2

e-Business Applications in the European Food & Beverages Industry: Managerial & Economic Implications

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2.1 INTRODUCTION

Until recently, companies in the food and beverages industry have used e-business mainly to improve their internal processes and procedures. Applications most commonly used both by small and large enterprises are e-mail, websites and online banking. These basic tools are followed, at a considerable distance in terms of adoption rates, by Electronic Data Interchange (EDI) and Enterprise Resource Planning (ERP) systems. However, the growing complexity of the industry is driving companies to adopt more effective solutions in response to new strategic challenges. Most important issues that are likely to have a big influence on Information and Communication Technologies (ICT) investment decisions in the future are food safety and the full digital integration of the value chain. Investments in supply chain integration [both internally and in Business to Business (B2B) processes], including Radio Frequency Identification (RFID) technologies, are a focus of ICT adoption in the industry. Integration of internal processes, Customer Relationship Marketing (CRM) and Supply Chain Management (SCM) are also likely to gain momentum.

The main opportunities companies hope to exploit through e-business are improvements in customer service, increased efficiency of internal processes,

and sharing investments and risks. Main risks and barriers for e-business adoption in Small and Medium Enterprises (SMEs) are presently the inadequacy of the existing ICT infrastructure, the fragmentation of supply chains (especially in Southern Europe) and cultural barriers. This study reports and synthesises findings and reports of "European e-Business Market Watch" (www.ebusiness-watch.org).

2.2 e-BUSINESS APPLICATIONS

e-Business can be defined as any business transaction that takes place using information and communication technologies. This broad definition includes three mainstream e-business applications (a) commercial activities such as buying and selling products and services electronically, (b) business activities such as enterprise resource planning, customer relationship marketing as well as collaboration in new product development, and (c) social activities such as supporting social interaction and cultural enforcement i.e. by the use of discussion groups, e-mail, chat, and so forth.

According to the type of trading partners, e-business applications are classified into several categories such as Business to Business (B2B), Business to Consumer (B2C), Business to Government (B2G), and Government to Citizen (G2C). The dominant characteristic is the conduct of a business transaction electronically by using a communication network. The basic components of an e-business application are:

(a) the infrastructure which consists of hardware and a communications network in the form of the electronic medium. The most popular electronic medium is the Internet.

(b) Software applications that manage e-business transactions i.e. to present information, store and retrieve data in databases, or exchange information. Web-based applications such as a corporate web site, an electronic marketplace, and a web-based data interchange are increasingly become accepted by corporations of any size. The Web gives businesses a global presence; the corporate site becomes a company's shopfront in a worldwide city. As a result, internal software applications have to integrate with the Web applications seamlessly, a task which is more easily said than done.

(c) The type of e-business application, which can be classified into three categories according to the purpose it serves.

1. **Informative.** The purpose of informative e-business application is to provide technical, professional or business information such as in the case of a corporate web site. In this case, the content is typically unstructured and dynamic. Typical informative transactions include the corporate web site, business communication transactions, and e-promotions using e-newsletters and e-mail. Recent developments in web technologies such as the Extensible Markup Language (XML) aim to develop a unified framework for unstructured informative transactions. The XML is a language that defines a document format which is very similar to semi-structured data and can support the integration of multiple data sources (Deutsch et al., 1999).
2. **Transaction.** The purpose of e-business transactions is to facilitate current or future transactions with business partners and customers. In this case, electronic transactions should be codified in advance. Instead of using the post office to exchange mail invoices, receipts, and other sorts of business documentation, companies can exchange EDI messages, which are structured according to predefined standards e.g. the UN/EDIFACT standard. The majority of e-marketplaces are also characterized by codified business transactions. Humphrey (2002) found it useful to classify e-business marketplaces according to the extent to which transactions are either transaction- or information-oriented. In the transaction-oriented type, Humphrey classifies the online auctions, which take place in real time and also facilitate on-line payment.
3. **Growth.** Chandler in his seminal work pointed out that the purpose of a firm, particularly of a large and/or innovative one, is more than to reduce transaction costs: firms actually define new markets and resource uses (Chandler, 1990). e-Business can be used as an instrument to open up new markets, leverage new product development, and engineer innovative business processes. E-tailing is an example of how technology has created a new market of on-line shoppers, who, instead of paying a visit to the local retail store, prefer to do their shopping electronically from home or work. Although the initial target group of e-tailing consisted of busy people, reports i.e. by Andersen consulting indicate that as many 42% of shoppers in the US and Europe are willing to order groceries from home (Verhoef and Langerak, 2001; Narayanan, 1997).

