VIRTUAL STORE ATMOSPHERE IN INTERNET RETAILING: MEASURING VIRTUAL RETAIL STORE LAYOUT EFFECTS ON CONSUMER BUYING BEHAVIOUR

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VIRTUAL STORE ATMOSPHERE IN INTERNET RETAILING: MEASURING VIRTUAL RETAIL STORE LAYOUT EFFECTS ON CONSUMER BUYING BEHAVIOUR

A thesis submitted for the degree of Doctor of Philosophy

by

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Στους γονείς μου Παναγιώτη και Χαρούλα,

στη γιαγιά μου Ελπίδα,

στα αδέλφια μου Ελπίδα και Ευριπίδη

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The following papers have been published (or have been accepted for publication) as a direct or indirect result of the research discussed in this dissertation:

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3. Vrechopoulos, A.P., Siomkos, G.J. and Doukidis, G.I. (2000), The Adoption of Internet Shopping by Electronic Retail Consumers in Greece: Some Preliminary Findings, *Journal of Internet Banking and Commerce*, 5, 2, available online at: http://www.arraydev.com/commerce/jibc/0012_02.htm

4. Pramataris, K.C., Vrechopoulos, A.P. and Doukidis, G.I. (2000) The Transformation of the Promotion Mix in the Virtual Retail Environment: An Initial Framework and Comparative Study, *International Journal of New Product Development and Innovation Management*, 2, 2, pp. 163-178.

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6. Pramataris, K.C., Vrechopoulos, A.P., Mylonopoulos, N., Papamichail, G. and Poylymenakou, A. (2000) Personalised Services and Promotions in Internet

Retailing. In Stanford-Smith, B. and Kidd, P.T. (Eds.), *E-business: Key Issues, Applications, Technologies,* IOS Press, pp.796-802.

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8. Vrechopoulos, A.P., Pramataris, K.C. and Doukidis, G.I. (1999) Utilizing Information Technology for Enhancing Value: Towards a Model for Supporting Business and Consumers within an Internet Retailing Environment. In Klein, S., Gricar, J. and Pucihar, A. (Eds.), *Proceedings of the 12th International Bled Electronic Commerce Conference,* Bled, Slovenia, pp. 424-438.

9. Falkou, X., Lytras, G., Pramataris, K.C. and Vrechopoulos, A.P. (1999) Putting the Consumer on "TOP": Traditional Online Products Store. In Pries-Heje, J., Ciborra, C., Kautz, K, Valor, J., Christiaanse, E., Avison, D. and Heje, C. (Eds.), *Proceedings of the 7th European Conference on Information Systems (ECIS),* Copenhagen Business School, Copenhagen, Denmark, June 23-25, pp.142-155.

10. Vrechopoulos, A.P., Siomkos, G.J. and Doukidis, G.I. (1999), Electronic Marketing: Information requirements and implications for retail management in the new millennium. In Agorastos, K. (Ed.), *Proceedings of the International Conference Preparing the Manager of the 21st Century,* Thessaloniki 16-18, Greece, pp. 55-66.

11. Pramataris, K.C., Vrechopoulos, A.P. and Doukidis, G.I. (1999) The Transformation of the Promotion Mix in the Virtual Retail Environment: An Initial Framework and Comparative Study. In Leng, P., Grant, S., Keane, J., Macaulay, L. and Wood, B. (Eds.), *Proceedings of the 2nd International Conference IeC' 99 - Innovation Through Electronic Commerce,* November 1-3, Manchester, United Kingdom, pp. 155-167.

ABSTRACT

The research presented in this dissertation is concerned with the effects of the "virtual store atmosphere" on consumer buying behaviour within the context of Internet retailing. More specifically, the focus of this research is to investigate whether the virtual store layout, as a major virtual store atmosphere determinant, affects consumer buying behaviour during shopping activity within a virtual grocery store over the Web. The present research is of a multidisciplinary nature and belongs to the field of Internet Retailing, in which there is not to date an exhaustive established theory available as the case is for conventional retailing. Therefore, the relevant literature covers the established theories in the areas of Marketing, Retailing and Consumer Behaviour along with current research in Internet retailing. Moreover, Human Computer Interaction (HCI) served as an important theoretical tool as far as Web site design principles and guidelines are concerned. The research hypotheses were mainly generated based on the conventional retail store layout literature review. They were tested through a laboratory experiment employing a causal research approach. To that end, a virtual retail laboratory store employing the three most common conventional retailing layouts (i.e., grid, free-form, and racetrack) was developed in three versions (i.e., one version per layout), following the concept and rules applied in each specific layout type. Therefore, the layout was the only manipulated variable (treatment), since all other potential influencing factors remained the same. The findings of the present study indicate that conventional retailing store layout theory is not applicable on its present form in the context of Internet retailing. Furthermore, the layout was found to affect consumer buying behaviour regarding "perceived usefulness towards searching for and buying shopping list products," "perceived ease of using the store," "perceived entertainment during shopping activity" and "time spent for shopping." However, it was found that the layout does not significantly affect "promotion effectiveness" and "impulse purchases." Based on the research findings, the "freegrid" layout (i.e., a new layout type) was introduced as an emerging layout for Internet retailing. The suggested layout contributes toward the Internet retailing theory development, as well as toward the provision of direct managerial implications. Finally, the present research provides several future research directions dealing with the virtual store atmosphere effects on consumer buying behaviour.

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CHAPTER 1. INTRODUCTION

The research presented in this dissertation is concerned with the effects of the virtual store atmosphere on consumer's buying behaviour within Internet retailing. More specifically, the aim of this research was to investigate whether the store layout factor affects consumer buying behaviour during shopping activity within a virtual grocery store over the Web. To set the scene of the subsequent analysis, this Chapter begins with a definition and an introductory discussion of the relevant background areas, followed by an overview of the theoretical background framing the current research. The detailed aims and objectives of the research are presented next. The Chapter ends by outlining the dissertation's structure to assist the reader in positioning each subsequent Chapter within the overall research framework.

1.1. Research Background

1.1.1. Electronic Marketplace and Internet Retailing Dynamics: The Role of Information Processing and Information Technology

The enormous growth of the Internet, and especially the WWW, as several researchers note (Hoffman et al. 1995, Ricciuti 1995, Kalakota and Whinston 1996), led to a critical mass of consumers and firms participating in a global online marketplace. An "electronic marketplace" is created when an information system can serve as intermediary between buyers and sellers in a vertical market (Bakos 1991, 1997). Such electronic market systems typically reduce the information (search) costs for buyers (i.e., costs related to information about product offerings and prices in the market), consequently affecting market's efficiency and competitive behaviour.

Malone et al. (1987) first addressed the basic strategic issue of the effects that advances in information technology have on the firm and market structures. They claimed that new information technologies allow closer integration of adjacent steps on the value-added chain through the development of electronic markets and hierarchies.

The information processing requirements of companies are expanding as their competitive environment changes, becoming more dynamic and unstable (Child 1987). Similarly, as modern organisations operate around business processes rather than

functional hierarchies (Rockart and Short 1989), they are faced with specific needs for new kinds of Information Systems in Marketing and Retailing (Talvinen and Saarinen 1995).

The emergence of electronic markets is associated with three major effects of the use of information technology (Malone et al. 1987):

(a) electronic communication effect: IT dramatically decreases the costs of communication;

(b) electronic brokerage effect: through a central database, the number of product alternatives that consumers consider increases, along with the quality of the alternative selected by them, whereas the cost of the entire product selection process decreases;

(c) electronic integration effect: a supplier and a procurer use IT to create joint processes at the interface between value-added stages; as a result, time is saved and errors are avoided (since data need only be entered once).

Rayport and Sviokla (1994, p.142) stated that, "the virtual market in cyberspace, in which information is handled, processed and utilised can be referred to as marketspace and can be seen as an artificial, intangible market for information." Furthermore, information is the basis of the specialised marketing in the marketspace, referred to as "information-based" marketing (Weiber and Kollmann 1998). Facilitating the exchange of this information is, according to Bakos (1998), one of the three main functions that characterise markets (electronic or otherwise). In addition, the cost of communicating and processing information (essence of coordination cost) decreases by the use of Information Technology while, as presented above, more information is allowed to be communicated in the same amount of time, termed as electronic communication effect (Malone et al. 1987). The future is in delivering information about customers to all the parts where customers interact with retailers (Rowley 1999) and, furthermore, "be able to identify them when they get in touch via the Internet or kiosk" (Field 1997, p.46). Kambil (1997, p.56) suggests that "in order to remain competitive, firms must understand the implications of the information-rich infrastructure the Internet provides". However, Deighton (1997) claims that the dynamically evolving nature of the Internet has made it difficult to predict its impact on marketing communications, transactions, and distribution.

The Internet is continuously developing more and more into an actual marketplace, where all the stages of a commercial transaction can be handled in the virtual arena

(Strausak 1998). Traditional interactions in the marketplace are becoming transactions in the "marketspace," which are different in terms of content, context and infrastructure of the transaction (Rayport and Sviokla 1994). Choudrie et al. (1998) claim that as the popularity of Internet increases, a dynamic development of Electronic Commerce, in particular Electronic Retailing, is occurring. Electronic retailing is built on the information superhighway and is also referred to as electronic marketplace, interactive television or electronic mall (O'Connor and Galvin 1997).

According to Pawar and Sharda (1997, p. 110) "...the Internet is a gateway to vast and varied information and it could revolutionise the way organisations seek and use information." They state that external information is a key input in strategic decision making and that the external environment of a firm consists of two parts: (a) immediate task environment and (b) general environment. Customers and business partners (suppliers) belong to the immediate task environment and there is a need to identify in detail all the required pieces of information in a large and industry-time specific list, in terms of applicability. Furthermore, as Vrechopoulos et al. (1999) note, marketers will have to place their emphasis on obtaining accurate and timely information about customers and on providing precisely the type and level of service that customers want. Therefore, the key research issue is what type of information is required to support the customers during their interaction with the system. Furthermore, important research issues include the ways that this information should be collected, processed, and exploited within the retail sector over the Internet.

Kannan et al. (1998) support that Internet retailing facilitates the instantaneous exchange of up-to-date information about products, services, and market transactions, as well as the efficient collection of information about customer needs, interests and demographics. Furthermore, it enables the direct contact both with suppliers and customers, the provision of advanced customer service, the application of one-to-one marketing techniques, etc. For example, Ceneral Electric and Cisco are leveraging the Internet in order to redefine marketing channels and customer communications to provide rich information, receive orders and gather detailed customer profiles (Kambil 1997, p.57).

The fact is that Internet adoption is growing at an unprecedented pace, being deployed more rapidly than any new technology ever. The birth of WWW in 1993, particularly its graphical user interface, offered enormous opportunities which were previously unimaginable (Poon and Jevons 1997). Gordon (1998) predicts that the Internet will be a vital vehicle in customer communications for the next several years. In general, the

networked communication form can be utilized in the design of new products, marketing strategy and innovation of contents never existing before (Berthon et al. 1996a, Bush et al. 1998). It can also determine new capabilities and new ways to carry communicational contents that traditional media can not do (Baty and Lee 1995, Hoffman and Novak 1996, Srivastava et al. 1984). In particular, Web's unique forms of interactivity have contributed to its rapid diffusion as a commercial medium in recent years. Internet has a significant advantage over all other interfaces between retailers and customers since it puts greater power and control on the hands of the customers. Customers can control the nature of the relationship, the way products are structured and the way products and services are promoted and presented (Field 1996).

With projections that businesses will exchange goods and services over the Internet worth over $3.2 trillion in the year 2003 (Forrester Research 1998), and with surveys reporting that 75% of respondents in the United States already purchase online from home (eMarketer 1999), online retailing raises many research questions about how to effectively market on the Net.

Consequently, several important research questions are raised about business strategy, technical infrastructure, government policies, the electronic market demographics, as well as about the ways people will use technology (Lohse and Spiller 1998).

Perhaps, the entire consumer products industry is in a state of a major transition. This transition is a function of a complex mix of consumer, technological and marketplace factors (ECR Report 1996). At the moment, a growing number of retailers has successfully implemented electronic commerce solutions. The experience of these early adopters provides valuable insights into how new value chains are constructed (Aldridge 1998). Amazon.com has become the third largest bookseller in the U.S., despite being in business only since 1995 (Lohse and Spiller 1998). Bill Gates (1995), Microsoft's CEO, predicted that by the year 2005, one third of food retailing will be conducted electronically. According to the Ernst & Young Special Report for Global Online Retailing (2000), 39 million people in the United States shopped online in 1999, up from 17 million in 1998. According to the same report, in Europe, some 8.3 million people shopped online in 1999, up from 5.2 million in 1998. Moreover, online retail sales, as a proportion of total sales, is higher in the UK than in any other European country except Sweden, growing by 280% in 1999 (Boston Consulting Group, 2000). Based on the results of a consumer survey, respondents estimated that Electronic Commerce will account for 5%-10% of the total volume of groceries in 2010 (Heikkila et al. 1998).

