

# Northumbria Research Link

Citation: Vlachos, Ilias (2002) Business-to-business e-commerce: an innovative tool for food chain management. In: 1st Pan-Hellenic Conference of Hellenic Association of Information and Communication Technology in Agriculture, Food and Environment, 6 June 2002, Crete.

URL:

This version was downloaded from Northumbria Research Link:  
<http://nrl.northumbria.ac.uk/12982/>

Northumbria University has developed Northumbria Research Link (NRL) to enable users to access the University's research output. Copyright © and moral rights for items on NRL are retained by the individual author(s) and/or other copyright owners. Single copies of full items can be reproduced, displayed or performed, and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided the authors, title and full bibliographic details are given, as well as a hyperlink and/or URL to the original metadata page. The content must not be changed in any way. Full items must not be sold commercially in any format or medium without formal permission of the copyright holder. The full policy is available online: <http://nrl.northumbria.ac.uk/policies.html>

This document may differ from the final, published version of the research and has been made available online in accordance with publisher policies. To read and/or cite from the published version of the research, please visit the publisher's website (a subscription may be required.)

[www.northumbria.ac.uk/nrl](http://www.northumbria.ac.uk/nrl)



# **BUSINESS-TO-BUSINESS E-COMMERCE: AN INNOVATIVE TOOL FOR FOOD CHAIN MANAGEMENT**

**By**  
**Ilias P. Vlachos**  
**Lecturer Agribusiness Management**  
**Agribusiness Laboratory, Agricultural University of Athens, Iera Odos 75,**  
**Botanikos 11855, Athens, Greece**  
[ivlachos@aua.gr](mailto:ivlachos@aua.gr)

## **Abstract**

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished goods, and the distribution of the final goods to customers.

The management of food chains, particular of fresh produce chains, need to achieve two goals: (a) create efficient physical flows of products by minimising logistics cost, and reducing lead times (b) run an effective value chain by safeguarding mutual gains for all members of the chain, building trust between suppliers and buyers and at the same time maintaining quality for end consumers.

Food chain management was always at a loss for tools to leveraging its efforts on achieving value for chain members and eventually the end-consumers. Although food industry, both in USA and Europe, has experimented with various alternative solutions to this multimillion chain management, yet more can be expected.

Business-to-business e-commerce (B2B) appears to be an innovative tool that meets the high standards of the industry and the potential growth. This study examines the uses of B2B in food industry to give chain management solutions. It reviews the uses of B2B and, in particular, highlights the applications of B2B by small agribusiness in order to forge their ring in food chains. It builds upon communication in supply chain. It describes contracting as an example how B2B e-commerce can advance supply activities and reports the development of a B2B olive oil supply chain application. It concludes that B2B can be a strong leverage for food chain management to achieve its goals and produce value for the members of the chain and the end consumers.

**Keywords:** Business-to-Business (B2B) E-commerce, Supply Chain Management, Food Chain, Agribusiness.

## **Introduction**

The current status of Agriculture in Greece and the dynamic growth of Information and Communication Technologies (ICTs) have created much optimism about the potential success of e-commerce applications in agriculture. Common agricultural business-to-business (B2B) transactions such as buying, selling, trading, delivering, and contracting seem to be natural targets for conversion to e-commerce (Leroux et al., 2001). Yet, the applications of e-commerce in the supply chain management are still in an emergent stage with few successful cases reported. This study focuses on B2B e-commerce applications in food supply chains. It reviews the theory of Supply Chain Management (SCM) focusing on communication and information flows. Then, it describes the popular practice of contracting which can be advanced using B2B applications for food chain management. In doing so, it contributes to practitioners aiming to adopt these technologies, to policy makers who would promote ICTs in a systematic and practical manner.

