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Abstract

Advances in information technology have changed not only traditional goods and services, but also business-to-consumer relationships in terms of interactivity. For example, by facilitating access to company data, offering additional services, and/or providing self-service options through the World Wide Web, consumer requests can be recorded, handled faster, and dealt with more individually in a cost-effective manner. This article examines the extent to which companies in the Dutch food retailing sector are using the World Wide Web and its associated technologies to conduct their business. Employing the electronic commerce architecture suggested by Basu and Muylle (1999, 2002, 2003), we analyse the commercial Web sites of Dutch food retail companies (numbering 34 in all) to determine which commerce processes are being supported online in this sector. The results of the research provide insights to academics on the adoption of electronic commerce in a particular industry sector and to food retail managers on their competitors' usage of the World Wide Web. Our findings show that, generally, support for electronic commerce processes and sub-processes is merely 16 per cent of the considered sample. Most retailers use the Internet only as a medium of communications, although others have set up commercial Web sites that provide higher customer support. Several sub-processes appear to be supported such as core logistics, online search of products, and price information display and determination. With the exception of search there is practically no online customisation possible in the processes. A high correlation was observed between search, valuation, and authentication on the one hand and support for online payment on the other hand. Lastly, there is no significant difference between regional/national retailers or firm size, especially for the search and valuation processes, which share close to identical extent of support.

Introduction

Marketing has changed profoundly since it first emerged as a distinct business and management phenomenon in the 1920s and 1930s. With a focus on gaining customers, the challenge was originally to set up production facilities to meet a growing and unfilled consumer demand, and to employ marketing techniques to capture customers entering the market (Buttle 1996; Christopher *et al.* 1991; Heskett 1994; Palmer 2001). This approach to marketing has become known as transaction marketing or 4Ps marketing where the marketer is the 'mixer' of the product, price, place and promotion (Borden 1965; Culliton 1948).

In the 1980s, however, the validity of the 4Ps framework was questioned and said to be of mixed value outside the North American market where market and product situations often would be different (De Ferrer 1986; Grönroos 1994; Gummesson 1999). Moreover, the series of oil crises changed the business landscape abruptly in the 1970s halting the rise in consumer demand, as consumers experienced economic hardship, which in turn meant that manufacturers increasingly were faced with mature markets. Other serious challenges to the 4Ps framework included the increase in competition and the development of fragmented, regional, and global markets and companies, as well as the appearance of technological developments that continued to provide new solutions and products. Over and above these challenges, consumers had become ever more discriminating and demanding (Aijo 1996; Doyle 2000; Hunt and Morgan 1994; Palmer 2001; Tapscott and Caston 1993).

It was against this background that relationship marketing was introduced as a new marketing 'paradigm' (Berry 1983; Christopher *et al.* 1991; Grönroos 1994; Gummesson 1999; Peppers and Rogers 1993; Sheth and Parvatiyar 2000). When few or no new customers are emerging,

and when their numbers at times actually are reducing, the importance of those customers who do remain increases significantly. However, companies that succeed in retaining customers experience additional advantages: retained customers increase their purchases of existing products while cross-purchase other products; they are more likely to accept price premiums of products because the company's service adds value to their shopping experience; and they give positive word-of-mouth (Anton 1996; Best 1999; Buttle 1996; Heskett *et al.* 1994; Lindgreen and Crawford 1999; Reichheld 1996; Rosenberg and Czepiel 1984; Storbacka 2000).

Marketing practice has continued to change since then (Brodie *et al.* 2000; Doyle 2000; Ngai and Wat 2002; Sheth and Sisodia 1999). Above all, managers are now placing a greater emphasis on managing their marketing relationships, networks, and interactions, both internally and externally, and, as an underlying force behind many of the observed changes, interactivity based upon information technology is transforming the nature of goods, services, structures, functions, processes, and communications (Brodie *et al.* 2000; Coviello *et al.* 2001; Coviello *et al.* 2002).

Consider for example the food retailing sector. A major study carried out for the Coca-Cola Retailing Research Group (cfr: Coopers and Lybrand 1996) found that new shopping modes are emerging because of underlying consumer problems with the existing shopping process: Some consumers find food shopping a frustrating and unenjoyable experience because of problems with access, traffic and parking, queuing, and children, among other things, and they are bored since shopping is both repetitive and unrewarding (Seth and Randall 2001). Other consumers want to communicate directly with the producer or find information about the products (Beer 2001). Another finding was that consumers resent mass marketing and

expect to be treated individually. New food shopping ways have, therefore, appeared such as the self-scanning and autonomous checkouts in Safeway's Shop and Go, experiments with pre-telephoned or pre-faxed orders, personalised printed shopping lists, and home deliveries. In other cases the swiping of a loyalty card produces a shopping list of routine items that are picked and packed by store staff, an arrangement that makes it possible for the consumer to check out non-routine items, relax, or go somewhere else in the meantime (Estham *et al.*, 2001; Seth and Randall 2001).

Electronic commerce has been one favourite approach to establish customer relationships that are supported by information technology-based interactivity (Huizingh 2002; Ianni 2000; Lancioni *et al.* 2003; Sharma 2002). It is contended that "[Internet-driven electronic marketplaces] should enable firms to trade and collaborate more efficiently [...]" (Skjøtt-Larsen *et al.* 2003: p. 199) and that "[companies] can use the Internet to strengthen or change the relationships within their business network" (Huizingh 2002: p. 729).

Consider again the food retailing sector that is currently creating a Web of inter-firm alliances and networks, which transform relationships within the sector's value system (Cox and Mowatt 2002). Among the first companies to look toward electronic commerce were Peapod, NetGrocer, and WebVan in the US and Flanagans in the UK. Although none of these companies have yet made a profit, some 40 per cent of the 40 leading European food retailers were engaged in electronic commerce in 2000, and a further 14 per cent were setting up a pilot service; in fact, less than ten per cent believed they would not be online by the year 2001 (Seth and Randall 2001). The same authors estimated that by 2005 the percentage of food shopping bought online in Europe will vary between more than seven per cent for the most advanced market (the UK) and less than one cent for the least advanced market (Greece).