Table 2.1 A taxonomy of e-Business applications

		Objective of e-Business Application		
		Informative	**Operations**	**Growth**
Type & Scale of Users	**Individuals (Customers)**	Discussion groups Mailing Portals Vortals	Internet access Retail Auctions Build-to-order Banking Brokerage Travel	P2P Mobile commerce G2C
	SMEs (including SBC)	E-Procurement Search Engines Electronic Agents	ASPs Hosting E-Banking B2G Auctions & marketplaces	ASPs Mobile commerce
	LSEs	B2E Electronic Agents	ERP CRM Enterprise Application Integration (EAI) Sales Force Automation	Mobile commerce Virtual Chain

SBC: Small Business Customers / SME: Small & Medium Enterprises /LSE: Large Scale Enterprises
B2E: Business-to-Employee: Services provided to employees e.g. corporate/industry news and key contacts.

2.2.1 e-Business Applications in the Agriculture & Food Industry

The advent of advanced information and communication technologies has created a multitude of challenges and opportunities in food sectors in developed economies. e-Business applications have enjoyed particular acceptance, given the fact that food industries depend on effective distribution systems in order to meet diversified consumer demands and short delivery times, as well as maintain effective reverse logistics (Vlachos, 2003; Iijima et al., 1996).

During the last two decades, large companies, especially retailers and manufactures, have used e-business applications to increase their power in agrifood supply chains by enhancing customer service, creating economies of scale, reducing logistics costs, and facilitating the efficient flow of food and information (Bell et al., 1997). Such an achievement has been strategically

leveraged by information and communication technologies (ICTs) that enhance the performance of food chains, i.e. in terms of cost, time and accuracy of deliveries, and at the same time, assure food quality and safety. Small and medium-sized food companies can use web-based e-business solutions to exploit niche markets and create new market segments by gaining sporadic, low volume suppliers and customers at low marginal cost.

The table number 2.2 presents the e-business applications to various agribusiness functions. A multitude of e-business solutions can be applied to each business function, e.g. EDI and web-based integrated inventory management for warehousing and automated replenishment.

Table 2.2 Applications of e-Business tools to Food & Agribusiness Management

Business Functions	e-Business tools	Applications
Marketing	B2B e-commerce, Internet ordering, Corporate Websites	Product promotion, new sales channels, direct savings, reduced cycle time, customer services
Purchasing	EDI, Internet-purchasing, EFT	Ordering, fund transfer, supplier selection
Production	B2B e-commerce, MRP, ERP, GIS	Production planning and control, scheduling, inventory management, quality control
Sales and distribution	Electronic funds transfer, On-line TPS, Bar-coding system, ERP, WWW integrated inventory management, Internet delivery of products and services	Internet sales, selection of distribution channels, transportation, scheduling, third party logistics
Warehousing	EDI, EFT, web-based integrated inventory management	Inventory management, forecasting, scheduling of work force
Supplier development	WWW assisted supplier selection, communication using Internet (e-mails), research on suppliers and products with WWW and intelligent agents	Partnership, supplier development

Source: Adopted from Gunasekaran et al. (2002)

There is consensus that e-business applications have a profound impact on the food supply chain. e-Business adds flexibility to operations management, allowing for smaller lots of orders and shipments, real-time inventory replenishment, and shorter order cycle time and, subsequently, shorter lead times. Vorst et al. (1998) argue that Supply Chain Management should be concerned with the reduction or even elimination of uncertainties to improve the performance of the chain and suggest that reduction of uncertainties could improve service levels significantly. Myoung et al. (2001) pointed out that the successful implementation of SCM in agriculture means that all involved parties in production, distribution, and consuming should trust each other in order to gain by information sharing. However, a substantial body of evidence suggests that the competitive advantages from the implementation of e-business in food chain may be distributed unevenly among the parties involved (Loebbecke and Powell, 1998).

2.2.2 The role and use of ICT technologies in European food & Beverages sector

The role and use of ICT technologies mirrors the structure of the industry: dominance by large multinationals, where the creation of industrial groups (tied to mergers and subsidiaries) has encouraged the installation of interconnected local networks. In the large multinationals, the role of ICTs is evolving from mere instrumentation for reducing production costs and it is becoming a growing support for strategic decisions and greater e-business interaction/models. Sophisticated technologies and applications are less pervasive than in other manufacturing sectors, focusing mainly on intra-organisational processes and procedures.