Research Firms	Year				
	2000	2001	2002	2003	2004
eMarketer	$60	$101	$167	$250	$428
Forrester Research	$53	$96	$169	$284	$452
Gartner Group	-	-	-	$380	-
Goldman Sachs	$238	$494	$870	$1,392	$2,134
IDC	$59	-	-	$213	-
Merill Lynch	$218	$398	$734	$1,317	-
Ovum	$29	$49	$81	$133	$219

Source: eMarketer (2001)

Table 1: Comparative Estimates: Worldwide B2C eCommerce Revenues, 2000-2004 (in billions)

eMarketer's eCommerce B2C report (2001) has combed through data from all the major research firms regarding B2C eCommerce revenue estimates from 2000 to 2004. Based on these data, the potential and the dynamic character of B2C eCommerce is clearly shown in Table 1.

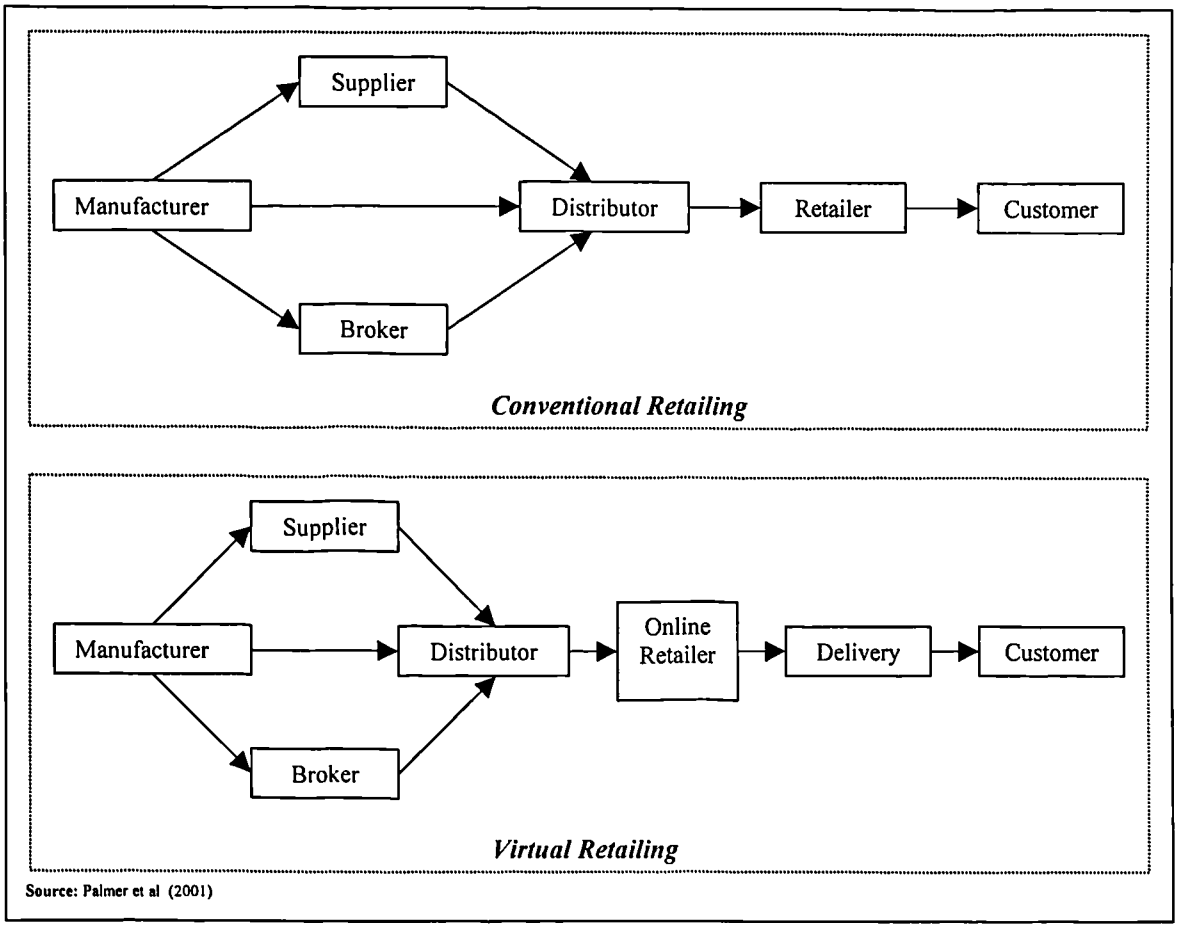


Figure 1: Traditional and Online Retail Supply Chain Comparison

According to Business Week (1998), the online grocery shopping is expected to reach $34 billion by 2002, while according to Palmer et al. (2000), the global market for groceries in 2000 was over $2 trillion of which only $300 million was online. However,

virtual retailing as an effective alternative shopping method will probably not take the place of conventional retailing. It will rather serve those customers that prefer to conduct shopping remotely and electronically through an intelligent business-to-consumer interface. Furthermore, Palmer et al. (2000) conducted a comparison among traditional and online retail supply chain.

As clearly shown in Figure 1, the delivery "ring" was inserted in the traditional retail supply chain, therefore enhancing, customer service through "distance shopping/ordering" and "home delivery" capabilities.

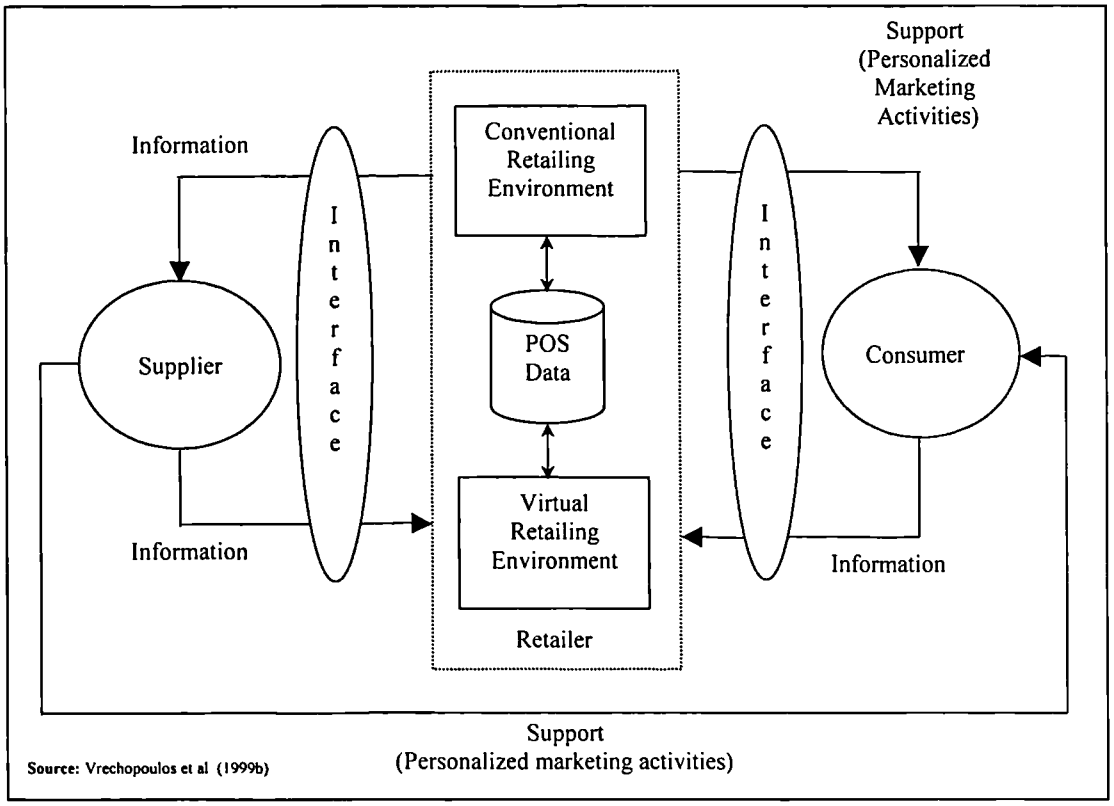


Figure 2: The Internet Retailing Business Environment

A typical Internet Retailing environment incorporates business-to-business and business-to-consumer information exchange relationships in the form presented in Figure 2 (Vrechopoulos et al. 1999b). In such an environment, the potential that the collection of integrated data can offer and the benefits that can accrue from the utilisation of the new available information should be appreciated. To that end, a comparative study of the features of twelve virtual retail stores currently operating on the Web showed that there is still ample room for development and improvement in exploiting the full potential of the capabilities offered in that information context towards providing effective and supportive shopping environments (Pramataris et al. 2000a). Thus, it is important to

understand the key data, how and when these should be collected and, most importantly, the way in which they support Web site customers and visitors. This understanding requires knowledge and evaluation of consumer's requirements, continuous and systematic study of consumer's behaviour in the store, as well as the collection and analysis of data created by him/her (Vrechopoulos et al. 1999a).

Doherty et al. (1999) examined the use of the Internet in the UK retail sector and its potential as a new retail channel. They identified the following advantages of the Internet as a retail channel: (a) accessibility, (b) direct communications, (c) cost savings, and (d) additional sales through existing customers or new ones from the same or new markets. As far as retailers' perceptions of Internet's comparative advantages are concerned, the same study showed that they unanimously agree that the Internet provides market development opportunities through the many services that it offers to customers and their accessibility to wider markets.

However, despite the many unresolved problems, retailers are showing an increasing interest in the Internet as one of the world's fastest growing markets (Rowley, 1996). Early research results indicate that the use of the Internet for retailing purposes is very promising (Choudrie et al. 1998). Internet retailing continues to grow rapidly in terms of its adoption. The great opportunity for virtual retailing also arises from the fact that up to 20% of a product's price may represent costs of running retail stores (O'Connor and Galvin 1997). Schneider (1994, p.37) forecasted that in virtual retailing, "being a merchandiser will be far more important and far different than it is in the real world." Essentially, in virtual retailing the store will be bypassed. The idea is how the virtual retailer and merchandiser will manage to draw customers into the virtual store and provide them with a satisfying shopping experience. It is obvious that simply putting pictures of products from a catalogue to a TV screen will not be enough. Many consumers visit stores to satisfy product, social or entertainment needs. For that reason, retailers develop community atmospheres in their stores in order to satisfy social or entertainment consumer needs. Therefore, virtual retailing would have to provide consumers with "significantly better, faster, less expensive, or more entertaining shopping experiences" (Schneider 1994, p.38). In other words, virtual retailing fits the needs of many consumers who consider conventional shopping an unpleasant and inconvenient experience.

Morgan & Stanley's "Internet Retailing Report," (1997) states that the Internet will be the next mass medium since it has the potential to become a powerful new distribution

channel for retailers. According to the same report, the Internet provides great one-to-one customized marketing (i.e., a vendor's ability to interact with users at the point where they view a site's advertisements and content). Internet consultants believe that first-mover advantages for Web retailers will be important. According to the same report, the following markets were found to have the best potential for Web retailing: insurance/financial services, computer software/hardware, travel, books, magazines, music/video, flowers/gifts, and autos. Specific retail categories that may take longer to develop, although they have the greatest potential for mass markets, include: groceries/food, apparel, sporting goods, tools/home repair, and toys.

On-line markets differ significantly from "classical" or physical markets in a number of structural aspects while offering advantages which other channels cannot easily replicate. It is apparent that virtual retailing completely solves many of the typical problems that shoppers face while conducting their shopping in conventional stores. To just name a few, virtual store shoppers avoid: the hustle of parking outside the store or reaching the store by public transportation, too much time spent and experience of difficulty with locating the products of interest to them inside the store, crowding in the store aisles or the store entry/exit, much time spent in queues in the check-out counters/cashiers, and so on (Markham 1998).

Conclusively, continuous monitoring of consumer behaviour on the Web along with the exploitation of information about consumer profiles, preferences and navigation/shopping habits, gathered through an intelligent interface, facilitate retailers and suppliers to design effective marketing strategies and reach final consumers at a more tailored, personalized and effective way (Vrechopoulos et al. 1999a). However, information on a Web site must be presented in a manner that respects both the medium's possibilities and its limits (Hewitt 1998). This implies that the strategic decision regarding the information content provided to customers along with the display techniques employed to present this information, should be supported by a thorough consumer analysis in order to exploit the Web capabilities in an optimum manner.

1.1.2. Digital Marketing and Online Consumer Behaviour

Information Technology developments enable retailers to focus their marketing efforts on managing their customers more effectively (Mulhern 1997). The Internet, as an

Information Technology outcome, is an extremely fast moving and rapidly changing environment (Ainscough and Luckett 1996) and according to Paul (1996), its role as a marketing tool is something that businesses must consider.

Based on the findings of ECR Europe Report (1999) which focuses on the Retailing sector in general, traditional marketing mix is no longer sufficient to generate growth and it is no longer the case that the application of classic marketing tools is sufficient to achieve a competitive edge. More specifically, as far as Internet Retailing is concerned, Poon and Jevons (1997) state that application of marketing techniques which have proven successful in traditional media, offered disappointing results on the Internet. Furthermore, Aldridge (1998) states that the Electronic Commerce model requires a very different approach to customer acquisition, support, promotion, merchandising and distribution.