'Advanced markets' here means that in contrast to 'less developed markets' a relatively high percentage of transactions take place online. As can be seen from Table 1, online food shopping in most other European countries is forecasted to be at around five per cent (Forrester, as referenced in Seth and Randall 2001). (The actual performance in the years 2000 to 2003 has been below the level anticipated by Forrester although the directions are broadly indicative.)

Insert Table 1 around here

Indeed, the last few years "have seen a massive escalation in internet use, with dynamic growth in user numbers, Web sites and electronic traffic" (Barratt and Rosdahl 2002: p. 111). Predictions are that electronic commerce sales will be some US\$7.29 billion by the year 2004 and that total revenue streams through this environment will exceed US\$2,800 billion in 2005 (Davis *et al.* 1999, 2000; Wilson and Abel 2002). The increase in electronic commerce sales has been facilitated by the explosive growth in the number of Web users, Internet hosts, and commercial hosts (.com) who numbered 320 million by the end of 2002 (International Data Corporation, as referenced in Basu and Muyllé 2002).

It is not given, however, that a company will succeed if it jumps on the electronic commerce bandwagon. Barnes and Cumby (2002: p. 39) observed that "[the] creation of customer satisfaction online and the ultimate generation of repeat buying and loyalty as a result is entirely dependent on the extent to which the online retailer or service provider has created value for its target customers". Some companies have, in fact, not realised that with competitors only a click away (Yang and Jun 2002) Web sites require much more than "sticking the corporate brochure on the Website" if they are to create customer value (Leong

et al. 2002: p. 131). A Web site's quality therefore becomes key, but the ability to measure this quality is, however, neither simple nor straightforward (Aladwani and Palvia 2002) meaning that managers experience difficulties in fully exploiting the Internet.

Criteria for Successful Electronic Commerce Solutions

Several studies have addressed key attributes of Web sites including reliability, access, ease of use, personalisation, security, credibility, readability, and emotional elements (e.g., Barnes and Cumby 2002; Griffith and Krampf 1998; Hoffman and Novak 1997; Kaynama 2000; Leong *et al.* 2002; Liu and Arnett 2000; Rice 1997; Yang and Jun 2002). For example, Kagan *et al.* (2000) explored the degree of interactivity within Web sites, while Aladwani and Palvia (2002) suggested that technical adequacy, Web content (specific content and content quality), and Web appearance make up a Web site's quality dimensions. Bauer *et al.* (2002) developed a questionnaire to understand the influence of certain Web characteristics on key variables of relationship marketing including commitment, satisfaction, and trust.

There have also been attempts at putting together a more comprehensive framework for evaluating Web sites (Murphy *et al.* 2003; Van Lierde 2001; Waite and Harrison 2002). One case in point is Basu and Muylle (1999, 2002; Muylle and Basu 2003) whose systematic and empirically derived framework has been tested in several industry sectors. In contrast to other frameworks it recognises information technology as a powerful enabler of innovation and success in any business; it is organised around flexible business processes rather than traditional business functions; and it is based on a multi-layered collection of network, commerce, business, and market services. There are three levels of services - (1) services supporting the network through which electronic commerce is implemented, (2) services

relating to commerce processes, and (3) services that are specific to the particular industry – that are organised around basic commerce and supporting processes (Figure 1).

Insert Figure 1 around here

The framework can be used by a range of strategic decision makers including technology users, technology providers, and intermediaries. It allows a number of questions to be answered including the extent of support for commerce processes and sub-processes in electronic commerce and the patterns of correlations for the support of the different commerce processes within an industry (Basu and Muylle 1999, 2002; Muylle and Basu 2003).

Methodology

The article now proceeds to outline the methodology for the empirical analysis of commercial Web sites in the food retailing sector. We consider data collection, measures, sample, and data analysis techniques.

Data Collection

The unit of analysis was the individual Dutch food retailers and wholesalers and their Web sites. The analysis of each Web site was structured using a comprehensive checklist based on Basu and Muylle's original electronic commerce architecture (Basu and Muylle 1999, 2002; Muylle and Basu 2003), which consists of 96 checkbox items. In other words, the completion of an analysis form (Table 2) for a given site would allow to evaluate the extent of support for each of the five commerce processes (search, valuation, authentication, payment and

settlements, and logistics) and the support services (overall logistics processes 1 and 2). In order to avoid the influence of subjective biases on the results we used binary response formats.

Insert Table 2 around here

Measures

Basu and Muylle (2002) constructed aggregate variables for each commerce process in order to summarise the amount of information from the 96-items checkbox evaluation form (Table 3). A given aggregate variable represents the mean of the questions pertaining to the relevant sub-process. As the sub-processes each has the value of either 0 or 1 the value of an aggregate variable will range between 0 and 1. For details of aggregate measures of electronic commerce and the associated mathematical formulas we refer to Basu and Muylle's articles. The following discussion of the five electronic commerce sub-processes is based upon Basu and Muylle (2002).

Insert Table 3 around here

Search: The search sub-process includes support for searching the seller online (e.g., Web portal query results) and the products online (e.g., search supporting e-mail functions), as well as search-related support services such as downloadable product catalogues and extent of support for search customisation including the possibility for personalising the Web site and the product.

Valuation: The sub-process of valuation relates to the extent to which price information is displayed (e.g., product price, shipment, and tax) and the extent of support for price determination mechanisms and value customisation. Discounts and frequency marketing programmes are examples of price determination mechanisms, while personalised discounts are an example of value customisation.

Authentication: The issue of authentication encompasses not only the extent of authentication of the Web site and product quality (i.e., the credibility and quality of the seller's business practices and products) and the buyer (i.e., the credibility and integrity of the buyer), but also the extent of customising product authentication via virtual communities.