## **Supply Chain Management**

Supply Chain Management (SCM) is concerned with the linkages in the chain from primary producer to final consumer with the incentive of reducing the transaction costs incurred within. It seeks to break down barriers between each of the units so as to achieve higher levels of service and substantial cost savings (Wilson, 1996). Mentzer et al. (2001) conducted a meticulous literature review on supply chain management (SCM) and concluded that SCM is:

*“The systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole”.*

It is increasingly evident that individual companies in the agribusiness and food industries cannot achieve their desired market position solely through their own efforts. Instead, they will have to co-operate more effectively as an integrated food supply chain. In this respect, a food supply chain is defined as a set of interdependent companies that work closely together to manage the flow of goods and services along the value-added chain of agricultural and food products, in order to realize superior customer value at the lowest possible costs (Folkerts and Koehorst, 1998). Figure 1 depicts the types of supply chain and provides an example from the Greek poultry supply chain.

<<Insert Figure 1 about here>>

Myoung et al. (2001) stated that the successful implementation of SCM in agriculture means that all participants in production, distribution, and consuming could trust each

other and get benefit by sharing information. Thus, Win-Win relations are realised satisfying agricultural producer, distributor, and consumer together by faster and rapid reaction in production and consumption.

Vorst et al. (1998) investigated the impact of Supply Chain Management in food supply chains and found that the availability of real-time information systems (i.e. Electronic Data Interchange-EDI) was a requirement for obtaining efficient and effective food supply chain.

### **Communication and Coordination in the Supply Chain**

Traditionally, the way of communicating demand for products or services across a supply chain was the following: a customer of each stage (Figure 1) keeps his internal data hidden from his suppliers, regarding, for example, sales patterns, stock levels, stock rules, and planned deliveries. This phenomenon, in which orders to the supplier tend to have larger variance than sales to the buyer and the distortion propagates upstream in an amplified form is called the **Forrester effect** (Towill, 1996). Forrester (1961) showed that the effect is a consequence of **industrial dynamics** or time varying behaviours of industrial organisations and the lack of correct feedback control systems. This effect has serious cost implications. For instance, processors and retailers incur excess materials costs or material shortages due to poor product forecasting; additional expenses created by excess capacity, inefficient utilisation and overtime; and mostly excess warehousing expenses due to high stock levels (Vorst, 1998; Lee et al., 1997).

In the past few years, the supply chain concept has been revolted through advances in the information and communication technologies. The benefits attributed to B2B e-commerce that have been identified include: (1) reduction or elimination of transaction costs (Porter, 2001), (2) facilitation of industry coordination (Nicolaisen, 2001), and (3) promotion of information flow, market transparency, and price discovery (Poole, 2001). In this way, the implementation of B2B e-commerce controls the Forrester Effect, bringing better coordination of the supply chain, reducing stock levels at all stages, cutting costs, and forging partnerships as a result to information sharing and collaborating. Those results are evident in the agriculture sector as described in the following case of contracting.

### **Contracting and B2B e-commerce**

Contracting is one means of coordinating procurement of food, beverages and their supplies. It is a mechanism for coordinating production and delivery of products ensuring food safety, keeping detailed production and logistics records. The advantages of contracting include: (a) reducing financial, quality, quantity, and price risks, (b) lowering transaction costs, and (c) faster response to changing customer demands.

Many markets and supply chains in agriculture can be characterized as buyer-driven where the buyers in the market tend to set prices and terms of transactions. This occurs either because of buyers' size versus suppliers or because of traditional market workings. For example, a multi-store retail chain imposes the terms of trade to its suppliers. Those terms can include availability, prices and discounts, and the use of electronic means of communication to support automatic replenishment of goods,

management of supply and inventory. When a big retailer imposes inter-organisational information systems, i.e. Electronic Data Interchange (EDI), to its partners (with the threat to exit business) this is called the 'hub and spokes' phenomenon. Jimenez and Polo (1996) found evidence of EDI diffusion in Europe that indicates that initially its diffusion follows the pattern of hub and spokes. Then, as EDI becomes known among companies due to that phenomenon, more and more firms adopt it on their own initiative.

Contracting is now facilitated by the use of B2B applications that reduce prior challenges occurred due to its complexity and cost. B2B e-commerce inherently entails coordinating activities between suppliers, buyers, and logistics agents in between. In order for partners to reap the benefits of contracting, they must go beyond a written document with signatures. Contracting needs an integrated data storage, management and retrieval system (Leroux, 2001). B2B e-commerce has the capacity to support contracting activities by creating a virtual integration of the supply chain. Hayenga (2000) stated that quick information flow between supply chain participants leads to reduced risk, lower costs, better decision making, market access and faster responses to changing consumer demands.