The Web as a virtual hypermedia environment, incorporating interactivity with people and computers, represents a revolution in marketing (Hoffman and Novak 1997). However, it is apparent that marketing is a 'virgin' territory from a technological viewpoint and is underutilised as a business weapon (Kalakota and Whinston 1996). Several researchers (Bovee et al. 1995, Hamill and Grecory 1997, Poon and Jevons 1997, Quelch and Klein 1996) have already identified the need for a paradigm shift to pursue marketing on the Internet.

Turaif and O'Keefe (1998) support that traditional marketing is separated from marketing in Electronic Commerce. Even though marketing was traditionally consumer-driven, the strategic role of the consumer in the Internet environment reshapes the meaning of the marketing concept. The fact is that interaction is becoming the "name of the game" and technology enabled, people want to participate rather than just passively be receiving marketing communication messages as the case is in conventional retailing (Hawkins et al. 1998).

Turban et al. (1999) suggest that Electronic Markets capitalise on the general movement from a market-centric to a customer-centric environment (Figure 3) and therefore, customer research is critical to the success of any market (Turaif and O'Keefe 1999, Berthon et al. 1996b, Hoffman and Novak 1996). However, consumer behaviour in electronic retailing has not yet been the subject of much research (Hoffman and Novak 1997). As a result, little is known about online-customers characteristics and the factors

influencing their purchase decision (Sieber 1999). Thus, a key task for electronic commerce is to identify who the actual and potential customers are.

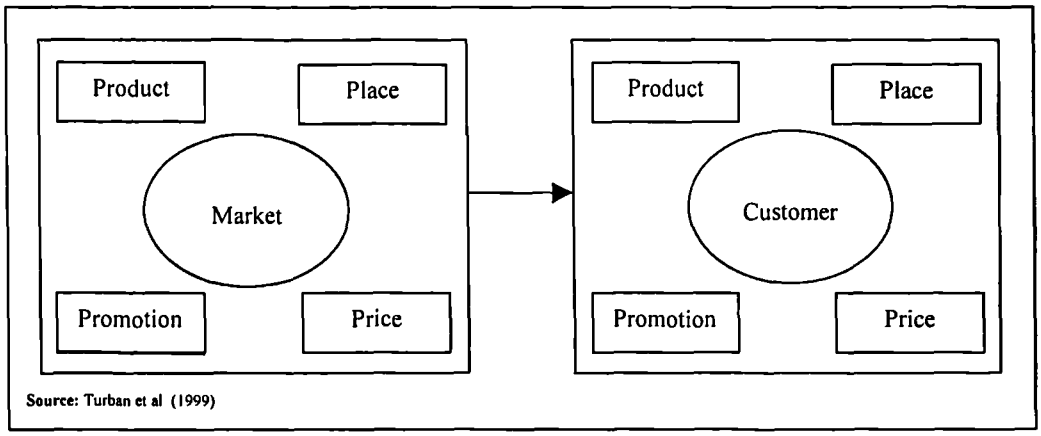


Figure 3: Movement from a Market-Centric to a Customer-Centric Environment

Based on the STP Marketing process (segmentation-targeting-positioning), adopted by every modern organisation today, customers constitute a basic source that provides the requirements to the organization regarding the development of marketing strategies (Kotler 1997). More specifically, input provided by customers should be effectively utilized for the development of every element of the marketing mix. Thus, thorough knowledge of consumer behaviour, coupled with advances in technology, enable marketers to target customers on a more personalised, customised and segmented basis (Petrison et al. 1997). Therefore, consumer behaviour must be thoroughly investigated towards the design and implementation of effective marketing strategies tailored to the peculiarities and capabilities of the new shopping medium and on the needs and wishes of online customers. However, the Web shopping environment constitutes a completely different environment in terms of marketing communication capabilities. On the other hand, customers visiting a Web shopping environment behave differently than when visiting a conventional shopping environment (Bellman et al. 1999). All the aforementioned evolutions generated by Web's peculiarities as a shopping medium, have created a strong need for research in this area in order to develop new marketing strategies and guidelines for business effectiveness over the Net.

According to Granitz and Ward (1996) and O'Connor and Galvin (1997), the phenomenal growth of the Internet in the last few years may generate a new subculture, that of Web users. It is already sufficiently documented that Web-consumers are well-informed and very demanding regarding services offered to them, seeking high quality information and treatment (Scribbins 1999). Furthermore, Scultz and Baily (2000, p.50) state that "in today's marketspace the consumer is gaining more power as new

distribution systems are driving price down, making access to both products and the information needed to compare alternatives easier". However, before the introduction of the World Wide Web, Herbing and Day (1992) had stated that the failure of retail innovations (e.g., home banking and home TV shopping), to catch on with consumers has been attributed to the tendency of developers to take a technology-centered view. Similarly, Burstein and Kline (1995) argued that retailing over the World Wide Web faces the same problem.

1.1.3. Human Computer Interaction within the Web Shopping Environment

Shackel (1984) claims that there is no comprehensive and generally accepted manual on how to design good human factors into computer systems. However, the penetration of the World Wide Web in the global business environment as a new and very promising shopping medium has raised a clear need for research towards providing effective shopping interfaces. More specifically, the investigation of Web's interface role as a critical success factor for business effectiveness over the Net along with the provision of principles and guidelines for usable and effective Web site design, constitutes a challenging research opportunity for both businesses and academics. Current research is also focusing on the identification of those Web interface factors that affect consumer buying behaviour during the shopping activity (Jarvenpaa and Todd 1997, Eroglu et al. 2000, Lohse and Spiller 1998 and 1999, Elliot and Fowell 2000, O' Keefe at al. 2000, etc.). Several relevant research studies are thoroughly discussed in Chapter 2.

Along the same lines, Lohse and Spiller (1998) support that the promise of electronic commerce and online shopping will depend to a great extent upon the interface and the way that people interact with the computer, i.e., the online shopping experience. They also state that as the user interface design is an essential link between the customer and the retail store in Web-based shopping environments, the growth of Internet retail sites will depend on the interface design issues. In other words, they state that "designing online stores with effective customer interfaces has a critical influence on traffic and sales" (p.81).

Apparently, there are large differences between a physical store and its electronic counter-part. A help button on the home page of the Web shopping site replaces the sales clerk's friendly advice and service. The familiar layout of the physical store becomes a maze of pull-down menus, product indices, and search features. However, a

Web storefront is very important for customer satisfaction within the process of online shopping. The design of a successful Web storefront constitutes a critical success factor to any online store (Gehrke et al. 1999).

As the Internet can provide an one-to-one shopping experience instead of an one-to-many (as the case is in conventional retailing), the issue of designing personalised shopping interfaces constitutes a challenging research and business opportunity. Pramataris et al. (2000b) claim that the ultimate objective of any personalisation effort on Web retailing should be placed on the enhancement of the shopping experience and on the level of service offered to the site's customers. They also state that this is probably the best argument to convince customers to disclose their personal information and revisit the site.

Great emphasis is placed at the moment on usability issues towards the provision of effective Web site design principles and guidelines. In the Web context, the term "usability" covers aspects that influence a site's ease of use (Spool et al. 1998), navigability (Horgan 1996), consistency of functionality across pages (Nielsen 1999a) etc. The "usability" attribute is highly valued by users, as it ensures that they can actually use the "product" (Nielsen 1994). Dix et al. (1998) propose that the usability principles are divided into three main categories: (a) learnability, (b) flexibility and (c) robustness. Nielsen (1994, 1997a) supports that given the great number of Web sites that a user might visit even daily, the demands for good usability are probably higher for WWW user interfaces than for normal user interfaces. However, as the capabilities of this new shopping medium allow for the design and development of shopping interfaces tailored to the needs and wishes of each specific customer, there is ample room for research in this area. This implies that usability principles and guidelines for effective Web site design should be supported by research initiatives investigating the factors that affect consumer buying behaviour within a Web-based shopping environment.

Dix et al. (1998) also state that the appropriate interface layout is important in all applications and the issue of presentation has been around for many years, long before computers, interactive systems or HCI. Both Web architecture and interface designs have a common important goal, i.e., to create livable, workable and attractive environments (Mountford 1995). In addition, Baty and Lee (1995) supported that limited menus, poorly designed navigation and difficulty in comparing multiple products on the same screen, have adverse effects on electronic shopping. Furthermore, Loshe and Spiller (1998) supported that virtual retail stores' convenience features (e.g., store

layout, organizational features, ease of use) help manage customer expectations and strongly encourage future research in this area.

According to Nielsen (1996a), "designers of Web stores should be succinct, keep the text short, aid scanability, using informative headlines, make judicious use of white space, and use multiple levels of headings, highlighting and color text as visual cues." Furthermore, Nielsen (1995) states that the unconstrained use of multimedia results in user interfaces that confuse users and make it harder for them to understand the information. Websites need to have all the information and services users want and care should be taken to provide a "high-touch" feeling in addition to the "high-tech" image of a WWW site (Nielsen 1994 and 1997a). Finally, Nielsen (1996a) suggests that much information can be hierarchically organised, and an explicit representation of the hierarchy can be added to the top of the page to provide additional context and navigation options.

According to Palmer and Grifith (1998, p. 49), "the full utilization of the Web, both in terms of marketing activities and technical characteristics, will place a firm in a competitive position upon entering the next century." They introduced a model of marketing on the Web which addresses the basic marketing functions and the Web site characteristics (Figure 4). As presented in this model, Web site design is strongly interrelated with the employed marketing functions in the sense that the technical characteristics of the Web site (i.e., navigability, hyperlinks, etc.) constitute the medium through which marketing functions could be effectively implemented.

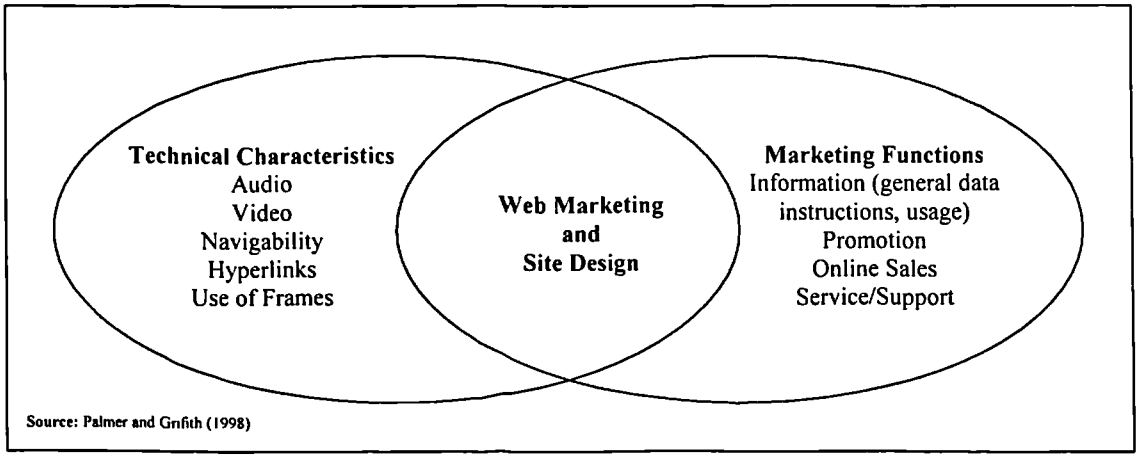


Figure 4: Emerging Web Marketing Model

Finally, according to Lohse and Spiller (1998, p.81) "it is important to look at the relationship between sales and user interface design." They measured 32 interface

features for 28 online retail stores and identified store design features that influence online store traffic and sales. For example, they found that the number of products on the Website had no effect on sales. Furthermore, Jarvenpaa and Todd (1997) offered insights on Human Computer Interaction factors known to affect consumer behaviour and suggested ways to improve retail Web sites.

1.2. The Theoretical Background

It is evident that the Web shopping environment constitutes a critical success factor for business effectiveness over the Internet. Correspondingly, as far as conventional retailing shopping environment is concerned, there is a well established theory regarding the role of store atmosphere as a major influencing factor of consumer buying behaviour within the store. Research insights regarding conventional retailing shopping atmosphere presented below, along with the findings of current online research being conducted investigating consumer buying behaviour over the Web, constitute the basic theoretical background of the present study.

1.2.1. Conventional Store Atmosphere and Consumer Behaviour

Kotler (1973-4) considered store atmosphere as one of the most important influencing factors of consumer perceptions and attitudes of a store and defined it as "the conscious design of the store space in a way to generate specific influences on its clients or shoppers." According to Lewison (1994), store atmosphere is the overall emotional and aesthetic effect which is created by a store's physical features. Donovan and Rossiter (1982) suggested that store atmosphere evokes emotional reactions which, in turn, affect consumer attitudes toward the store and their behaviour within it. More specifically, such effects on consumer's buying processes might include: (a) spending more money than initially planned, (b) shopping in the store with enjoyment, (c) talking with sales personnel willingly, (d) spending time browsing and exploring the store's offering, and (e) returning to the store.