Payment: The extent of online and offline payment support, as well as customisation in payment are the three measures of the payment sub-process. Online payment includes such different payment systems as online credit card payments, e-cash, and payment through third parties, while check, cash, and offline credit card payments refer to different methods of offline payment. At times, it is possible to customise payment, for example through differentiated payment programmes.

Logistics: The fifth sub-process relates to the extent of core logistics support and the extent of support for online logistics and customising logistics. For example, in terms of core logistics we find offline delivery and online order tracking facility. Online logistics refer to the availability of online delivery and the provision of multiple-source sites, while customising logistics addresses order consolidation and multiple delivery options. Two overall logistics processes have been identified. The first one, the extent of overall support for offline logistics, refers to the extent of core logistics support and the extent of support for customising

logistics. The second one, the extent of overall support for digital products logistics, includes support for online logistics.

In addition to these measures Basu and Muylle constructed two additional ones. The first one seeks to measure after-sales customer service such as support on product use, repair, disposal, and service contracts, as well as the possibility of giving feedback or participating in virtual communities. The second one summarises the separate customisation sub-processes that have been identified.

Sample

To obtain an overview of Dutch food retailers and wholesalers the following method was employed. We first searched for food retailers and wholesalers in the Netherlands by using the services of the portal <http://www.startpagina.nl> and its daughter portal <http://www.supermarkt.pagina.nl> that provide an overview of major (in terms of market share) Dutch supermarkets and wholesalers. We also contacted Statistics Netherlands (Dutch: Centraal Bureau voor de Statistiek; <http://www.cbs.nl>), a department of the Ministry of Economic Affairs, which directed us to the Trade Information Office (Dutch: Bureau voor Handelsinlichtingen; <http://www.buvoha.com>), a Dutch association specialised in supplying trade information and establishing business contacts. The latter organisation suggested that we approach the Hoofdbedrijfschap Detailhandel (<http://www.hbd.nl>) and the Central Bureau for Provision Trade (Dutch: Centraal Bureau Levensmiddelenhandel; <http://www.cbl.nl>) to which the <http://www.supermarkt.pagina.nl> has a link. These organisations confirmed the overview that we had previously put together (Table 4). Lastly, our search on <http://www.google.com> and <http://www.ilse.nl> using the keyword 'supermarkt' resulted in the previous mentioned

food retailers and wholesalers, as well as numerous smaller ones that were omitted from the research because they represent only a tiny fraction of total supermarket spending and not many have a Web presence.

More precisely, in the Netherlands approximately 3,000 supermarket organisations exist, exploiting more than 6,600 outlets. Two thirds of these outlets are part of larger food retail chains that each have seven or more outlets. In all there are 42 retail chains. In our sample 19 of these retail chains are included, together representing more than 90 per cent of total market volume in 2003. The remaining 23 retail organisations were left out of the analysis because they have a very limited Web presence (because the shops are near the customers) or no Web presence at all. Furthermore, all currently operating eight Internet supermarkets are included as well as are all five wholesalers with a Web presence. Finally, two organisations that exploit several of the formats from the list of the 42 retail chains are included.

As part of their assignment, students participating in a fourth-year Strategic Marketing course had to consider different aspects of electronic commerce including analysing online support for commerce processes in the food retailing and wholesaling sector. A total of 34 students would then each be allocated three sites to analyse. The process of allocating three sites to a particular student was random, and each site was analysed by three students in all. Once the data had been collected the analysis forms were compared to see if there were differences in the Web site checkboxes. If this were the case the three students, a teaching assistant, and the lecturer would meet and resolve the difference(s). Through this method, which ensured that each Web site had been assessed correctly, we obtained 102 evaluation forms: the statistical analysis was thus performed on 34 sites (102/3).

Data Analysis Techniques

Firstly, we performed (i) a Kolmogorov-Smirnov test in order to verify the normality of the variables' distribution, (ii) a test of homogeneity of variance using a 'regional versus national' grouping factor in the one-way ANOVA, and (iii) an error distribution graphic; all of which being three obligatory conditions in order to use parametric statistical methods. Even though search (p-value = 0.419), valuation (p-value = 0.400), and authentication (p-value = 0.282) lead to rejecting H_0 of the Kolmogorov-Smirnov test meaning that the distribution of these variables has a good fit to the normal distribution they do not fulfil the condition regarding the equality of variances.

Secondly, and due to the non-applicability of parametric statistics, we continued by making use of (i) Kendall's Tau-b correlation test to study the relationships between the commerce processes, (ii) Chi-square test in order to assess whether the support of each process differs across the sample, and (iii) Mann-Whitney's test with the purpose of comparing the mean support of each process in two different groups based on a classification of regional *versus* national sites. Regional supermarkets are defined as retail chains with a presence in four or less of the 12 Dutch provinces. National supermarkets are defined as retail chains with a presence in more than four Dutch provinces. Further, we compared support for the various commerce processes according to size of the firm.

We believed our classification would be an adequate grouping variable. Bamford (2001) argued that electronic commerce has equal value for small and medium-sized and large enterprises. Indeed, small and medium-sized enterprises such as Club Chef Direct, Yorkshire Pantry, and T&S in the UK, Landhandell and ICA Rett hjem in Norway and Aarstiderne in

Denmark have all used electronic commerce to extend their market (Amundsveen and Solvoll 2002; Bamford 2001; Eastham *et al*, 2001). However, we believe it to be more likely that nationwide enterprises like Asda, Sainsbury, Tesco, and Safeway in the UK and Albert Heijn in the Netherlands have the necessary resources to launch fully-fledged electronic commerce infrastructure. For example, it was mentioned that 40 per cent of the 40 leading European food retailers were selling online in 2000 (Seth and Randall 2001). We would believe that fewer small and medium-sized enterprises – for lack of financial resources - could undertake the necessary investments for implementing an electronic commerce infrastructure. Further, such enterprises could have less need for a fully developed Web presence due to the characteristics of the Dutch market (see shortly).

