of quality assurance, traceability and efficiency. This can change food markets and relationships between individual elements of the food supply chain and the food market infrastructure. It also provides an opportunity to obtain a higher level of market satisfaction.

The implementation of ICT should be done successively, starting from easier concepts, e.g. from improvement of communication infrastructure, to more complex and sophisticated services. The Electronic Document (Data) Exchange – EDI can intensify and automate information flows between elements of the supply chain. EDI can be also used as a means of communication between individual enterprise transactional information systems (TIS), which perform a company administration of farms, trading and food processing companies. EDI combined with TIS could automatically interconnect companies with their customers in both directions. Further communication improvement and information access can be

achieved by a portal technology. Besides other features, portals provide an easy access to heterogeneous data resources in a uniform and comfortable user environment. Moreover, they provide also communication channels, which promote communication and information delivery in ad-hoc purposely constituted groups of users with a restricted access of other Internet users. The communication channels can turn into information agents - the special software solutions, which make searching for information in external resources and databases easier. The e-commerce technology opens Internet meeting places to trading activities. It makes possible to build virtual enterprises and companies with new forms of cooperation. The most important (and most difficult) condition is developing and setting suitable market rules to link individual participants of the electronic market. The highest level of future ICT implementation in the food supply sector is building *market networks* (Schiefer 2002). This concept considers all Internet network as a generalized market place. It interconnects former market places of trading companies and wholesalers and marketing platforms of individual farms. The market network is represented by complex network between individual trading participants with a peer-to-peer architecture. Obeying communication standards is vital. All ICT instruments and systems promoting food-market-chain should comply with business processes of individual players in the agri-food scene. This needs a close cooperation between market management, system design and information technology. The technology may fail or be even counterproductive without this cooperation.

E-commerce in agriculture

Seven papers were dedicated to this topic. Karestos et al. dealt with the use of intelligent agents for E-agribusiness environment. The paper proposed a secure agent-based architecture of a *Virtual Agricultural Market* (VAM) system and described roles of the identified intelligent business agents in this environment. This system was built for B2B transactions in agricultural markets, and offers instruments for Internet based trading and distribution of agricultural products. The system was developed and documented with use of the UML (Unified Modelling Language), which gives a better reliability to the system. The basic participants of the traditional market chain are: producer, seller, wholesaler, buyer, consumer and transportation company. The innovation of VAM

is that it introduces a new generation of VAM electronic wholesalers. They regulate demand and supply and coordinate transactions in an Internet commerce environment using enhanced market knowledge. The VAM introduces eight types of agents:

- Customer – (buyer or consumer) is responsible for executing customers' queries and for monitoring results.
- Provider – (producer or seller) is responsible to report about orders, demands on producers' products and watches transaction process.
- Marketing – promoting providers' products to customers.
- Information brokering – is responsible for the supply and demand matching in the system. He communicates Customers and Providers.
- Negotiating and Contracting – is authorized to negotiate terms concerning exchange and payment. This negotiation process can be multi-fold and very complex.
- Financial – is oriented on transaction management after a successful negotiation.

Scheduling – is responsible for an effective transportation management after a successful negotiation phase.

– Security – is responsible for protecting all information concerning a given deal against various threats deriving from an open and insecure nature of the Internet.

All these agents extensively collaborate and help to automate variety of trading tasks using the Internet. The great care was given to security issues in the VAM.

In Vlachopoulou and Manthou (2002), there is designed a framework for the structure and content of an *agribusiness portal* which has to support and facilitate the agricultural sector with information distribution, input supply, commodity trading floor, marketing and logistic management. Also organizational aspects concerning implementation and dissemination were discussed. Besides standard objectives of portals used for e-commerce applications, the following value added activities are supported by this portal for improvement of agribusiness:

Information search and dissemination, Interactive communication and discussion, Education and training, Consulting services, E-agents, e-brokers, e-marketplaces and e-auctions. These activities can be provided as a free information or service, but also as paid specific technical services and e-commerce services. This system requires necessary technical and organizational infrastructure available. Although agribusiness networks offer unprecedented opportunities for information and communication activities, a number of issues still have to be solved to achieve the full potential and benefits. There are also several factors which create obstacles and barriers for dissemination of the new progressive technology, as e.g. lack of awareness and skills, low level of understanding of computers and Internet connection, the linguistic diversity, feeling the lack of privacy and security, issues of the secure payment, preference for established relationships with trusted partners, unwillingness to pay for online services, etc. The main requirements for the diffusion and adoption of the e-commerce portals are as follows:

- Development and maintenance of electronic information repositories dedicated to agribusiness topics, projects, regions, events ...
- Increase of the agribusiness subjects connected to Internet over the critical mass.
- Public and private cooperation in infrastructure, training and funding.
- Enhancement of Internet access in the agribusiness sector.
- Viability of European funded e-commerce projects.
- Communication links and agribusiness networks.
- Legal and policy issues.