Donovan and Rossiter (1982) also argued that retail store selection studies have emphasized cognitive influences (e.g., location, quality of merchandise, price) and neglected the influence of store atmosphere. They also found that emotional responses, which are induced by in-store environments, constitute primary determinants of the extent to which individuals spend money beyond their original expectations.

The influence of store atmosphere on consumer's behaviour has been the subject of many research studies. For example, Bruner II and Gordon (1990) studied music as an influencing factor of in-store consumer behaviour. Music was found to be a strong stimulus that directly affects consumer mood and indirectly influences consumer behaviour.

There are many factors that determine the store atmosphere in conventional retailing. According to Lewison (1994), the psychological impressions a store makes on consumers depend on ***(a) store images*** (e.g., storefront, layout, etc.), ***(b) store atmospherics*** (e.g., sound, scent, etc.) and ***(c) store theatrics*** (e.g., décor themes).

1.2.2. Transforming Physical Store Environment to a Web Shopping Interface

Electronic Commerce comprises a completely new environment, offering the appropriate background for challenging and innovative research initiatives. Therefore, many disciplines are currently very active within its context (e.g., Marketing, Economics, Sociology, etc). Existing models and well-established theoretical frameworks are tested within Electronic Commerce environment in order to investigate whether they are applicable in their current form or should be transformed and adapted to the new conditions, providing therefore the starting point for research in this new field.

In other words, existing knowledge supports research initiatives within Electronic Commerce especially for disciplines other than Information Systems. For example, in Marketing, many researchers have investigated whether the traditional marketing mix model can be effectively applied in the virtual environment and concluded that "Information Processing" should be characterised as the fifth "P" within an Electronic

Commerce environment, along with price, place, product, and promotion (Hamill and Grecory 1997, Hoffman and Novak 1997).

Correspondingly, the focus of this research is to apply the conventional retail store atmosphere model to the Web environment and measure the effects of the virtual retail store atmosphere on the online consumer's buying behaviour. The conventional store atmosphere model served as a tool towards transforming existing and well documented influencing store atmosphere determinants of conventional retailing to the Web environment, incorporating however key Web determinants (e.g., speed, personalization, etc). Consequently, Web peculiarities set several constraints regarding the factors that should be examined as potential influencing factors of consumer's buying behaviour. For example, the fact that the Web enables one-to-one communication, as opposed to conventional retailing's one-to-many communication, constitutes one basic difference, which should be undoubtedly incorporated in the list of factors that should be investigated under the label of "personalization."

The fact is that the virtual store environment is not yet sufficiently supported by a corresponding to conventional retailing's "store atmosphere model." Currently, however, many researchers are attempting to identify the respective virtual store atmosphere determinants and measure their effects on online consumer behaviour (Lohse and Spiller 1999, Jarvenpaa and Todd 1997, Elliot and Fowell 2000, Eroglu et al. 2000, Eroglu and Machleit 2000, Eroglu et al. 2001).

Based both on the findings of these research initiatives and on the conventional retailing theory presented above and thoroughly discussed in Chapter 2, it is concluded that the variables/factors that proved to affect consumer buying behaviour within a Web shopping environment are too many, as they actually are also in conventional retailing. To that end, Vrechopoulos et al. (2000) introduced the VIrtual REtail STore Atmosphere Model (VIRESTAM), which is based both on the store environment/atmosphere model of conventional retailing (Lewison 1994) and on Lee's comprehensive model of Internet consumer satisfaction and brand loyalty (included in Gehrke's et al. 1999 study). This model (described in Chapter 2) was adapted, therefore, to the Web by incorporating the key Web driven determinants (e.g., speed, security, etc).

It is apparent, however, that one study cannot include and thoroughly investigate the effects of all virtual store atmosphere factors on consumer buying behaviour. The present research therefore, is focusing on one of the relevant variables, i.e., the layout

factor, and more specifically measures of the impact and effects of the Web retail store layout on consumer buying behaviour. The decision of selecting the layout as the variable under study, was based on the fact that in conventional retailing, selling floor layouts (part of store image and store internal impressions; see Figure 5) are extremely important because they strongly influence in-store traffic patterns, shopping atmosphere, shopping behaviour, and operational efficiency (Lewison 1994, p.289). In addition, according to Lohse and Spiller (1998), virtual retail store layouts help towards effectively manage customer expectations. Based on that, they strongly encourage future research in this area.

According to Lewison (1994) and Levy and Weitz (1998), there are three basic layout patterns (i.e., grid, freeform and racetrack), each one employed to serve particular types of stores in conventional retailing (e.g., grid layout is employed by grocery stores as it proved to facilitate planned shopping behaviour).

In order to investigate on the one hand, whether Web consumers have particular preferences for a specific type of virtual store layout or not, and on the other, to investigate whether there could be an "effective" store layout for a particular store event (e.g., promotion of products), a decision was made to analyse, design and adopt the three conventional store layout types (i.e., grid, freeform and racetrack) to the Web environment. To do this, a laboratory virtual store was developed incorporating the three conventional layout patterns. In other words, a virtual store was developed in three alternative versions each one employing a different layout (i.e., grid, free-form, racetrack). More specifically, this online store was developed following three basic rules:

- Transform the precise concept and navigation rules that govern each layout type in conventional retailing to their corresponding layout patterns in the virtual lab-store.

- Keep distinct differences among the three virtual layouts as it also stands in conventional retailing.

- Keep all other variables (e.g., background colour, banners, product images, buttons) the same in order for the layout to be the only differentiating factor among the three alternative versions of the laboratory virtual store. Through

that, it was ensured that the only effects of the virtual lab store environment on consumer's buying behaviour, was those caused by the different layouts.

In sum, effort was placed to "transform the physical world to the virtual one," and test through the employment of a laboratory experimental research design (causal research), whether there are significant differences among the groups of subjects that visited the three different layouts (between groups experimental design – Chapter 3). The layout was the moderating factor (i.e., the manipulated variable of the experiment) and the objective was to measure its effects on the dependent variables (e.g., perceived usefulness, ease of use, etc).

1.3. Research Objectives and Questions

This dissertation researches the issue of the "virtual store atmosphere" as a major determinant for business effectiveness over the Web. It focuses both on conventional and Internet-based Marketing, Consumer Behaviour and Retailing literature. Based on the theoretical insights provided from these disciplines, as well as on the Human Computer Interaction principles concerning effective Web site design, this dissertation placed particular emphasis on the identification of the key virtual store atmosphere components/determinants and the investigation/measurement of their effects on consumer buying behaviour within an electronic shopping environment over the Internet. Relevant type of research conducted so far both in conventional and virtual retailing, measuring the effects of store atmosphere determinants on consumer buying behaviour, leads to the following basic research challenges:

- Which are the key determinants of the virtual store atmosphere over the Web? In other words, which factors (corresponding to conventional retailing or new ones) determine the virtual store atmosphere?
- How should the virtual store atmosphere be designed and developed in order to positively affect consumer buying behaviour?
- What are the effects that each of the virtual store atmosphere determinants has on consumers' buying behaviour and how could these effects be measured?
- Do Web-consumers have any particular preference for any store layout or not? If yes, which are these preferences and the effects of different virtual store layouts on consumer buying behaviour?

Based on all the above, the core research objective of the dissertation is to investigate the role of the virtual store layout structure as a major determinant of the virtual store environment/atmosphere and to measure its effects on consumer buying behaviour. Thus, the basic research objective of the present study is to develop a theoretical framework regarding the effects of the virtual retail store layout on consumer buying behaviour within an Internet retailing shopping environment. The following issues refer to the expected contribution of this research:

- Provide a theoretical framework regarding virtual store atmosphere determinants focusing, however, on virtual store layout related issues. It is, therefore, expected that the present study will contribute to the Internet retailing theory building.

- Provide valuable and direct managerial implications regarding the "optimum layout pattern" that a virtual retail store should employ and offer to its customers in order to satisfy them and meet its marketing objectives (e.g., facilitate shopping, increase impulse purchasing, etc).

- Provide future research perspectives and directions so that researchers can use the present research as a guide/research tool towards measuring the effects of other variables (e.g., sound, colour, theatrics, etc) on consumer buying behaviour. Another research dimension deals with the alternative to measure these effects in different business sectors (e.g., bank, tourism, etc).

The research, therefore, focuses on the following specific research questions:

- Does the virtual grocery store layout over the Web significantly affect consumer buying behaviour? If yes, how? More specifically, does it affect:
  - perceived usefulness in identifying desired/shopping list products?
  - ease of using the store?
  - perceived entertainment during the shopping activity?
  - time spent for shopping?
  - promotion effectiveness?

- impulse purchasing?

- Should the conventional retailing store layout theory be applied on its present form in the context of Internet retailing or should it be transformed?

- Can an optimum layout pattern preferred by the majority of Web-customers be developed for Internet retailing?

1.4. Dissertation Outline

This dissertation's structure consists of seven Chapters, each one addressing a distinct point in carrying out this research. The first Chapter (Introduction) presents a brief account of the research background by addressing some of the key concepts that will be discussed in detail in the rest of this volume. Furthermore, this Chapter introduces the objective and scope of the research in order to inform the reader about the contents and structure of the work.

Having discussed the basic concepts and drivers of the research, Chapter 2 (Literature Review) provides a more in depth analysis of the theoretical framework supporting the current research. Marketing and Consumer Behaviour towards Internet Retailing along with Retail Management and Human Computer Interaction disciplines are thoroughly reviewed. Furthermore, indicative online consumer behaviour studies are presented. The objective of this Chapter is to present the current status and guidelines of these disciplines towards Internet retailing. At the end of this Chapter, the reader will be able to thoroughly recognize the research need towards investigating online consumer behaviour through measuring the effects of the virtual store layout on it. Emphasis was also placed in documenting the need of a multidisciplinary research approach towards Internet Retailing and more specifically towards developing theory as far as virtual store atmosphere for Web shopping environments is concerned. Finally, based on the literature review insights, an initial model of the virtual store atmosphere is introduced which contributes towards the generation of the specific research question and the corresponding development of the research methodology.

The research methodology is analytically presented in Chapter 3. The first part of the Chapter includes the research hypotheses developed based on the theoretical insights provided in Chapter 2, followed by the research methodology developed to test these

hypotheses. It should be noted that as this research comprises a "hybrid" type of research, emphasis was placed on thoroughly documenting each one of the steps involved so that both the validity and reliability of the results are enhanced.

Chapter 4 presents an initial research effort conducted along with the literature review. The decision for conducting this initial research was taken as soon as literature review started to reveal potential challenging opportunities in the field of Internet retailing. More specifically, this initial research included two separate research designs, one focusing on consumer behaviour towards Internet shopping and the other on investigating current Web interface environments, placing emphasis on their employed layout. The findings of this initial research supported, stimulated and documented the need for thorough examination of the main research topic of this dissertation. Furthermore, the initial research contributed to the decision regarding the research design selection (Chapter 3). In addition, it served as an effective tool (supplementary and supportive of the literature review) for collecting know-how as far as Internet retailing landscape is concerned, through the investigation of the behaviour of its two key-players: consumers and businesses. Finally, initial research results serve as a tool towards the effective adoption and exploitation of the main research findings by virtual retailers.

The methodology followed for the development of the virtual laboratory store in three alternative layout versions, is presented in Chapter 5. Emphasis was placed on documenting every action taken towards the development of the virtual store. However, some concessions were made in cases where there was not any relevant literature to support specific actions. This laboratory virtual store constituted the research vehicle employed to test the research hypotheses. Therefore, the development of the virtual store was a prerequisite towards testing the respective hypotheses developed.

Chapter 6 includes the analysis of the experiment results. The first part of the Chapter discusses the pilot findings and the corresponding changes raised through testing the data collection instrument and the laboratory store. The Chapter proceeds with the analysis of the main experiment results. Except the research hypotheses' testing through the use of the appropriate statistical tools, there are also some other interesting findings discussed. At the end of this Chapter, emphasis is also placed on combining the quantitative with the corresponding qualitative analysis findings in order to explain and enhance the quality of the results.

The conclusions and the implications of the study are discussed in Chapter 7. The contribution of the present study is discussed in this Chapter in a structured approach. Firstly, this Chapter is dedicated to the contribution of the present study to Internet retailing theory. Then, the managerial implications raised in this study are thoroughly discussed. The limitations governing the present research are discussed in detail next. Finally, several avenues for further research are presented at the end of the Chapter.

1.5. Summary

This Chapter provided the forum for an introductory discussion of the issues that are the subject of further analysis in this dissertation. An introduction to the concepts and basic ideas behind the issue of measuring online consumer behaviour in the context of Internet retailing was presented. This was followed by an initial account of the potential role of virtual store atmosphere in general, and virtual retail store layout in particular, as major consumer behaviour influencing factors in Internet retailing.

In addition, another aim of this introductory Chapter was to elaborate on the objectives, research questions and expected outcomes of the research in order to prepare the reader for the detailed discussion of each particular aspect and phase of the work that follows. In this context, the purpose of this Chapter was to set the "roadmap" for the whole journey, ensuring that the reader is properly equipped before he or she embarks on it.