Findings

This section is presented as follows. Firstly, we present our findings related to the extent of support for each of the electronic commerce processes and support service in the Dutch food retail and wholesale sector and, secondly, we assess the patterns of correlations that exist between these processes. The findings are then compared to previous overall and industry-related results obtained by Basu and Muylle (2002). Lastly, we present the difference between the mean support of each commerce process across the two groups of retail Web sites based on two grouping factors: regional/national level and size.

Extent of Support for Electronic Commerce Processes

Support for the e-commerce processes and sub-processes are presented in Table 5. The results show that support from Dutch food retailers and wholesalers for their online

businesses is almost non-existent. Indeed, the mean overall support for electronic commerce processes and sub-processes is only 16 per cent of the considered sample. It appears that the support for authentication (12 per cent), payment (nine per cent), and online customer support (seven per cent) are the least supported processes, all below the overall average of 16 per cent. Even though these three processes appear to be less supported than the others in the research carried out by Basu and Muylle (2002) with respectively an extent of support of 15, 25, and 25 per cent, there is a significant difference between these findings, though. In fact, our results are relatively similar to those found in the automotive parts sector, which was the one sector that least supported online business. The study of Basu and Muylle withheld many US firms (.com) that support online business to a greater extent than European firms. In regards to the support of search, valuation, and logistics our findings range higher in value with respectively a support of 28, 17, and 23 per cent but still lower than the mean overall support for these processes in the Basu and Muylle's (2002) research.

In order to get a detailed appreciation of commerce processes support we look at the sub-processes, where we identify the support for (i) core logistics (39 per cent), (ii) the online search of the product (35 per cent), the search-related support (30 per cent), the search for the seller (27 per cent), and the search customisation (18 per cent), as well as (iii) the price information display (30 per cent) and determination (18 per cent) as the most supported sub-processes of all. Although an extensive amount of the literature has celebrated the Internet's customisation possibilities we observe that online customisation is practically inexistent in every process – with the exception of search – ranging from a support of zero per cent for authentication to seven per cent for logistics.

These findings are consistent with the characteristics of the Dutch food market. The Netherlands occupies a relatively small area, which is densely populated. The market is served through a fine-meshed infrastructure where daily supplies are often bought in smaller local supermarkets and specialist shops (Grievink and Josten 1999). Generally, these supermarkets and shops are within walking or cycling distance of consumer's homes. Subsequently, the use of brick-and-mortar facilities is easy and evident thereby causing a relatively low demand for online services and home deliveries. Furthermore, even when online shopping is used the delivery often takes place through and from the local brick-and-mortar facilities. Additionally, the use of credit cards is limited in the Netherlands due to the success of a wide spread debit card system, which accounts for most of the payments done. This system is not applicable for online payments. Generally, home deliveries of shopping goods are paid at the door either cash or through this debit card system. Consequently, the Web presence of most retail organisations is foremost a Web brochure rather than an ordering system explaining the low score on support for authentication, payment, and online customer support (Grievink and Josten 1999).

In order to assess whether the support for processes differs across the sample we performed a Chi-square test. The objective was to verify whether all sites support each online process to the same level, or if there are significantly different levels of support for each process across the sample. The findings reveal that the support for search (Chi-square = 11.882; p-value = 0.891) and valuation (Chi-square = 19.529; p-value = 0.077) do not significantly differ across the sample, whereas authentication (Chi-square = 19.417; p-value = 0.013), payment (Chi-square = 90.941; p-value = 0.000), and logistics (Chi-square = 63.412; p-value = 0.000) do. These findings may reveal the differences in the state of advancement by Dutch retailers to manage their online business. Indeed, search and valuation are processes that intuitively are

more easily dealt with than authentication, payment, and logistics. Most Web sites are, in fact, used as a communication medium enabling search and valuation, but are not intended to carry out online sales. Only the slightly higher support for offline logistics suggests that products may be ordered on the Web but that they are to be collected and paid in brick-and-mortar stores.

Pattern of Correlations between Electronic Commerce Processes

The patterns of correlations between the electronic commerce processes and customer support are presented in Table 6. Where Basu and Muyllé (2002) observed high correlations between the extent of support for valuation, payment, and offline logistics, we observe that all correlation coefficients between the commerce processes are significant and ranging between 0.308 and 0.631 (at a 0.5 level). We note that as support for search, valuation, and authentication increases, the extent of support for online payment increases significantly. This confirms our result, which shows that we have a clear cut between sites that use their Internet site as a medium of communication, and sites that confer it a direct commercial function. The sites, which have a commercial orientation, also provide much higher customer support with significant correlation coefficients ranging from 0.532 to 0.656 (at a 0.5 level). An interesting finding is that authentication is significantly correlated with other processes, which was not the case in the Basu and Muyllé (2002) research.

Extent of Support for Electronic Commerce Processes at the Regional *versus* National Level

Our sample is composed of 16 regional and 18 national Websites. We decided to regroup the sites based on their geographical spread rather than based on their nature (retailer's site or wholesaler's site) since we believe that assessing the internal disparities between the extent of support for commerce processes within the Netherlands seems more relevant. Using the Mann-Whitney test, our results show, however, that there is no significant difference between regional or national retailers, especially for the search and valuation processes, which share close to identical extent of support. Since our sample size is limited to 34 retailers, one may argue against the adequacy of the Mann-Whitney test, and we therefore also carried out Spearman's correlation and found that, except for authentication, the support for all commerce processes was positively related to the presence of the retailer at the national level. However, none of the correlations were significant at the 0.10 level. In hindsight, in a country as small as the Netherlands it may have been wise to classify the Web sites based on different factors such as the retailer's revenues, market share, and number of locations. Since we did not survey for these facts, we gathered information *ad hoc* on the number of the retailer's selling points as an indication of its size. Each food retailer was placed into one of four categories ranging from "more than 300 selling points" to "less than 50 selling points". Yet again, due to the limited size of the sample, we could not rely on a Kruskal-Wallis test to test significant differences between the support of each commerce process within each of the four categories. Instead, we simply choose to verify the significance and direction of associations between the commerce processes and the retailer's size by computing Spearman's correlation. Here again, we found no significant differences. Even though the correlations were non significant at the 0.10 level we observed that the smaller the retailer's size, the lower the support for overall

payment and authentication. If these findings were statistically significant, one would have demonstrated that the larger retailers use their Web sites as a commercial selling point to a greater extent than the smaller retailers.