Figure 2 depicts an application of B2B e-commerce for the supply chain management of olive oil, a project under development based on the infosociety programme. In this project, contracting is developed as B2B olive oil system with electronic modules for selling, procuring etc. The B2B environment is based on a data warehouse to support every necessary contracting or related activity such as market report, market intelligence, finance, auction, etc. By doing so, the whole (olive oil) supply chain is enhanced from producers to retailers and caterers using B2B as the coordinating and integrating device. Particularly, the B2B olive oil e-commerce would:

- Improve and simplify logistical processes, such as consolidation of consignments, item trailing using bar-coding, etc.
- Improve cash flows by earlier invoicing and earlier payments.
- Match market demand to production capacity. The losses associated with production operating without accurate information can be enormous.
- Reduce data entry costs and improve efficiency at each stage of the supply chain
- Eliminate data re-entry along the supply chain resulting in cost savings
- Reduce telecommunications costs (phone and fax costs).
- Apply Business Process Re-engineering (BPR).

## **Conclusions and Recommendations**

The applications of Business-to-Business (B2B) e-commerce, which are a relatively new innovation, are suitable for removing the barriers throughout the entire supply chain. Evidence shows that retailers have already taken advantage of new information & communication technologies (ICTs), impacting the structure and the balance of power in the supply chain against producers/manufacturers. The massive amounts of point-of-sale data have given retailers the ability to better forecast market demand and

perform advanced procurement management. In turn, manufacturers and, to lesser extent producers, can take advantage of ICTs, by sharing data and forecasts with retailers, thus performing better distribution and inventory management as well as becoming market-oriented. Adoption of B2B systems removes the barriers in the supply chain, and restrains the Forester effect, keeping industrial dynamics to a minimum level.

B2B e-commerce is particularly suitable for contracting, which is a popular means of coordinating the procurement flows in food industry. Contracting has inherent advantages that can be extended using electronic means. Substantial benefits occur as a result of improved management of faster information flows between supply chain participants. They include reduced transaction costs, improved cash flows, better decision making, market access and faster responses to consumer demands. Small and Medium Enterprises (SMEs) and small agribusiness are more likely to benefit of applications like e-olive oil, due to their need to meet market conditions and their lack of readiness in ICTs. There is scarce evidence exists to conclude that benefits are being passed onto consumers or shared with independent firm operators (Kinsey, 2000).

The locus of public policy should shift towards widespread diffusion of B2B applications, particularly for the benefit of farmers that lack the means to become early adopters. Further research is necessary to in-depth investigate the adoption process and the factors impinging upon diffusion progress using successful case studies.

Producers are known to say that good fences make good neighbours. In the information society, electronic commerce helps rearrange and ultimately tear down many of these fences. This will have a profound and fundamental impact on the way each and every one participant in the agricultural marketplace operates.

## References

Folkerts, H., Koehorst, H., (1998) Challenges in international food supply chains: vertical co-ordination in the European agribusiness and food industries, **British Food Journal**, 100 (8) 385-388.

Forrester, J. W., (1961) **Industrial Dynamics**, MIT Press, Cambridge, Massachusetts.

Hayenga, M., (2000) Value chains in the livestock and grain sectors: policy issues in the changing structure of the food system, **Proceedings of the American Agricultural Economics Association Pre-conference Workshop**, Tampa, Fl, July 29.

Jimenez, J., and Polo, Y., (1996) The international diffusion of EDI, **Journal of Internet Banking and Commerce**, 1(4).

Lee, H. L., Padmanabhan, V., Whang, S., (1997) Information distortion in a supply chain: the bullwhip effect, **Management Science**, 43 (4), 546-558.

Leroux, N., Wortman, M., S. Jr., Mathias, E. D., (2001) Dominant factors impacting the development of business-to-business (B2B) e-commerce in agriculture, **International Food and Agribusiness Management Review**, 4, pp. 205-218.

Kinsey, J., (2000) Electronic Systems in the Food Industry: Entropy, Speed and Sales, **E-Commerce Transformation: Sector Developments and Policy Implications**, BRIE Conference, Washington D.C., September 26-27.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., Zacharia, Z. G. (2001) Defining Supply Chain Management, **Journal of Business Logistics**, Fall.