Core sector business areas are: supply, production, logistics, services, and marketing & sales. Other critical areas now being targeted for improvement are: packaging processes, the control of quality in Hazard Analysis and Control Critical Points (HACCP), the quality of the product, and the reverse supply chain management of returned products. In the production sector, verifying the quality of the raw material is becoming increasingly more important.

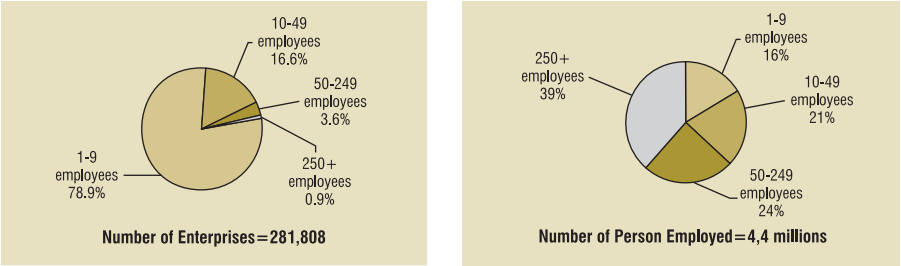

Figure 2.1 The Food & beverage industries: sector structure

Source: E-Business-Watch Observatory

2.3 METHODOLOGY

The data used in this study are derived from the European e-Business Survey 2003. In total, 3515 telephone interviews with decision makers in European enterprises in 5 EU Member States (Germany, Spain, France, Italy, UK) were conducted between 24th February and 20th March 2003. A follow-up study is on-going involving 5,000 enterprises (2005) from 10 different sectors across 7 EU member states.

The field work was carried using computer-aided telephone interview (CATI) technology. The decision maker in the enterprise targeted by the survey was normally the person responsible for ICT within the company, typically the IT manager. Alternatively, particularly in small enterprises which may not have a separate IT unit, the managing director or owner was interviewed.

2.4 ANALYSIS

The role of ICT in the sector is still rather controversial. Despite the fact that, based on the results of the survey, 71% of the interviewed enterprises feel that e-business does not play a significant role yet for the company, it must be noted that for approximately 50% of larger enterprises and over 20% of small enterprises, e-business already represents a rather significant part (see the Figure 2.2).