Conclusions

Using the frameworks of Basu and Muylle and other authors, evaluations of Web sites from a number of different industry sectors have appeared in the literature (e.g., Muther 2002). However, it is acknowledged that additional studies are warranted. One case in point is the limitation of geography in many studies meaning that findings may vary from those of other parts of the country or world (Yang and Jun 2002). Another case in point is that businesses differ from each other in terms of product type and product cost (Basu and Muylle 2002) so that Web sites must support different commerce processes for different businesses.

Our study provided insights to the correlations between electronic commerce processes, as well as the extent of support for electronic commerce processes. The study was carried out in the Dutch food retail sector. Among the findings were there following ones. Overall, support for electronic commerce processes and sub-processes is merely 16 per cent of the considered sample. Most retailers use the Internet only as a medium of communications (with some support for search, valuation, and logistics), although others have set up commercial Web sites that provide higher customer support. The lack of direct-to-home delivery may very well reflect that retailers have not yet worked out how to make money out of the provision of this service. Several sub-processes appear to be supported such as core logistics, online search of products, and price information display and determination. With the exception of search there is practically no online customisation possible in the processes. Lastly, a high correlation was

observed between search, valuation, and authentication on the one hand and support for online payment on the other hand.

The implications of our findings for managers are numerous. First, Dutch retailers can parsimoniously identify all commerce processes and sub-processes available to them in order to manage their Web site effectively. Indeed, even though we did not survey consumers in our research, retailers that identify needs from their consumer market to shop online are now in possession of a clear managerial online evaluation tool to judge their online commerce activities. Secondly, our findings enable them to compare their online commerce's state of advancement to that of others in the industry. Finally, having presented existing commerce processes and sub-processes, retailers may also find new ways of differentiating their online activities.

We realise that the study is constructed upon the analysis of only 34 food retailers and wholesalers. This is beyond question a small sample, and we caution against extrapolating the results of the study to the general food retailing and wholesaling sector. On the other hand, the sample of food retailers included in our sample represent more than 90 per cent of supermarket expenditure in the Netherlands and is considered representative of all food retail chains, covering two thirds of all outlets, and this should give us faith in that the findings are representative for the major players in the Dutch food retailing and wholesaling sector.

In this study we have been concerned with the interface between a company and its customers, i.e. external electronic commerce processes. However, as mentioned in the introduction the relationship marketing paradigm holds that it is key to establish relationships, networks, and interactions with both external and internal stakeholders. It would thus be

interesting to analyse companies and their internal electronic commerce processes. Future research could seek to determine if these processes support and/or supplement the external processes. We agree with Basu and Muylle (2002) that this naturally should involve a survey of Web site managers from the same companies that have been evaluated from the customers' point of view. This would ensure that we have both sides of what really is a dyadic relationship: food retailer – consumer. The reason why it is necessary to involve managers is that internal processes, in contrast to external processes, most often are not transparent, which means that the researcher has little possibility for evaluating them. We would also like to point to the fact that this research has been conducted in a business-to-consumer context. Although it is true that this segment used to be predominant and more advanced (Basu and Muylle 2002) future research should benefit from examining business-to-business Web sites that are now abundant. The way of evaluating such sites may require a method that is perhaps somewhat different from the one that was employed in this study, as it may be difficult to have access to business-to-business sites. Also, our research was about Web-based interaction between retailers and their customers but it would be equally worthwhile to examine upstream business-to-business electronic communication between the retailers and their suppliers. Finally, future research might want to consider smaller players in the food retailing industry. For example, instead of categorising retailers according to regional/national presence or size such factors as revenues and market share could be considered.

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Table 1. Amount and estimated percentage of food shopping bought online

Country	Online sales in € million			Percentage of market online
	1999	2002	2005	2005
Austria	1	133	959	3.5
Belgium	4	256	1,725	4.7
Denmark	2	381	1,786	6.4
Finland	3	255	1,232	6.2
France	6	777	7,658	3.9
Germany	17	1,324	13,725	5.7
Greece	< 1	14	122	0.4
Ireland	< 1	57	389	2.6
Italy	10	542	4,828	2.8
Luxembourg	< 1	11	75	4.7
The Netherlands	7	730	2,514	5.8
Norway	3	198	1,390	6.0
Portugal	< 1	30	248	1.0
Spain	2	104	1,211	1.6
Sweden	8	738	2,197	6.5
Switzerland	3	244	1,468	4.5
UK	99	3,513	13,530	7.4

Source: Forrester Research (2000), as referenced in Seth and Randall (2001: p. 261)

Table 2. Electronic commerce architecture: Web site analysis form

SEARCH: "The information gathering and evaluation process undertaken by buyers and sellers to identify opportunities. A trading opportunity consists of a supplier willing to offer a good and a buyer interested in purchasing the good. Thus search processes identify potential suppliers, goods and customers willing to purchase the goods."

S1. Is the Web site [↑] a manufacturer's site or [↑] an intermediary site (e.g., dealer)?	
S2. Can the seller be reached through www.companyname.com ?	oN [↑] / seY [↑]

S3. If you use the search engine of a portal site and type in the name of the company (S3a.), or if you type in a product type (S3b.), do the query results include a link to the company's Web site within the first page of results? If the banner ad changes to the company you are looking for, check [↑] banner ad.