Myoung, K., Park, S., Yang, K., Kang, D., Chung, H., (2001) **A supply chain management process modelling for agricultural marketing information system**, EFITA, 3<sup>rd</sup> conference of the European Federation for Information Technology in Agriculture, Food and the environment, Montpellier, France, June 18-20, 409-414.

Nicolaisen, R., (2001) How will agricultural e-markets evolve? **USDA Outlook Forum**, Washington DC, 22-23 February 2001.

Papandrea, F., and Wade, M., (2000) **E-Commerce in Rural Areas: Case Studies**, Rural Industries Research and Development Corporation, no. 00/185.

Poole, B., (2001) How will agricultural e-markets evolve? **USDA Outlook Forum**, Washington DC, 22-23 February 2001.

Porter, M. (2001) Strategy and the Internet, **Harvard Business Review**, 79, (2), 63-78.

Towill, D. R., (1996) Time compression and supply chain management: a guided tour, **Supply Chain Management**, 1 (1), 15-27.

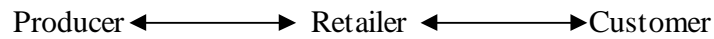
Vlachos, I. P., (2002) Marketing and Supply Chain Management of Poultry in Greece, **Georgia & Ktinotrofia**, forthcoming.

Vorst, J. G. A. J. Van Der, Beulens, A. J. M., Beek, W. De Wit P. Van (1998) Supply Chain Management in Food Chains: Improving Performance by Reducing Uncertainty, **International Transactions Operational Research**, 5(6), 487-499.

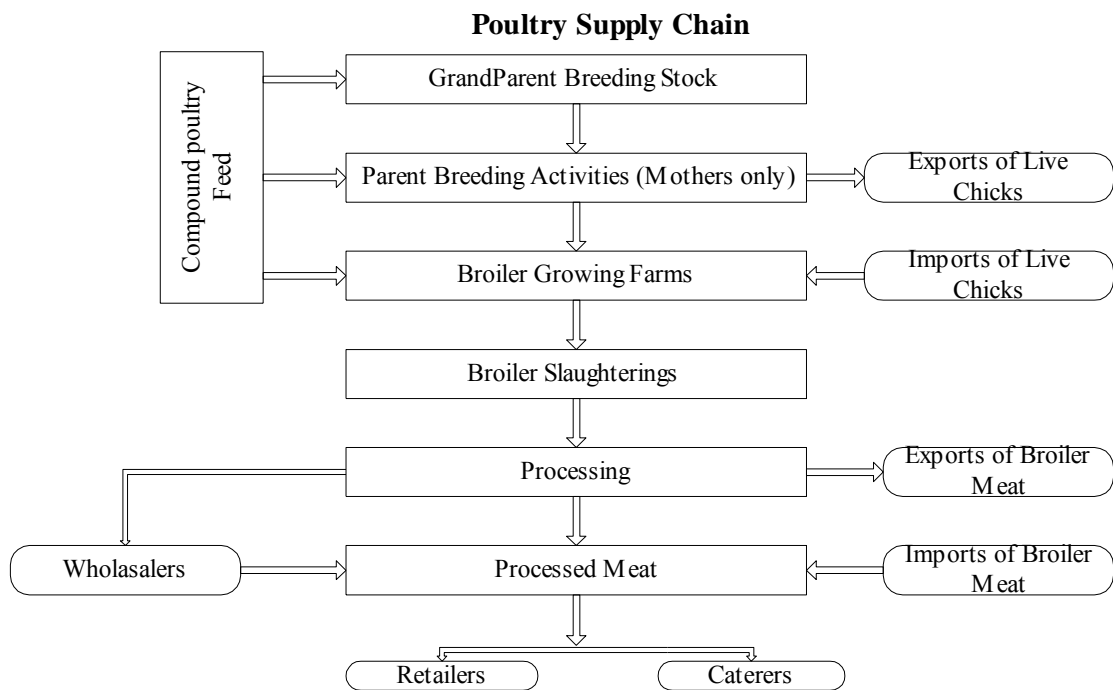
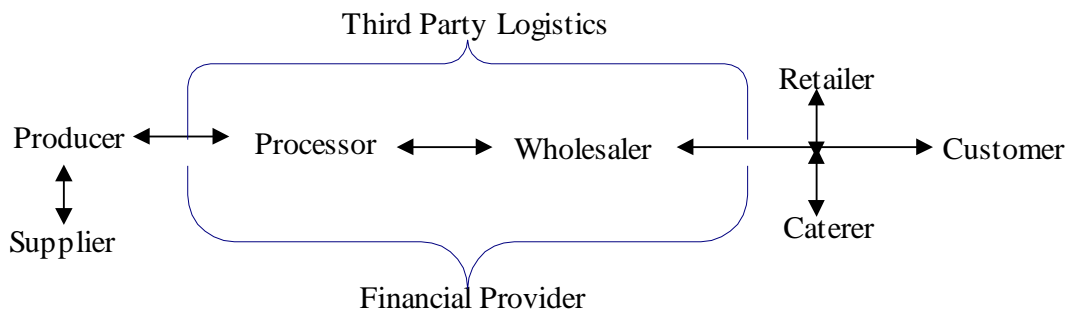
Wilson, N., (1996) The supply chains of perishable products in northern Europe, **British Food Journal**, 98 (6), 9-15.