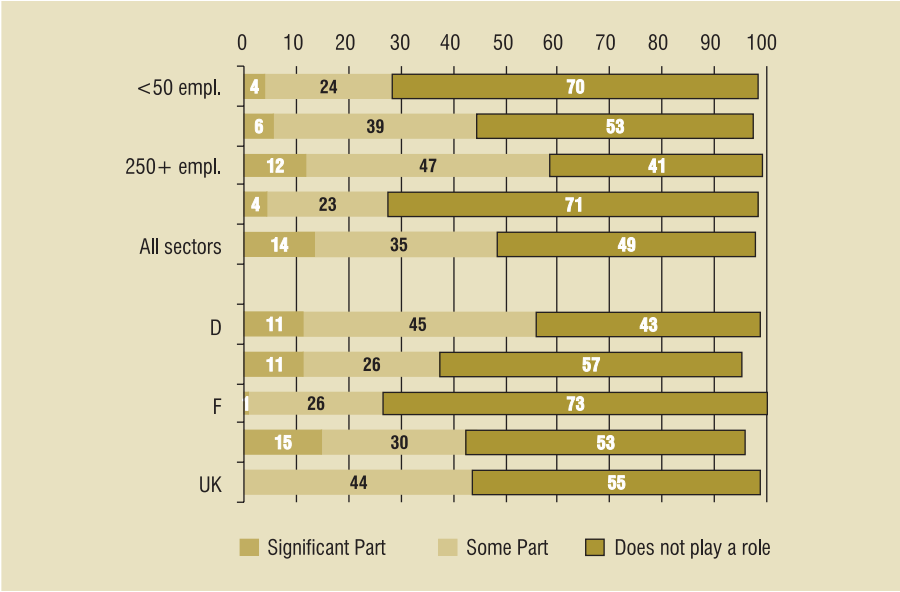

Figure 2.2 Importance of e-business in 2003 as perceived by companies

Source: E-Business-Watch Observatory

2.4.1 Online selling

Figure 2.3 shows the status of online selling in the food, beverage and tobacco sector. In particular, it indicates that only 5% of companies use online selling. This percentage is slightly higher in the case of medium-sized enterprises (9%) and large enterprises (8%). Nevertheless, it must be emphasised that in the food industry, online selling is less developed in comparison to the average of other sectors, in which there is a 16% rate of online selling. Spain and the United Kingdom are the countries that use this sales method the most, respectively with 10% and 9% of companies that sell online. Instead, France is the least oriented to online selling (only 2% of companies). The countries revealing the highest percentage of companies that are planning to introduce online selling within the next twelve months are Spain (11%) and the United Kingdom (13%).

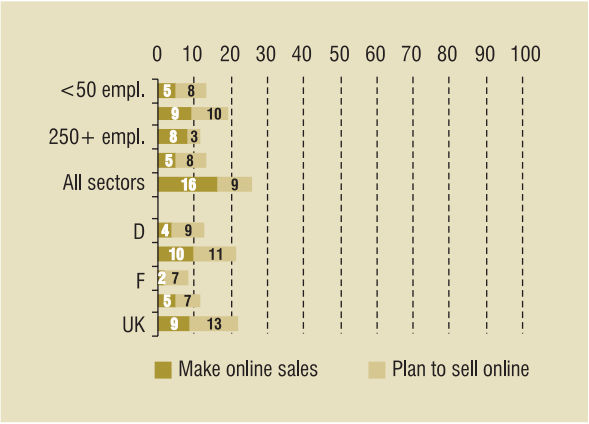

Figure 2.3 Companies selling online

Source: E-Business-Watch Observatory

2.4.2 Impact of online selling on companies

The figure number 2.4 illustrates the impact of online selling on companies in this sector. In particular, online selling has proven to have a positive impact above all in terms of the number of customers (an aspect cited by 64% of the companies that sell online). Moreover, although with a slightly lower percentage, its impact on the quality of customer service (58%) and on the efficiency of internal processes (57%) has been indicated as positive. There is also a significant percentage of companies that gave a positive opinion about the impact of online selling on their sales turnover, a factor that 12% of the companies even considered a “very positive impact”. The impact that online selling on logistics costs and stock management is less positive. For this factor, over 65% of the companies stated that online selling has neither a positive nor a negative impact.

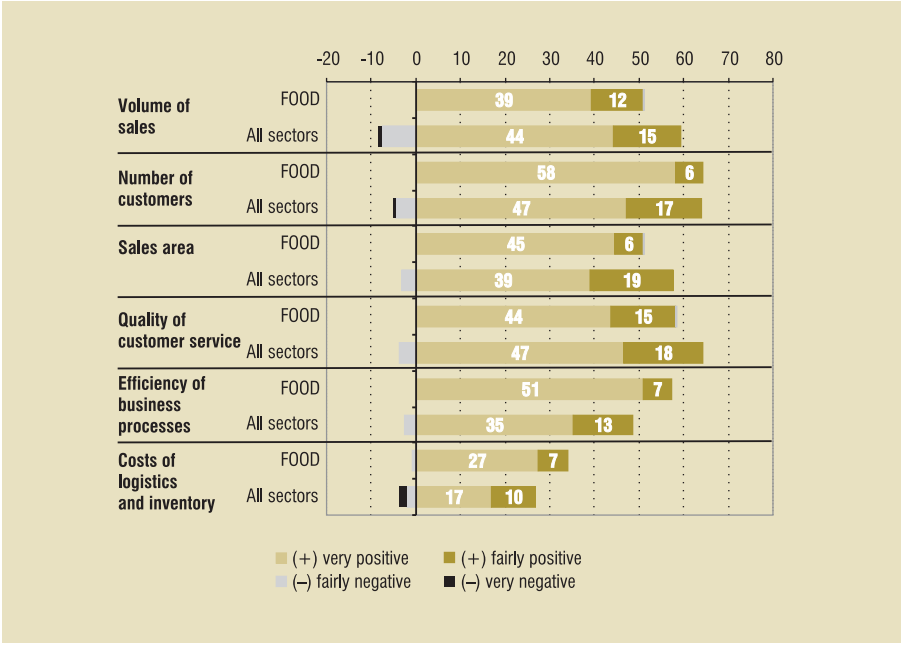

Figure 2.4 Impact of selling online

Source: E-Business-Watch Observatory

2.4.3 e-Procurement

As the e-business-watch report indicates, in contrast to online selling which is used by 5% of the interviewed companies, online procuring (as in other sectors) has been developed more rapidly, playing a more important role in the sector. In fact, 19% of the E-business-watch observatory sample uses online procuring. E-procurement is mainly used by large companies (54%). For 70% of the companies (out of the total number of companies that use e-procurement), online purchases represent less than 5% of total purchases. This leaves a wide window for future online purchases.