Portal	S3a. Query by company name (e.g., Toshiba)		S3b. Query by product type (e.g., notebooks)	
	knil [↑]	da rennab [↑]	knil [↑]	da rennab [↑]
Yahoo	knil [↑]	da rennab [↑]	knil [↑]	da rennab [↑]
Excite	knil [↑]	da rennab [↑]	knil [↑]	da rennab [↑]
Infoseek	knil [↑]	da rennab [↑]	il [↑] nk	da rennab [↑]
Lycos	knil [↑]	da rennab [↑]	knil [↑]	da rennab [↑]
MSN	knil [↑]	da rennab [↑]	knil [↑]	da rennab [↑]
Netcenter	knil [↑]	da rennab [↑]	knil [↑]	da rennab [↑]

S4. Does the Web site provide an internal search engine?	oN [↑] / seY [↑]
S5. Does the Web site provide forms with specific criteria for product search?	oN [↑] / seY [↑]
S6. Does the Web site provide a site-index / site-map?	oN [↑] / seY [↑]
S7. Did you find it easy to get information about products?	oN [↑] / seY [↑]
S8. Does the Web site support customised product design / bundling?	oN [↑] / seY [↑]
S9. Does the Web site have a downloadable product catalogue?	/ elif txet a sa ,seY [↑] / oN [↑] (tneilc taf) egakcap erawtfos a sa ,seY [↑]
S10. Does the seller offer e-mail services to facilitate search?	oN [↑] / seY [↑]
S11. Does the seller offer alternative offline ways that support search (e.g., order a catalogue, 1-800 number to talk to a sales representative)?	oN [↑] / seY [↑]
S12. Can you as a visitor personalise Web site (e.g. my.companyname.com)?	[↑] Yes / [↑] No

VO1. Does the company identify any external partners that help support the search process?	oN [↑] / seY [↑]
If yes, which partners?	

M1. Are there any innovative or unique features that the site offers with respect to the search process? If so, describe and provide URL:

VALUATION: "The processes and methods of negotiating and discovering a purchase or sales price for a product."

V1. Are product prices listed on the Web site?	oN ¹ / seY ¹
V2. If the prices are not listed, does the seller offer mechanisms to obtain prices? If other: specify:.....	oN ¹ / seY ¹
V3. Is price haggling offered?	oN ¹ / seY ¹
V4. Is product-price mix negotiation offered?	oN ¹ / seY ¹
V5. Does the seller provide tax computation?	oN ¹ / seY ¹
V6. Does the seller provide currency conversion?	oN ¹ / seY ¹
V7. Does the seller provide shipment cost information?	oN ¹ / seY ¹
V8. Does the seller offer discounts / promotions?	oN ¹ / seY ¹
V9. Does the seller offer personalised discounts?	oN ¹ / seY ¹
V10. Does the seller offer frequency marketing programmes?	oN ¹ / seY ¹
V11. Does the seller sell through auctions (dynamic pricing)?	oN ¹ / seY ¹
V12. Does the seller claim to have the lowest prices?	oN ¹ / seY ¹
V13. Does the seller guarantee to have the lowest prices by matching lower prices from competitors?	oN ¹ / seY ¹
V14. Does the seller show prices of competitors?	oN ¹ / seY ¹
V15. Can the buyer rent or lease the product?	oN ¹ / seY ¹

VO2. Does the company identify any external partners that help support the valuation process?	oN ¹ / seY ¹
If yes, which partners?	

M2. Are there any innovative or unique features that the site offers with respect to the valuation process? If so, describe and provide URL:

AUTHENTICATION: "A core set of activities used to verify the quality and features of the product offered, the authenticity of the trading parties, and monitor conformance to the contract or agreement among parties."

A1. Does the seller use trusted third parties that endorse the Web site (e.g., Better Business Bureau, CA Webtrust)?	oN [↑] /seY [↑]
A2. Does the seller display press releases (e.g., from PC magazines) to support authentication of its Web site?	oN [↑] /seY [↑]
A3. Does the seller ask the buyer for offline authentication mechanisms (e.g., telephone call, postal)?	oN [↑] /seY [↑]
A4. Does the seller ask the buyer for offline e-mail authentication?	oN [↑] /seY [↑]
A5. Does the seller offer the option of using a digital certificate?	oN [↑] /seY [↑]
A6. Is registration required before a buyer can transact (user ID and password)?	/seY [↑] oN [↑]
A7. In what form does the Web site provide product information?	(sitiruhcorb) evissap [↑] AVAJ ,evawkcchs ,g.e) evitcaretni [↑] applets)
A8. Does the seller provide descriptive information on product quality?	oN [↑] /seY [↑]
A9. Does the seller display descriptive customer testimonials?	oN [↑] /seY [↑]
A10. Does the seller facilitate interactive customer testimonials through virtual communities?	oN [↑] /seY [↑]
A11. Does the seller give information on how its offerings perform with respect to standards on quality?	oN [↑] /seY [↑]
A12. Does the seller give information on how its offerings perform with respect to competitors?	oN [↑] /seY [↑]
A13. Does the seller display expert opinions (trusted third parties) to assure the quality of the products?	oN [↑] /seY [↑]
A14. Does the seller have a warranty – return policy?	oN [↑] /seY [↑]
A15. Does the seller offer purchase on a trial base?	oN [↑] /seY [↑]
A.16 Does the seller allow customisation of the product quality assurance process by guiding the buyer to particular parts of discussions in virtual communities that address the product?	oN [↑] /seY [↑]
A17. Does the seller allow customisation of the product quality assurance process by guiding the buyer to particular parts of discussions in virtual communities that address particular product attributes the buyer is interested in?	oN [↑] /seY [↑]
VO3. Does the company identify any external partners that help support the authentication process?	oN [↑] /seY [↑]
If yes, which partners?	

M3. Are there any innovative or unique features that the site offers with respect to the authentication process? If so, describe and provide URL:

PAYMENT and SETTLEMENTS: "These processes define the terms and methods of payment permitted and ensure the settlement of payments in the exchange."