Figure 1 Examples of Supply Chains

### A. Direct Supply Chain



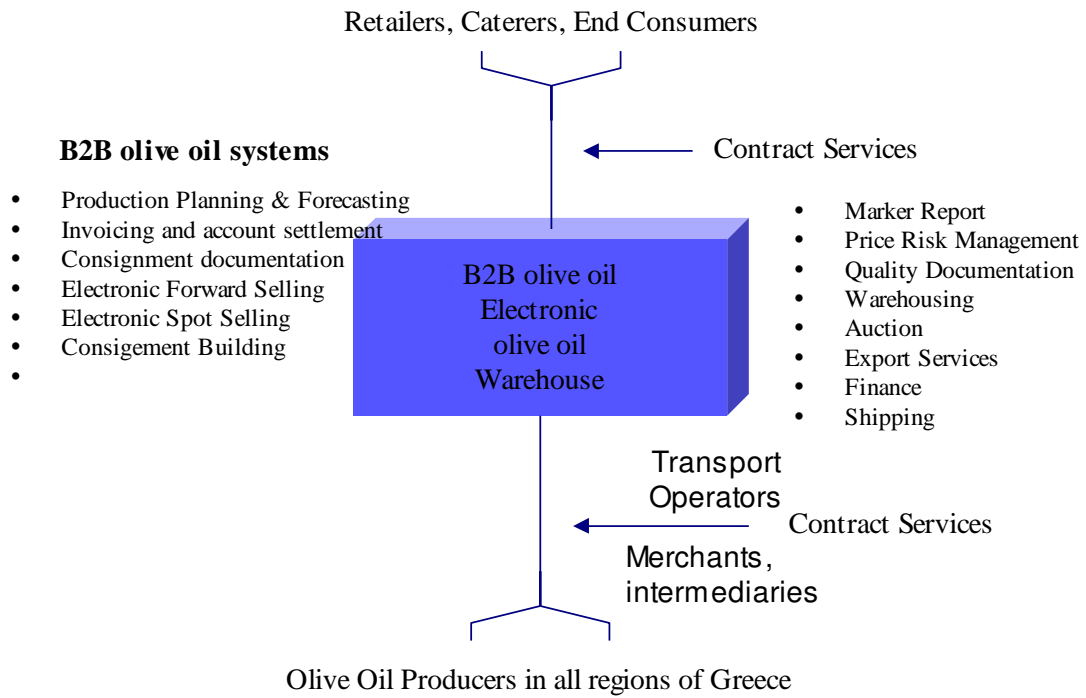
### B. Complete Supply Chain



Source: Vlachos, I. P. (2002) Marketing and Supply Chain Management of Poultry in Greece, Georgia & Ktinotrofia, forthcoming.



**Figure 2 B2B applications in Food Chain: Contracting of olive oil.**



Source: Adopted from Papandrea and Wade (2000), p.63.