CHAPTER 2. BACKGROUND RESEARCH MATERIAL

The purpose of this Chapter is to provide a detailed analysis and critical appraisal of the supporting areas introduced in Chapter 1.

Since the present research is of a multidisciplinary nature and constitutes a "hybrid" research in the field of Internet Retailing, there is not an exhaustive established theory available presently as the case is for conventional retailing. Therefore, the literature covers the established theories in the areas of conventional Retailing and Consumer Behaviour along with current research in Internet retailing.

To that end, Marketing, Retail Management and Consumer Behaviour Research constitute the main research areas and emphasis was placed on investigating the transformation process necessary to effectively adapt them to Internet retailing. Moreover, Human Computer Interaction (HCI) served as an important theoretical tool as far as Web design principles and guidelines is concerned. Furthermore, Internet Retailing relevant research initiatives, focusing on the effects of the Web interfaces on consumers' buying behaviour, served as an important research background.

2.1. Strategic Marketing Planning for Competitive Advantage in Electronic Commerce

2.1.1. Value Creation in Electronic Marketing

The entire way of value creation for the customer should be reconsidered by companies in the marketspace (Weiber and Kollmann 1998). Porter's (1985, p.59) value chain can be applied in virtual markets, as highlighted by the work of Rayport and Sviokla (1994, 1995). They spoke of a "virtual-actual value chain," referring to the relevant activities in the marketspace. They argued that a common value matrix will exist in the future which will be formed through an integration of different value chains, based on new inputs from information processes. Weiber and Kollmann (1998) go beyond the arguments by Rayport and Sviokla, claiming that there are also autonomous value creation activities in marketspace, which can be traced back to the importance of information in its own right. They support that by information functioning as a source of competitive advantage,

virtual value creation activities can emerge in the marketspace, independent of a physical value chain. The virtual value creation activities take the form of the collection, systemization, selection, combination and distribution of information.

Bloch et al. (1996) looked at sources of value of electronic commerce for a company and explored its effects along with its potential for competitive advantage. Some of their propositions were the following: Electronic Commerce offers a cost advantage through less expensive product promotion, distribution channels and direct savings. It helps the company to differentiate itself through price, product innovation, time to market and customer service. It enables the company to implement customer focus strategies through better customer relationships. It allows the company to raise the entry barriers in some markets, and to enter traditionally hard to access markets easily. It facilitates the introduction of substitute products in a market due to product innovation.

Benjamin and Wigand (1995) supported that electronic marketing gives consumers increased access to a vast selection of products, but on the other hand, causes a restructuring and redistribution of profits among the stakeholders along the value chain. Lower coordination costs would apply throughout the chain, since direct electronic transactions with consumers reduce intermediary transactions and unneeded coordination. As a result, physical distribution costs are also lowered.

There is an evolution away from single-source electronic sales channels toward "electronic markets" which include many suppliers' offerings (Malone et al 1989). A good, illustrative example of this is the case of airline reservations systems. United Airlines' reservations system was one of the first to become an electronic market since it listed flights from other airlines, as well. Initially, in 1976, United had created Apollo, a single-source sales channel which allowed travel agents to book flights on United only. Apollo provided a competitive advantage for United until American Airlines created Sabre, a system which included flights from other airlines. Profits and net worth for the companies adopting such electronic market systems increase, and the competitive dynamics of their industries permanently change. As the competitive landscape changes, note Malone et al. (1989), some companies will emerge as winners. They are the companies which make, or wisely use, electronic markets.

2.1.2. The Retailing Planning Process & Strategies for Competitive Advantage

The retail planning process is seen as consisting of three discrete steps. These interlinked steps are (Cox and Brittain 1996): (a) a retail mission statement, (b) objectives based on the defined mission, and (c) a series of strategies for achieving the objectives. The strategies first relate to specific target markets and then, retail mix strategies are developed to meet the needs of the targeted customers through the selection of the appropriate mix of price, service levels, promotion, customer support, etc. Several strategy alternatives are used by retailers, such as: penetration strategy (i.e., increase of market share), merchandise development (i.e., extra sales through addition of new merchandise), market development (i.e., appeal to new customers), vertical integration, diversification strategy, selectivity strategy (i.e., focus on serving selected market segments), merchandise strategy (i.e., decisions about what products to offer) and pricing strategy.

A strategic retail plan is a grand design or blueprint for ensuring success in all of the organization's business endeavors (Lewison 1994, p. 694). A strategic retail plan is therefore directed at achieving a strategic fit between the retailer's capabilities and the environmental opportunities (both present and future). A good fit results in a position which enables the retailer to sustain competitive advantages.

Moreover, Randall (1997, p. 165) states that "there is no one secret to being successful on the Internet ... in a fast-moving climate such as the Internet, strategic planning is always dynamic". Angehrn (1997a, 1997b) developed the ICDT model, a framework for understanding the opportunities and threats generated by the Internet and for developing strategies to leverage these opportunities and threats. According to the model, four "virtual spaces" are created by the Internet which correspond to different strategic objectives and require different types of organizational and investment adjustments (i.e., virtual information space, virtual communication space, virtual transaction space and virtual distribution space).

The competitive advantage can develop from any of the company's functions and activities. The most common competitive advantages are normally based on any of the following (Aaker 1998):

(a) innovation and product quality

(b) technology
(c) distribution or sales method
(d) degree of control over raw materials
(e) knowledge of the specific market
(f) customer service

Porter and Millar (1985) provided a framework for analyzing the strategic significance of new information technology (electronic commerce being a part of that). They identified and presented three specific ways in which technology affects competition: technology alters industry structures, it supports cost and differentiation strategies and gives rise to entirely new businesses. Furthermore, it is sufficiently documented that retailers use new and innovative technologies to gain sustainable competitive advantages (Ghosh 1994, Lewison 1994, Mason et al. 1991).

It is suggested that five important opportunities exist for retailers to develop sustainable competitive advantages (Walters and Knee 1989, Levy and Weitz 1998): (a) customer loyalty, (b) location, (c) vendor relations, (d) management information and distribution systems, and (e) low-cost operations. With the exception of location, the rest four opportunities apply to the case of virtual retailing as well. Customer loyalty refers to the commitment or systematic preference of customers for shopping at a particular virtual store. Strong vendor relations allow virtual retailers to gain exclusive rights to sell merchandise in a region, buy merchandise at lower prices than other competitors or even receive merchandise in short supply. Management information and distribution systems enable virtual retailers to respond quickly to customer needs. This ability constitutes a basis for the development of sustainable competitive advantages. Regardless of whether a virtual retailer appeals to price-sensitive or price non-sensitive consumers, low-cost operations are always a serious concern. Low-cost operations enable the retailer to either make a higher profit margin than competitors or use the potential profits to attract more customers and increase sales.

Hoffman et al. (1995) developed a framework for the evaluation of the commercial development of WWW. They identified two major categories of sites: Destination sites (i.e., online storefronts, Internet presence sites, content sites) and Web Traffic Control sites (i.e., malls, incentive sites, search agents) which direct consumers to the various destination sites. They suggest that strategic attention should focus, among others, on monitoring the leading edge to gain differential advantage. More specifically, this implies that managers should identify the extent to which firms are following existing

models or developing new ones. One way to differential advantage is the creation of innovative sites in less crowded categories, particularly as sites proliferate.

Figure 5 presents certain pathways to competitive advantage. The figure is adapted from Porter (1980, p.39) who identified three generic strategies for companies to compete successfully against others: (a) overall cost leadership, (b) differentiation, and (c) focus. The generic strategies are defined based on whether the strategic target of the company is the whole industry or only a particular segment of the market, and whether the company's strategic advantage is based on the perceived product/service uniqueness, or a relative low cost position.

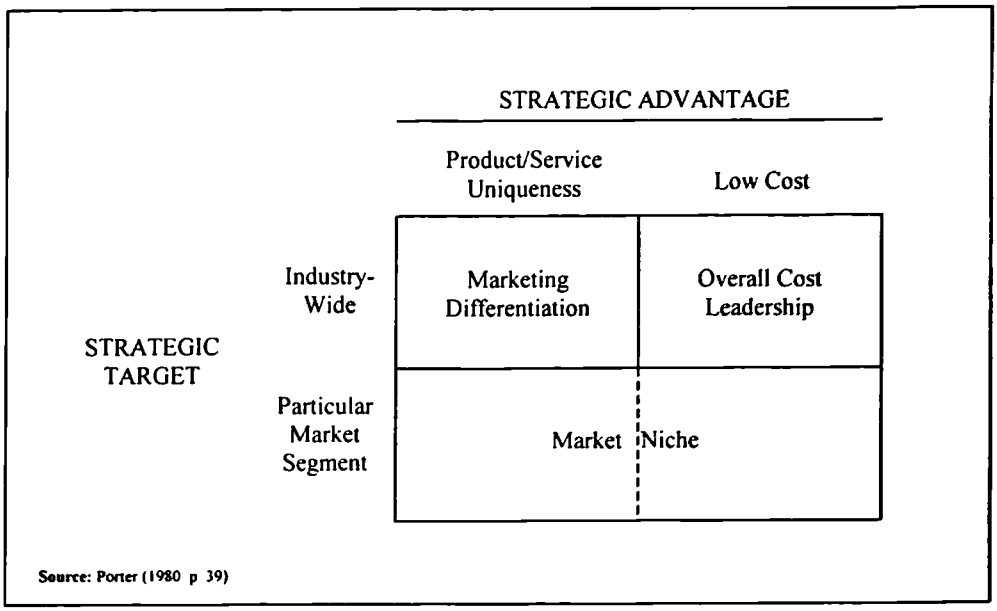


Figure 5: Pathways to Competitive Advantage

"Differentiation" refers to marketing differentiation. Competitive advantage can materialize through marketing differentiation actions or assets, like brand name, after-sale support, product service uniqueness, product quality, technology, distribution, store environment, product line, and so on. Competitive advantage by cost leadership implies exploitation of scale effects, experience effects and productivity, or is achieved through cost controls. Finally, competitive advantage by market niche could be based on a specific, well-defined, small but profitable customer segment (niche), on a product line, on a geographic area, price, or even the use of specific technology.

According to Siomkos and Vrechopoulos (2001), in the case of virtual retailing, the corresponding virtual retail mix elements are the following (Figure 6):

- merchandise assortments
- virtual store atmosphere (e.g., virtual store layout and design)
- delivery
- pricing
- advertising and promotion
- customer services

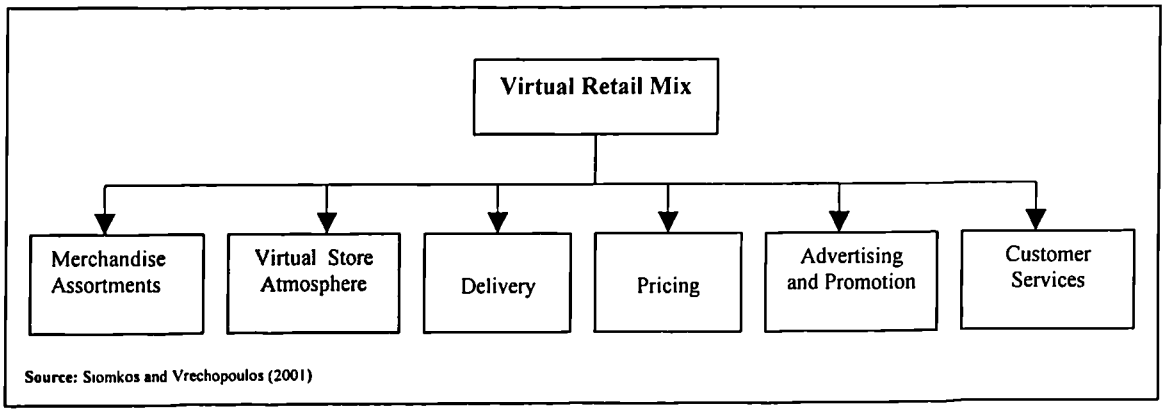


Figure 6: The Virtual Retail Mix

It should be noted that in the virtual retailing context, the notion of "location" is substituted by "delivery," or the physical delivery of the purchased products to the buyer. Therefore, decisions about delivery refer to the selection of served areas or locations. "Location," in other words, does not refer to the physical place of the store, but rather to the physical place of the buyer. The virtual retailer decides which areas to provide delivery services to. In parallel, as it is clearly shown in Figure 6, virtual store atmosphere constitutes one of the basic elements of the virtual retail mix.

Finally, according to Siomkos and Vrechopoulos (2001), a detailed breakdown of current and potential customers in terms of who they are and how they behave, is crucial for the successful implementation of a typical virtual retailer's marketing plan. More specifically, customer analysis requires a well-thought and executed segmentation of the market. Furthermore, the analysis should identify what each segment of customers wants, what might cause a segment's members to change their behaviour, and how these changes would affect the virtual retailer. Particular emphasis is placed on the value each category of customers perceives receiving from a particular virtual retailer.