P1. Does the seller provide walk-in based sales?	oN ¹ /seY ¹
P2. Does the seller provide subscription- / account-based sales?	oN ¹ /seY ¹
P3. Does the seller support e-wallets?	oN ¹ /seY ¹
P4. Does the seller provide a shopping cart mechanism?	oN ¹ /seY ¹
P5. Does the seller support offline check payments?	oN ¹ /seY ¹
P6. Does the seller support offline cash payments (e.g., delivery)?	oN ¹ /seY ¹
P7. Does the seller support wire payments?	oN ¹ /seY ¹
P8. Does the seller support offline credit card payments (fax, telephone, postal)?	¹ /seY ¹ No
P9. Does the seller support payment process through trusted third parties (e.g., First Virtual) where only non-sensitive information is exchanged online?	oN ¹ /seY ¹
P10. Does the seller support online credit card payments?	TES gnisu ,seY ¹ u ,seY ¹ sing SSL oN ¹
P11. Does the seller support smart card payments? If so, which ones?.....	oN ¹ /seY ¹
P12. Does the seller support software-based e-cash payments? If so, which ones?.....	oN ¹ /seY ¹
P13. Does the seller allow the buyer to customise his payment options?	oN ¹ /seY ¹
P14. Does the seller offer the buyer the option to open an account?	oN ¹ /seY ¹
P15. Does the seller allow the buyer a certain credit level?	oN ¹ /seY ¹
P16. Does the seller provide differentiated payment programmes (e.g., gold programme conditions for heavy users)?	oN ¹ /seY ¹
P17. Does the seller allow for instalment / lay-away payments?	oN ¹ /seY ¹
VO4. Does the company identify any external partners that help support the payment process? If yes, which partners?	oN ¹ /seY ¹

M4. Are there any innovative or unique features that the site offers with respect to the payment process? If so, describe and provide URL:

LOGISTICS: "The processes specifying and co-ordinating the actual delivery of goods from the seller to the buyer."

L1. Which of the following product delivery options are supported?	yreviled enilno [†] tnege /relles yb yreviled enilffo [†] kciplacisyhp [†] -up by customer
L2. In case of online delivery: are multiple-source sites provided, i.e., does the seller offer you information on the nearest server to download the content form?	oN [†] /seY [†]
L3. Does the company identify physical stores in its Web site?	oN [†] /seY [†]
L4. Does the seller offer you information on the nearest dealer or store (i.e., show you the point of sale closest to your location)?	oN [†] /seY [†]
L5. Does the company offer basic order status services?	oN [†] /seY [†]
L6. Does the company offer online order tracking services?	oN [†] /seY [†]
L7. Does the company offer order consolidation options?	oN [†] /seY [†]
L8. Does the seller offer multiple delivery options (e.g., postal, FedEx)?	oN [†] /seY [†]

VO5. Does the company identify any external partners that help support the logistics process? If yes, which partners?	N [†] /seY [†] o
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M5. Are there any innovative or unique features that the site offers with respect to the logistics process? If so, describe and provide URL:

SUPPORT SERVICES: "Process of supporting the customer after the transaction."

S1. Does the seller offer after sales customer service through descriptive information on product use, repair and disposal?	oN ¹ / seY ¹
S2. Does the seller offer after sales customer service through interactive online (e-mail) technical training and education on product use, repair and disposal?	oN ¹ / seY ¹
S3. Does the seller offer dispute resolution services?	oN ¹ / seY ¹
S4. Is it possible for buyers to give feedback (complaints, suggestions)?	oN ¹ / seY ¹
S5. Are community features provided that let buyers interact with other buyers?	oN ¹ / seY ¹
S6. Does the seller allow the buyer to purchase a service contract?	eY ¹ s / ¹ No
S7. If the seller does allow the buyer to purchase a service contract, does the seller offer a choice of service contracts?	oN ¹ / seY ¹

VO6. Does the company identify any external partners that help support the customer support process?	seY ¹ / ¹ No
If yes, which partners?	

M6. Are there any innovative or unique features that the site offers with respect to the support process? If so, describe and provide URL:

Source: Basu and Muyllé (1999, 2002) and Muyeille and Basu (2003)

Table 3. Electronic commerce architecture: sub-processes

Process	Sub-process
<u>Search:</u>	Extent of support for searching the seller online Extent of support for searching products online Search-related support services Extent of support for search customisation
<u>Valuation:</u>	Extent to which price information is displayed Extent of support for price determination mechanisms Extent of support for valuation customisation
<u>Authentication:</u>	Extent of authentication of the Web site Extent of authentication of the buyer Extent of authentication of product quality Extent of customising product authentication via virtual communities
<u>Payment and settlements:</u>	Extent of online payment support Extent of offline payment support Extent of support for customisation in payment
<u>Logistics:</u>	Extent of core logistics support Extent of support for online logistics Extent of support for customising logistics
<u>Overall logistics process 1:</u>	Extent of overall support for offline logistics
<u>Overall logistics process 2:</u>	Extent of overall support for digital products logistics

Source: Basu and Mylly (2002)