B2B e-commerce for effective food chain management

The management of food chains needs to achieve two objectives:

- create an efficient physical flow of goods and products by minimizing logistic expenses and reducing delivery times,
- operate an effective value chain by safeguarding gains of all members of the chain, developing trust between buyers and suppliers, and preserving quality for the end users.

Paper (Vlachos 2002) examines the uses of B2B in the food industry to bring chain management solutions. It highlights the application of B2B by small agribusiness. It concludes that B2B can be a strong leverage for food chain management to achieve its objectives and create a value for all participants of the chain. Contracting is one instrument of coordinating procurement of food. Many market and supply chains in agriculture are buyer-driven where the buyers tend to dictate prices and terms of transactions. B2B e-commerce is very suitable for contracting because it inherently contributes to coordinating of activities among suppliers, buyers and logistics. B2B e-commerce has the capability to support contracting by a virtual integration of the supply chain. Fast transmission of information between members of the supply chain can lower costs, reduce risks and improve decision making and provide a faster response to changing consumer requirements. The accurate point-of sale data enable retailers to forecast better market demand and improve procurement management. Producers and manufacturers can by this way improve their inventory and distribution management and become more market oriented.

E-commerce in agriculture: applications, impacts, benefits and drawbacks

The objective of the paper of (Roumana et al. 2002) was to discuss how e-commerce is affecting agricultural sector. The applications developed via Internet and used in the rural sector are discussed, such as information services, education, and consultancy and e-commerce trans-

actions. It is examined how adoption of e-commerce will change the ways farmers do business. The paper also describes current applications of the Internet in the agriculture and variety of functions that e-commerce firms perform in agriculture.

Internet creates a new resource for agricultural sector, providing all components to communicate with each other. Farmers have information about product attributes, which enables comparison of products from many respects, including prices. Agriculture is receptive to e-commerce because the market is large and segmented. Two alternative scenarios were discussed of how e-commerce will affect agriculture: Provided that there is a direct link between farmers and their suppliers of inputs and also with retailers, restaurants and consumers, then response will flow directly. In this case, market power will shift from retailer/processor to the food producer and food customer. The direct link between producers and customers will improve food quality and safety. In the second scenario, the competitive advantage of e-commerce is considered as temporary, because part of the added value perceived by customers will be shared with e-commerce companies. Therefore, farmers will have benefits from the new technology only in the beginning and then they will become only a part of well-organized supply chain.

The following benefits are derived from the e-commerce in agricultural sector: market reach improvement, convenience, reduced business transactions costs, transparency of market conditions, increase of productivity and efficiency and coordination of supply chain.

E-commerce in agriculture has also its drawbacks, like the lack of high-speed Internet access, the prohibitive costs of implementation of the e-commerce technology, particularly of software, a low level of computer literacy of farmers, which separates computer skilful farmers from the rest.

Little attention is paid to e-commerce application in agriculture, in contrast to other sectors. Improvement will require a lot of training and education. There is an important role of agricultural schools and educational institutions in co-operation with the government.

REFERENCES

- Schiefer G. (2002): The new technologies and their impact to agriculture, the environment and the food industry. The HAICTA international conference "The impact of ICT in agriculture, food and environment", Athens: 16–18.
- Karestos S., Costoupoulou C., Lambrou M., Zorkadis V. (2002): The use of intelligent agents in the E-agribusiness environment. HAICTA, Athens: 19–26.
- Vlachopoulou M., Manthou V. (2002): A portal for agricultural and agribusiness network. HAICTA, Athens: 27–36.
- Vlachos P. (2002): Business-To-Business E-commerce: the innovative tool for effective food chain management. HAICTA, Athens: 37–46.
- Roumana M., Vlachopoulou M., Manos B. (2002): E-commerce in agriculture: applications, impacts, benefits and drawbacks. HAICTA, Athens: 93–102.

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