2.2. Marketing and Consumer Behaviour Shift towards Internet Retailing

2.2.1. Electronic Commerce: A New Revolution in Marketing

According to Gogan (1996-1997, pp. 89), "Marketing and sales techniques evolve in response to the emergence of new information technologies." To that end, the Internet and the World Wide Web are revolutionizing the ways in which products and services are marketed to customers (Kannan et al. 1998). Furthermore, the Internet has revolutionized retail and direct marketing and has evolved as an extraordinary marketing tool having revolutionary impact on the discipline of Marketing (Wang et al. 1998, Herbig and Hale 1997).

Palmer and Grifith (1998, p.45) argue that "...the world of marketing is continually evolving. New technologies create new and innovative means of interacting with customers. The Web has created a new revolution in marketing by providing much more than just a new medium through which organizations can communicate with the public." The fact is that Information Technology and the collaborative potential of the Internet may eventually change human cognitive processes (Haeckel 1998) and through the resulting interactivity, even reshape marketing (Webster 1998). According to Bezjian-Avery et al. (1998, p.23), "...interactive marketing is the immediately iterative process by which customer needs and desires are uncovered, met, modified, and satisfied by the providing firm." Along the same lines, Day (1998) supports that the emergence of interactive marketing within a virtual shopping environment over the Web, enables firms to use information from the customer rather than about the customer. Palmer and Grifith (1998, p. 46) additionally argue that "the Web is one of the most revolutionary topics to be discussed by marketing practitioners and academics in the past decade."

Despite all the aforementioned evolutions, Parsons et al. (1998) support that the rapid development of the new interactive media as the World Wide Web, has taken most consumer marketers by surprise. In addition, they argue that the Internet as a marketing tool has occurred so quickly that it has not been subject to the typical scrutiny in academic marketing forums. Finally, Briggs and Hollis (1997, p.44) suggest that "the Web offers unique and undeniable advantages over other media in terms of targeting and direct marketing".

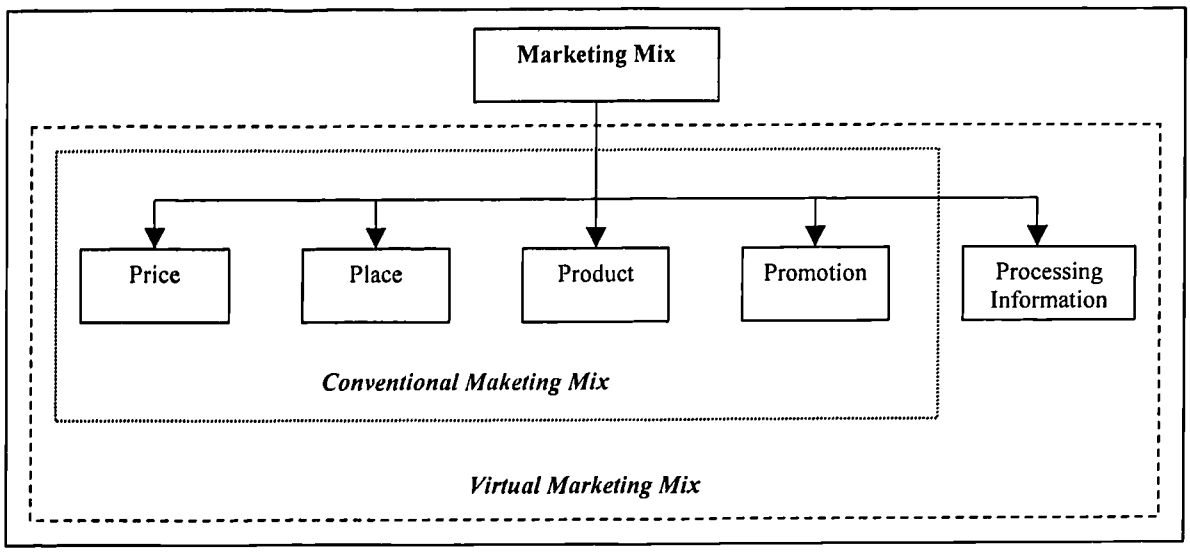


Figure 7: The Transformation of the Conventional Marketing Mix

Evidence shows that the Internet and Electronic Commerce with all their new developments will redefine the meaning of Marketing's 4 P's (Stil and Zimmerman 1996, Hamill and Grecory 1997). Schultz and Bailey (2000) also state that the interactive marketplace changes traditional marketing theory. Processing information is now generally accepted as the fifth "P" of the marketing mix (Figure 7) and a large number of studies has shown that effective management of information systems/information technology can be a powerful source of enhancing value and bringing competitive advantage (Hamill and Grecory 1997).

Internet Retailing offers new marketing opportunities for both retailers and suppliers. As presented in Figure 8, information flow through an interactive environment, where online and dynamic communication is established, enables both suppliers and retailers to apply marketing strategies and conduct marketing activities successfully and cost effectively (Vrechopoulos et al. 1999b).

Finally, it should be noted that as Jones and Vijayasarathy (1998) conclude in their study, many open research questions remain regarding factors that might influence consumer shopping towards Internet shopping. According to them, respective studies on this field seem to offer much to the discipline of direct marketing.

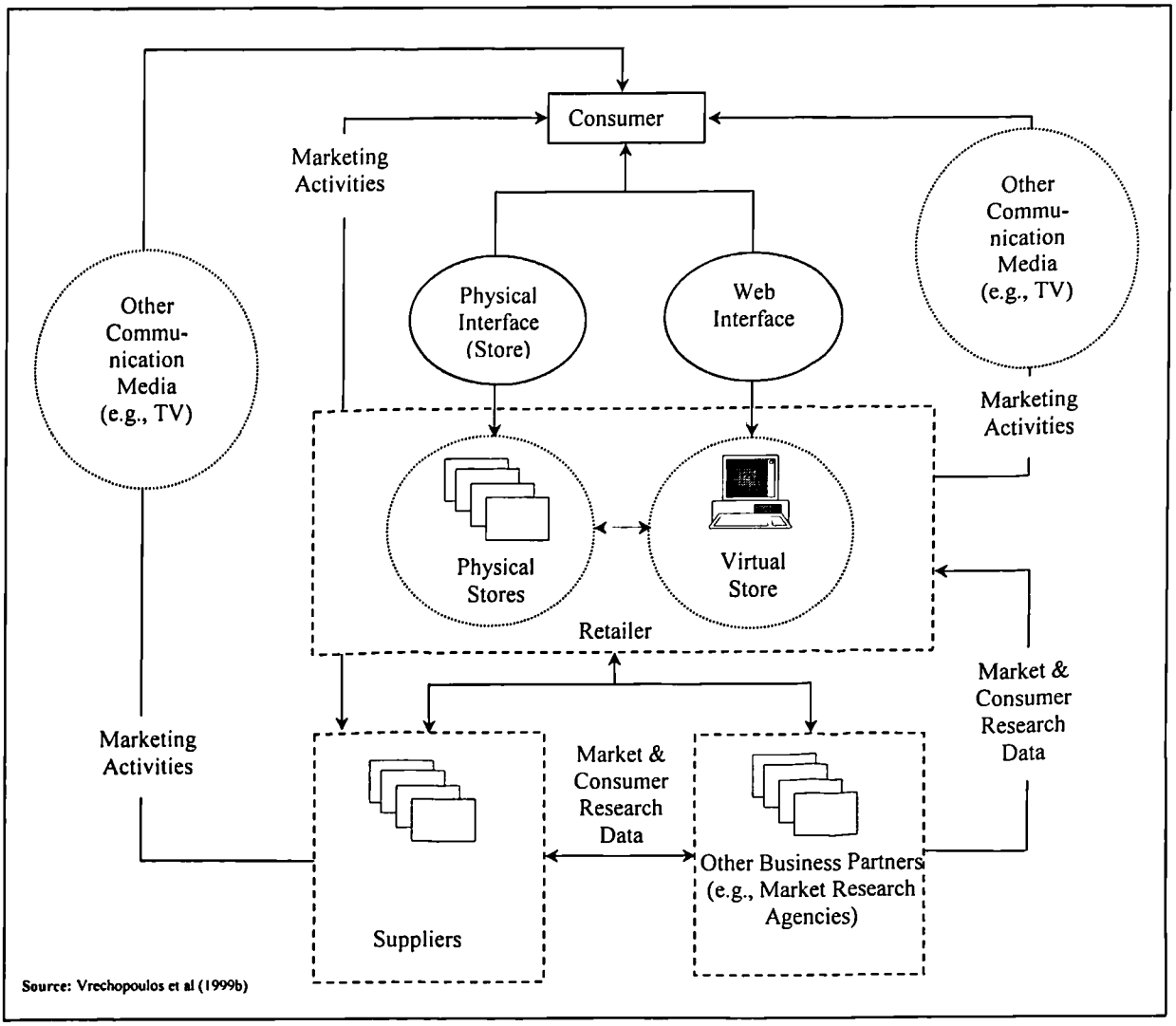


Figure 8: Information Flow and Marketing Activities within Internet Retailing

Based on the aforementioned discussion, it is apparent that the Internet comprises a completely new environment where traditional Marketing strategies and guidelines have proved to be inefficient, and research focusing on Internet Marketing related issues is crucial. In addition, as it is clearly indicated previously in this Chapter, a key success factor for gaining and sustaining competitive advantage over the Internet is the application of effective and tailor-made marketing strategies. Nevertheless, there are many issues in the Marketing discipline that should be thoroughly investigated within the Internet context. To that end, Consumer Behaviour, as a fundamental "pylon" of the discipline of Marketing, constitutes a research direction that should also be thoroughly investigated.

2.2.2. Online Consumer Behaviour

Understanding consumers and the consumption process brings a number of benefits, among them the ability to assist managers in their decision making, a knowledge base from which marketing researchers can analyse consumers, and assistance to the average consumer in making better purchase decisions (Mowen and Minor, 1998).

However, as digital technology and consumer behaviour evolve, marketers need to continuously enhance the value of their digital marketing offering. Online purchases constitute a fundamental change for customers and therefore a key task for electronic commerce is to find out who the actual and potential customers are (Turban et al. 1999). Along the same lines, Currie (1999) supports that one of the central themes of Internet commerce relates to customer focus. In addition, Berthon et al. (1996b) and Hoffman and Novak (1996) suggest customer research as one of the main uses of the Web sites, while Quelch and Klein (1996) support that the Internet promises to be an efficient new tool for market and product research enabling new types of measurement tools, such as online surveys, bulletin boards and Web visitor tracking.

The World Wide Web is considered a strategic information technology with the potential to change the ground rules by which businesses interact with their customers (Rayport and Sviokla 1995). Along the same lines, the marketing function can be organized in entirely new ways, enabling retailers to apply new skills and resources in communicating with their customers (Field 1996). Marketers can identify the active involvement of the consumer in this process and take it into account when designing new products and developing marketing strategies (Stil and Zimerman 1996). As also discussed above, customer research is therefore critical to the success of any market. However, until now, research towards evaluating the business effectiveness and potential of the Internet as a shopping medium has focused on company's rather than on consumers' opinion (Berthon 1996b).

Palmer and Grifith (1998) state that the Web constitutes an innovative mean of interacting with customers. To that end, Wang et al. (1998) support that innovative business professionals exploit the Internet and offer an innovative shopping experience to their customers. The Internet revolutionises the way to approach consumers by processing consumer behaviour information captured through users' interaction with the system. This information intensity and on-line availability have great potential for

supporting consumers in their buying process in a personalised manner (Vrechopoulos et al. 1999a, Vrechopoulos et al. 1999b).

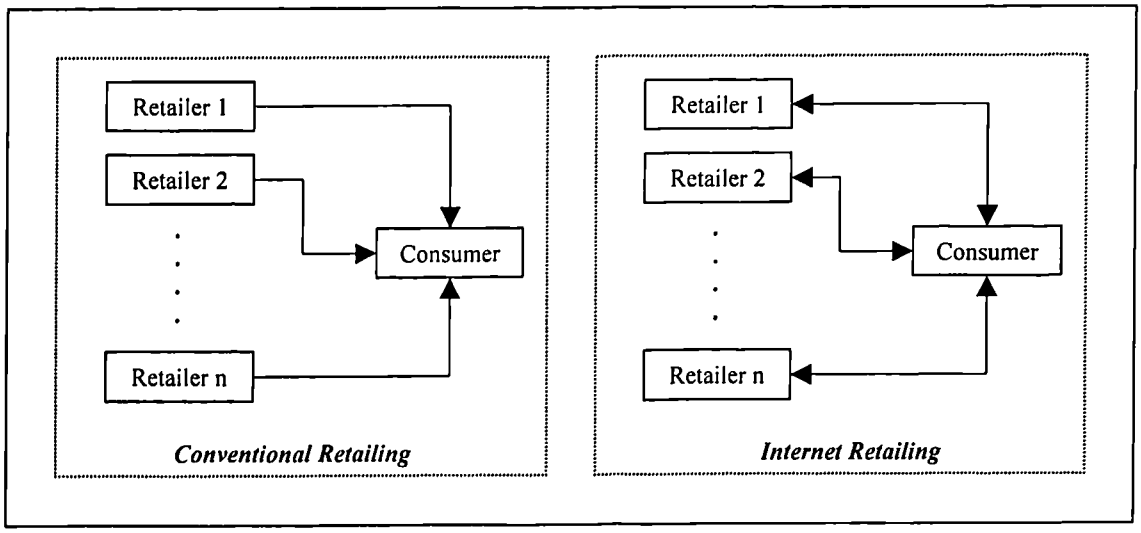


Figure 9: Consumer – Retailer Interaction Shift towards Virtual Retailing

In an interactive two-way, addressable world (Figure 9), it is the consumer, and not the marketer, who decides whom to interact with, what to interact about and whether to interact at all (Field 1996). Therefore, the role of the consumer within an electronic commerce environment is enhanced and the consumer-retailer interaction within Internet retailing environment creates many research questions and application areas. The new business conditions governing this environment have alerted researchers towards the production of new frameworks and theoretical guidelines addressing the needs and peculiarities of "electronic markets". This requires that marketers acquire a good knowledge of consumer's behaviour within such an environment and understand their habits and preferences, in order to market products and services that meet their needs. The fact is that virtual retailers have the technology capabilities on their side, as the virtual retail environment provides them with an enormous amount of information they can use to enhance their understanding of the consumer and offer personalized services through tailor-made shopping interfaces. In order to further understand the business potential of Internet trading, several surveys have been conducted so far, focusing on online consumer behaviour (Hoffman et al. 1996, GVU 1998, Gupta 1995, Jarvenpaa and Todd 1997, Elliot and Fowell 2000, etc).