2.5 RESULTS & DISCUSSION

2.5.1 Managerial implications

A key challenge from the perspective of the food and beverages industry is to improve process and product innovation. SMEs should be encouraged to use innovation to produce higher margin and higher value products. More participation in global value chains and marketplaces will assist commercialisation. Access to new markets and business partners should also be supported. Working with large companies well equipped with e-business and experienced in large IT projects will help SMEs to access distribution chains and new markets.

Fragmentation, which is typical in Southern Europe, creates both supply inefficiencies derived from dynamics (the Forester Effect) and – perhaps more critical – ineffectiveness to safeguard food quality and safety. Food tracking and tracing requires to a large extent supply chain integration. Food traceability is hard to be implemented without the help of modern technology and e-business applications.

E-business technologies can create market transparency allowing consumers to track all the relevant information about the food they eat. This raises consumer confidence and trust in the integrated supply chain. Until recently, companies in the food and beverages industry have used e-business mainly to improve their internal processes and procedures.

2.5.2 Industry implications

The diffusion of e-business tools and applications in the food & beverage sector, even at a lower pace than other industries, lowers the transactions costs within business-to-business and business-to-consumer transactions. The players that seem to ripe the fruits of this cost reduction are large companies. To this extent, we can anticipate that e-business can contribute to the creation of new agreements or strategic alliances, as well as acquisitions and mergers. As a consequence, many food companies and particularly SMEs would face the dilemma of either collaborate or compete with existing business partners and competitors.

2.5.3 Economic implications

1. **Informative**
   E-business are a standard communication means for efficient and cost-effective dissemination of corporate information. E-mail is commonplace even for small food SMEs across EU.

2. **Transaction**
   Transaction-type e-business are the most popular in food sector, such as online management of capacity/inventory, online technology to track working hours and/or production time, SCM and ERP systems. A lot of development is also anticipated to take place in the near future, particularly as regards as online sales/procurement and traceability systems.

3. **Growth**
   The first-mover advantage is well documented in the literature and evidenced in the EU food sector when referring to large retailers and smaller suppliers. It is typical in the adoption process that followers have the advantage of lowering the risk of investing in an 'uncertain' e-business which trade-off with the opportunity of reaping higher benefits if the investment is successful. However, the pace of growth that e-business is not always certain as proven by the e-tailing case in food sector. Thus, it is anticipated that there would be no significant change in the growth of food sector unless an array of best practices of food SMEs paves the way for rest SMEs.

2.5.4 Policy implications

1. **Informative**
   The majority of food companies have built a web site, thus making the first 'big step' into digital world. A corporate web site is the cornerstone of **market transparency** which allows consumers to track all the relevant information about the food they eat. Market transparency raises consumer confident and trust in the integrated supply chain. A web-site is required but not sufficient condition to achieve full market transparency. Food traceability is also necessary but this requires e-business applications to enhance transactions.

2. **Transaction**
   Food tracking and tracing requires to a large extent supply chain integration. **Food traceability** is hard to be implemented without the help of modern technology and e-business applications. Food traceability is harder to achieve when supply chain is fragmented, a typical case in Southern Europe. **Fragmentation** creates both supply inefficiencies, inhibits market transparency, creates information asymmetries, and prohibits food quality and safety. Policy measures should address supply fragmentation i.e. by supporting participation to e-marketplaces, creating clusters of SMEs, virtual chains, etc.
3. **Growth**
   E-business is a new market to itself for food companies, thus creating growth dynamics for SMEs. For example, e-business opens us access to new markets, or opportunities for re-engineering existing business models. Access to new markets and business partners should also be supported. For example, disseminating best practices for food SMEs can remove barriers to change and unfold growth potential. Growth dynamics is equally important for SMEs and LSEs.

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