Table 4. Dutch food retailers and wholesalers

Type of organisation	Web site
Albert Heijn	http://www.ah.nl/
Aldi	http://www.albert.nl
Bob's teleshop	http://www.aldi.nl/
C1000	http://www.bobs-teleshop.nl
C-1000 Aalsmeer	http://www.c1000.nl/
CoopCodis	http://www.c-1000-aalsmeer.nl
Deen Supermarkten	http://www.coop.nl/
Deli XL	http://www.deen.nl/
DeWitKom@rt Supermarkten	http://www.delixl.nl/
Edah	http://www.dewitkomart.nl/
EM-TE Trommelen	http://www.edah.nl/
Gamaknet	http://www.em-te.nl/
Groothandel in Levensmiddelen	http://www.gamaknet.nl
Hema	http://www.tolfood.com/
Hoogvliet	http://www.hema.nl/
Jan Linders	http://www.hoogvliet.com/
Lidl	http://www.janlinders.nl/
Jumbo	http://www.lidl.nl
Konmar	http://www.jumbosupermarkt.nl/
Laurus	http://www.konmar.nl/
Makro Nederland	http://www.larus.nl/
Nettorama	http://www.makro.nl/
Phicoop	http://www.nettorama.nl/
Poiesz Supermarkten	http://www.phicoop.nl
Schlecker	http://www.poiesz-supermarkten.nl/
Sligro	http://www.nl.schlecker.com
Sperwer Groep	http://www.sligro.nl/
Super de Boer	http://www.plussupermarkt.nl/
Telesuper	http://www.supermarkt.nl
Troefmarkt	http://www.telesuper.nl
Vomar Voordeelmarkt	http://www.troefmarkt.nl/
VEN Groothandelcentrum	http://www.vomar.nl/
Wehkamp	http://www.ven.nl/
	http://www.wehkamp.nl

Table 5. Extent of support for commerce processes and sub-processes ^a

Process	Mean	Standard deviation
<u>Overall search:</u>	0.28	0.17
Search the seller online	0.27	0.10
Search the products online	0.35	0.36
Search-related support	0.30	0.22
Search customisation	0.18	0.27
<u>Overall valuation:</u>	0.17	0.12
Price information display	0.30	0.31
Price determination	0.18	0.09
Valuation customisation	0.03	0.10
<u>Overall authentication:</u>	0.12	0.11
Website authentication	0.07	0.18
Buyer authentication	0.16	0.23
Product authentication	0.13	0.13
Authentication customisation	0.00	0.00
<u>Overall payment:</u>	0.09	0.15
Online payment	0.08	0.14
Offline payment	0.14	0.25
Payment customisation	0.05	0.13
<u>Overall offline logistics:</u>	0.23	0.16
Core logistics	0.39	0.20
Logistics customisation	0.07	0.22
<u>Customer support:</u>	0.07	0.09

^a Measured on a 0-1 scale with '0' indicating no support and '1' meaning fully-fledged support.

Table 6. Patterns of correlations between commerce processes in electronic commerce and customer support

Correlations

		Search	Valuation	Authenticat ion	Pay ment	Logistics	Customer support	
Kendall's tau_b	search	Correlation Coefficient	1,000	,516**	,402**	,454**	,341*	,569**
		Sig. (2-tailed)	,	,000	,002	,001	,012	,000
		N	34	34	34	34	34	34
	valuation	Correlation Coefficient	,516**	1,000	,331*	,631**	,371**	,615**
		Sig. (2-tailed)	,000	,	,013	,000	,007	,000
		N	34	34	34	34	34	34
	Authenticati on	Correlation Coefficient	,402**	,331*	1,000	,572**	,321*	,532**
	Sig. (2-tailed)	,002	,013	,	,000	,023	,000	
	N	34	34	34	34	34	34	
Pay ment	Correlation Coefficient	,454**	,631**	,572**	1,000	,308*	,656**	
	Sig. (2-tailed)	,001	,000	,000	,	,038	,000	
	N	34	34	34	34	34	34	
Logistics	Correlation Coefficient	,341*	,371**	,321*	,308*	1,000	,556**	
	Sig. (2-tailed)	,012	,007	,023	,038	,	,000	
	N	34	34	34	34	34	34	
Customer support	Correlation Coefficient	,569**	,615**	,532**	,656**	,556**	1,000	
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,	
	N	34	34	34	34	34	34	

** . Correlation is significant at the .01 level (2-tailed).

* . Correlation is significant at the .05 level (2-tailed).

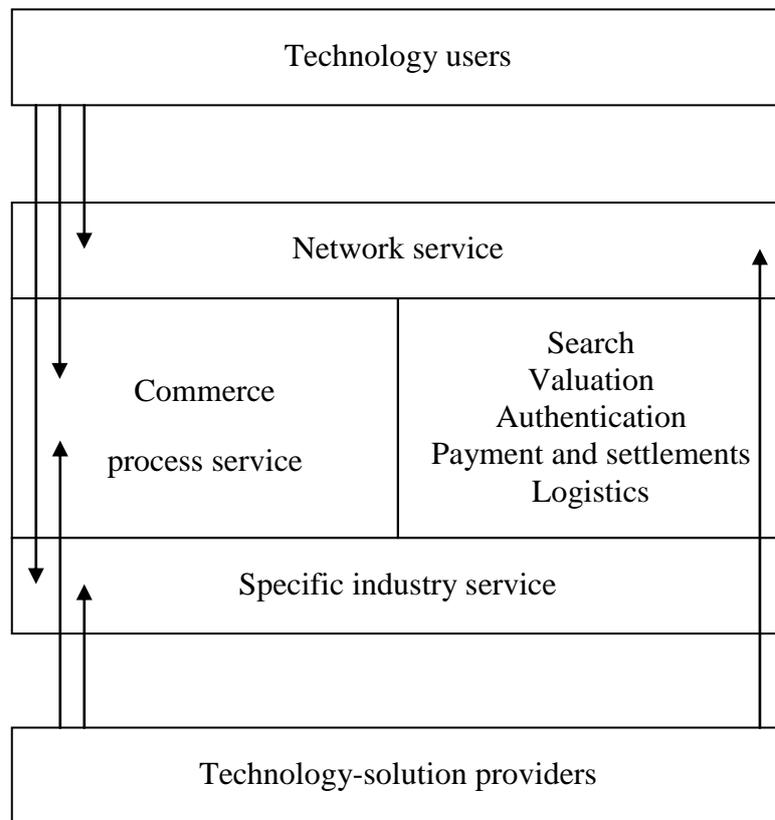


Figure 1. Electronic commerce architecture: network service, commerce processes service and specific industry service