Traditional models of consumer buying processes may substantially be affected by the characteristics and peculiarities of the new virtual environment. According to the traditional five-stages model of consumer buying behaviour, consumers progress

through the rational stages of problem/need recognition, information search, evaluation of alternatives, purchase decision and post-purchase behavior (Bettman 1979, Engel et al. 1996, Howard 1989, Lilien et al. 1992). This model may be strongly influenced/transformed by the peculiarities and characteristics of the new "electronic" business environment. According to Hawkins et al. (1998), online availability, convenience, depth and variety of information available on the Internet, may well change the nature of consumer information search behaviour and consequently, the entire consumer buying behaviour process. Furthermore, information search and evaluation of alternative stages of the consumer buying process may be incorporated in one stage within a Web shopping environment, i.e., customers search and compare alternative products at once (Vrechopoulos et al. 1999a). However, according to Cole and O'Keefe (2000) and Miles et al. (2000), consumer behaviour research is moving beyond the simple application of traditional consumer behaviour models towards a generation of new models which are more relevant to the online environment.

Lohse and Spiller (1998, p. 81) state that "there are large differences between a physical store and its electronic counterpart" where customers are provided with a completely new and innovative shopping experience. According to Watson et al. (1998), Web changes the nature of communication between firms and customers. Customers have considerable control over which messages they receive by visiting Web sites and being exposed to marketing communications. Therefore, the need for re-examination and understanding of the consumer buying process within the virtual shopping environment is apparent. In addition, the guidelines for creating an Internet strategy introduced by Randall (1997, p.167), indicate that "the driving influence on the Internet is going to be human behaviour and focusing on technology is less important than understanding how users plan to incorporate that technology into their life."

In parallel, Miller (1995) states that electronic shopping is in the very early stages of its development and little is known about consumer attitudes toward adopting or not adopting this new type of shopping. Similarly, according to Kardaras and Papathanassiou (2000), the contribution of the Internet and Electronic Commerce applications to customer satisfaction has not been yet adequately addressed. However, many different types of research have been conducted so far under the umbrella of "Web Marketing and Online Consumer Behaviour," towards investigating the online consumer behaviour. For example, based on the findings of the survey conducted by Donthu and Garcia (1999), Internet shoppers are more innovative than Internet non-shoppers, while according to Eastlick and Lotzc (1999), the strongest predictors of potential adoption of

electronic shopping as an innovation are, among others, the perceived relative advantages it offers over other shopping formats. Finally, based on a study conducted by Bellman et al. (1999) focusing on online buying behaviour, it was found that Web consumers shop online or use online services to save time.

2.2.3. Information Processing for Consumer Support within an Internet Retailing Shopping Environment

Improving the quality of customer service is a key for achieving a competitive advantage and Information Technology can act as a powerful catalyst for improving and advancing customer service (Coyne 1989, Earl 1989). Furthermore, according to Keen (1991, p.23) "...customer service, operations, products, marketing strategies and distribution are heavily or sometimes even entirely dependent on information technology." The challenge for Internet as an IT-based trading medium, is to provide users with an experience that is not easily replicated by conventional media (Breitenbach and Van Doren 1998). In addition, new cyber technology may create new shopping experiences for the consumer and ways of searching for product information that are not possible in the physical environment (Biocca and Levy 1995).

Information available online are distributed among heterogeneous sources of dynamic nature (Turaif and O'Keefe 1998). Stil and Zimerman (1996) support that information can compose a key success factor for influencing and effectively supporting online consumer behaviour by utilizing the huge capabilities offered by this new sales channel. Therefore, the key question is what type of information is required to support consumers and business processes, and how this information can be effectively collected, processed and exploited (Vrechopoulos et al. 1999a).

Collecting, processing and exploiting consumer data (e.g., profiles, preferences, etc), navigation data (i.e., shopping behaviour within the store) and sales data, generated by the consumer-system interaction, facilitate the design of effective strategies and reach the final consumer in a more tailored, personalized and effective way (Vrechopoulos et al. 1999a). For this purpose, they introduced the Internet Consumer Behavior Framework (ICBF) upon which strategic marketing and sales planning can be based (Figure 10).

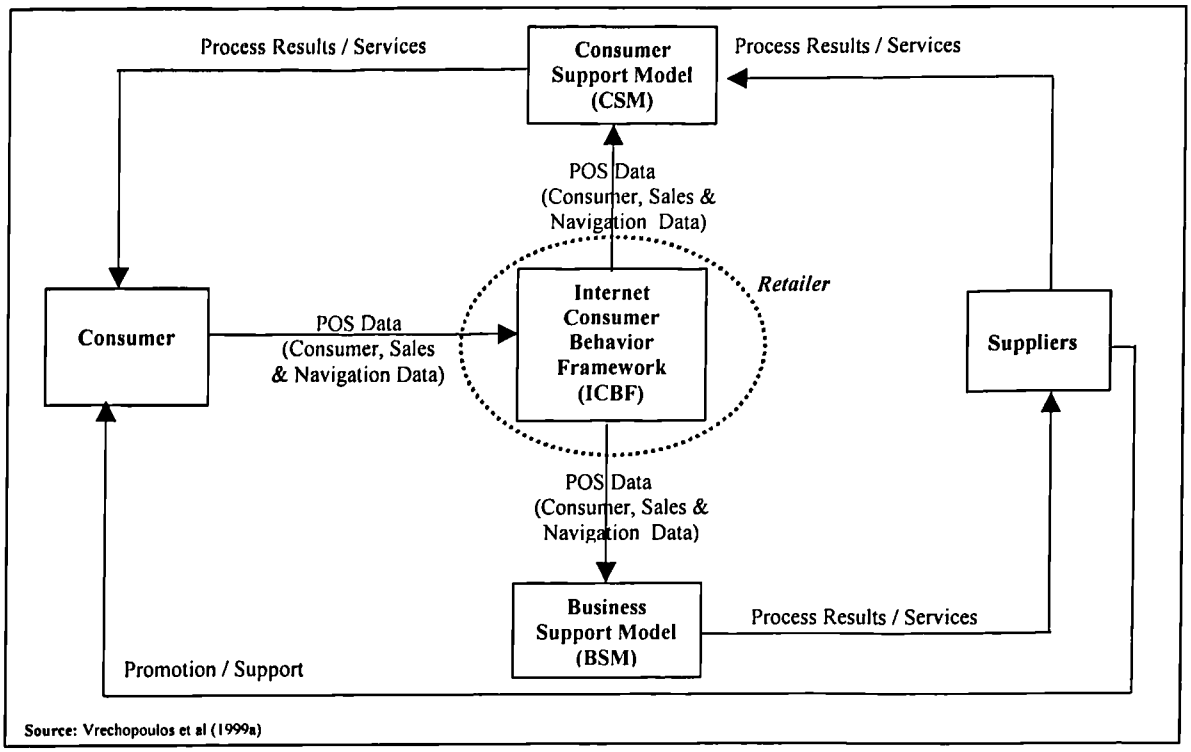


Figure 10: The Internet Consumer Behaviour Framework (ICBF)

Along the same lines, Sen et al.'s study (1998) considered the following main information sources:

- Data that are automatically recorded at Web sites in logfiles
- Secondary data from publicly available sources
- Data elicited from Web site visitors

The Consumer Support Model as part of the Internet Consumer Behaviour Framework presented before deals with the support provided by the virtual retail store on the Web, on each stage of the traditional model of the consumer buying process (Figure 11). Technology capabilities (e.g., data mining techniques) enable virtual retailers to offer personalised shopping interfaces/environments. The one-to-one interaction capability as opposed to an one-to-many, enables virtual retailers to design and develop personalized shopping environments and support customers in a tailor-made way (e.g., offer personalized navigation experience though a tailor-made store layout), consequently building satisfied and loyal customers and gaining competitive advantage. To that end, the role of consumer information is critical, as it constitutes the main source upon which the virtual retailer should design the virtual retail mix.

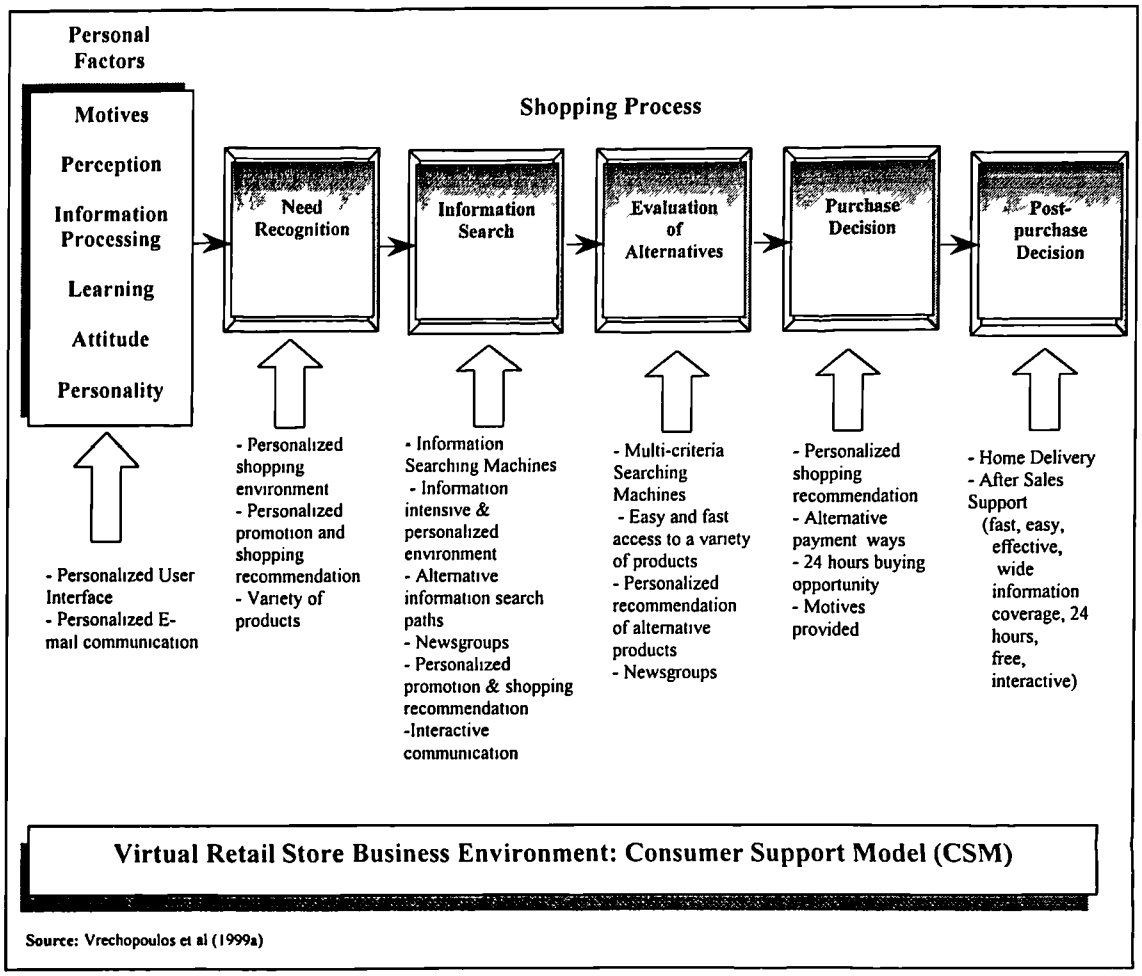


Figure 11: The Consumer Support Model

O'Keefe and Mceachern (1998) introduced a framework using Customer Decision Support Systems (CDSS) and generic Web and Internet facilities to support customer decision making (Table 2). They state that Websites, which support the whole buying process of a consumer online, ensure customer satisfaction and competitive advantages for the firm. They also state (p. 73) that "in the same way that a managerial Decision Support System (DSS) must support some or all of the stages of decision making, so does a CDSS.....Descriptions of managerial decision making have to be replaced by descriptions of customer decision making."

Decision Process	CDSS Facilities	Generic Internet and Web Facilities
Need recognition	Agents and event notification	Banner advertising on other Web sites URL on physical material Discussions in newsgroups
Information Search	Virtual catalogs Internet search on Web site Structural interaction and question/answer sessions Links to (and guidance on) external sources	Web directories and classifiers External search engines Focused directories and information brockers
Evaluation	FAQs and other summaries Samples and trial Provision of evaluative models Pointers to (and information on) existing customers	Discussions in newsgroups Cross site (i.e., firm) comparisons Generic models
Purchase	Product or service ordering Payment methods Arrangement of delivery	Electronic cash and virtual banking Logistics providers and package tracking
After purchase evaluation	Customer support via email and a newsgroup Email communication and response	Discussions in newsgroups

Source: O'Keefe and Mceachern (1998)

Table 2: Framework using Customer Decision Support Systems (CDSS) and Generic Web and Internet Facilities to Support Customer Decision Making

Furthermore, Vrechopoulos et al. (1999b) introduced the Internet Consumer Information Framework (ICIF). This framework can by utilized by virtual retailers towards supporting consumers at each stage of their buying process (Figure 12). However, this framework also emphasizes the decision that should be taken by each virtual retailer regarding:

- The content of the information that should be collected.
- The reasoning/documentation of the need to collect such type of information. In other words, how can this information can contribute to the firm's marketing objectives?
- The timing in which this information should be collected (e.g., at the end of the shopping activity).
- The method that should be employed towards collecting this information (e.g., online questionnaires).

These categories should be applied in a personalised manner depending on each customer's type profile. For example, customer "X" may prefer to offer personal information at the beginning of his/her shopping trip, while customer "Y" may prefer to offer such kind of information just before leaving the virtual store. Furthermore, customer "X" may prefer to provide such kind of information in an online questionnaire, while customer "Y" does not like to fill out questionnaires.

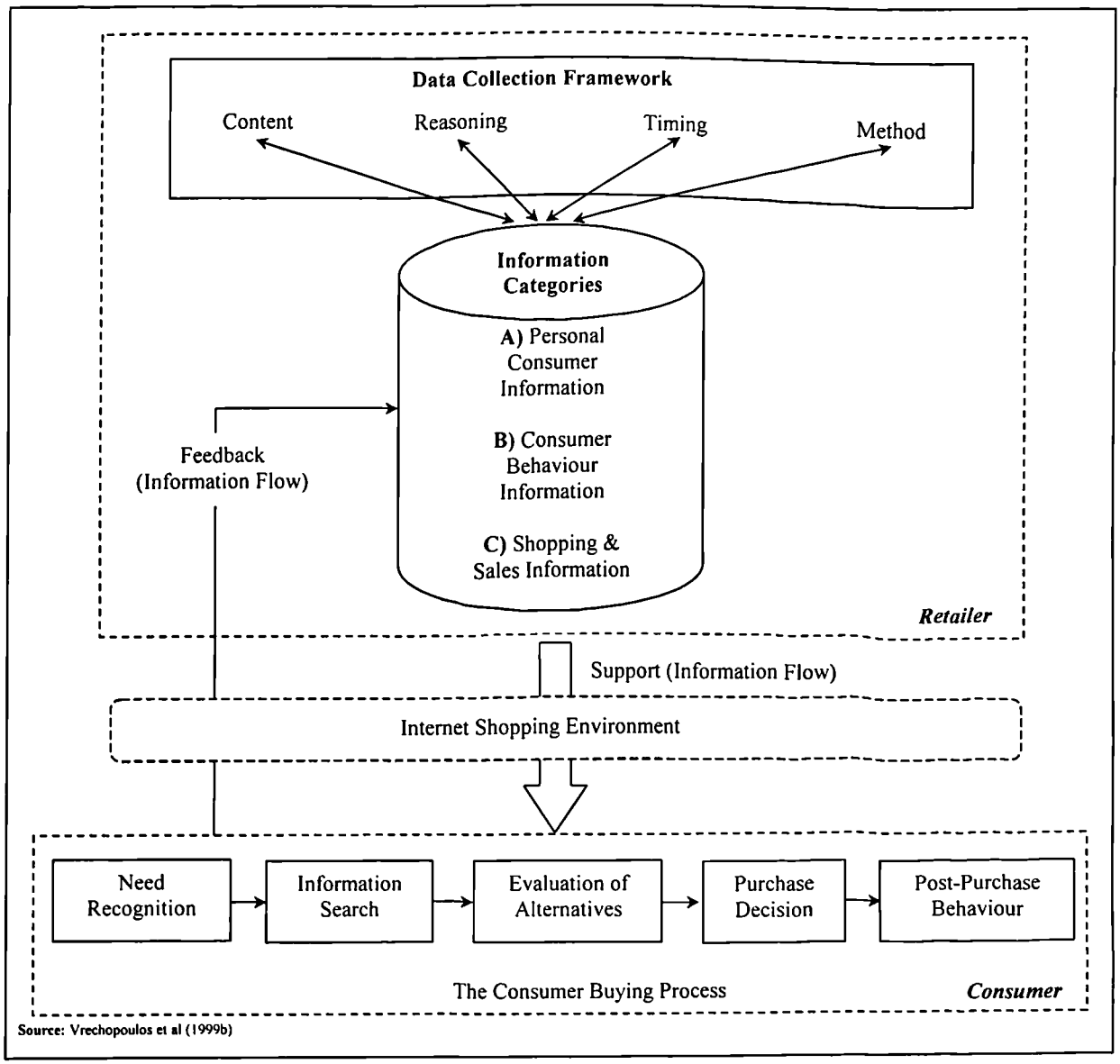


Figure 12: The Internet Consumer Information Framework

Along the same lines, Falkou et al. (1999) developed an innovative laboratory virtual retail store (TOP: Traditional Online Products store) aiming to effectively support consumers at each stage of their shopping activity. To that end, they employed the traditional five stages model of the consumer buying behaviour as a guiding tool.

Therefore, this application materializes all the functions of a store in a manner that supports consumers at every stage of their online shopping behaviour (Table 3).

"TOP" Services	Buying Process Stages Supported
Service for search of products	Information search / Evaluation of Alternative stage
Service for the establishment of a personal account & principle determination of consumer's profile (static profile)	Input for the Need recognition stage & Post-Purchase Decision stage (customer satisfaction)
Service for the purchase of products – personal shopping cart	Purchase Decision Stage
Service for a multiple method of payment of an order	Purchase Decision Stage
Service of communication with the store & Customer's remark book	Post-Purchase Decision Stage
Service for the indication of more profitable purchases of the current period & suggestions for purchases relevant to the specific customer (consumer's dynamic profile)	Need recognition/ Information Search / Evaluation of Alternative Stages
Service offering statistical diagrams and dynamic character tables to the customer	Post-Purchase Decision (after sales support)
Additional services	Information Search / Evaluation of Alternatives / Post-Purchase Decision Stages (customer service)

Source: Falkou et al (1999)

Table 3: Services Offered by "TOP" Application

Based on the findings of the aforementioned research initiatives, it is apparent that great emphasis is placed on developing virtual stores on the Web that use technology evolutions in such a way to provide effective support to their customers. Moreover, personalized customer support constitutes a challenging research opportunity and a key issue in Internet retailing in the sense that, technology enabled, retailers are able now, more than ever, to design and offer to their customers a shopping environment that meets their specific needs and desires during shopping activity.

2.3. Human Computer Interaction and Web Interface Effects on Consumer Behaviour

O'Keefe et al. (2000, p. 611) state that "...research in Human Computer Interaction (HCI), traditionally based upon concepts of user performing tasks, is faced with a new challenge: the consumer interface. Models of consumer behaviour and HCI are merging to better inform the interface aspects of electronic commerce."

2.3.1. Developing Effective Web Site Designs through HCI

According to Preece et al. (1994), Human Computer Interaction has a role in the design and development of all kinds of systems. World Wide Web is the best-known multimedia hypertext system, which offers a rich environment for information

presentation (Dix et al. 1998, Leventhal et al. 1995). However, understanding of the existing constraints, while appreciating its capabilities, can lead to the development of WWW pages which are more informative, attractive and easier to comprehend, as compared to pages that are constructed without any thought about how they will be used (Dix et al. 1995). Moreover, most application systems place little emphasis on providing a holistic picture of the information space to the user, even though they provide extensive navigational facilities (Preece et al. 1994).

From a database perspective, the system retrieves the information from a database when a word, phrase or sign is selected. Eberts (1994) suggests that one of the keys to making database manipulations easier is to fool the user into thinking that it is not a database programme at all but is merely the natural way of accessing the information needed.

Understanding the user's work domain has been a consistent source of interest and challenge for human-computer interaction designers. Consequently, much of the research in the past decade dealt with different approaches to formulating this understanding. Since the early 1990's, work in user-centered design (Nielsen 1989, Nielsen 1995, Perlman et al. 1990) has emphasized the role of user-participants in treating work context as an empirical source of design rationale. Erskine et al. (1997) have addressed some of the user work domain problems facing Web designers, principally the problems of incorporating workplace expertise into the design process.

Other discussions in Web design development refer to the notion of usability and many researchers have enumerated some of the difficulties of incorporating usability into the design of Web sites (December and Randall 1994, Henninger 1997, Vora 1997). To that end, Roh et al. (1997) suggest a specific process for initiating, developing and launching Web pages that explicitly incorporates usability techniques at several points in the development cycle.

Serco Usability Services (1999) identified the following issues/guidelines which are important for the design of a successful virtual store, and should be seriously considered by HCI professionals:

- Make it easy for users to enter the store
- Use a meaningful store layout and product categories
- Ensure descriptive terms or pictures are used
- Allow users to find and use search facilities

- Provide meaningful and relevant search results
- Make it clear whether displayed products are available in the on-line store
- Allow users to see what is in their shopping basket
- Provide sufficient product information and explain technical terms
- Clearly flag the financial security features of the site
- Consider ways of providing a "value-added" experience

There is a lot of discussion around the competitive "relationship" between graphics that improve aesthetics and site performance, bandwidth limitations and download times. In addition, simplicity is the essence of good Web design and can greatly improve a site's usability (Veen 1998).

According to Nielsen (1999a, p.65), "...if the growth rate of World Wide Web does not slow down, the Web will reach 200 million sites sometime during 2003." However, "...unless the vast majority of Web sites are improved considerably, we will suffer a usability meltdown of the Web no later than the year 2000, and most people will refer to the Web as: oh, yes, we tried that last year but it was no good" (Nielsen 1999a, p.67). Nielsen (1999a) also states that Web navigation is a challenge because of the need to manage billions of information objects, while content is "king" on the Web and the only way to increase the ultimate value is to enhance the quality of the content. Moreover, according to Lohse and Spiller (1998, p. 85), "improving navigation of product lists, product search, and increasing the use of hyperlinks within a store is the primary area of opportunity." Finally, Dix (1998) states that the Web site popularity is found to be strongly and positively influenced by the number of changes made to it in the preceding three-month period.

Kerne (1998), Alben (1996) and Nielsen (1999b), suggest that the key usability issues of satisfaction and effectiveness can be achieved, among other ways, by improving the ease towards reaching information relevant to customer desires via an effective navigation capability and by increasing "aesthetic enjoyment" of Web shopping. However, according to Vora and Helander (1997), there does not exist a set of guidelines for designing hypertext systems and most hypertext designs are based on the designer's intuitions and past experience.

However, as was also discussed in Chapter 1, there is little empirical evidence regarding the impact of Web on consumer shopping behaviour (Jarvenpaa and Todd 1997).

However, as user interface design is an essential link between the customer and the retail store in Web-based shopping environments, the growth of Internet retail sites will depend on the interface design issues (Lohse and Spiller 1998). In addition, according to Hoffman et al. (1995), attracting visitors to a Website and generate repeat traffic have been argued to be the main challenges for Internet Marketing. Along the same lines, Gehrke et al. (1999) support that the business-to-consumer interface, or the "virtual shopping environment," determines buyers' willingness to purchase through the Net constituting therefore a critical success factor for business effectiveness over the net. Furthermore, Lohse and Spiller (1999) support that it is important to investigate the possible relationship between poorly selling items and screen design and layout.

Based on the previous discussion, virtual retailers should consider store environment as a critical success factor for their business effectiveness over the Web. Virtual store shopping environment constitutes a new concept arising from the rapid technology evolutions along with the digital business activity over the Internet. Thus, it should be taken under serious consideration as it stands in conventional retailing. Figure 13 presents a conceptual framework of the mediating role of HCI in the effective transformation of the conventional store atmosphere to the virtual store atmosphere, supported by a consumer behaviour analysis.

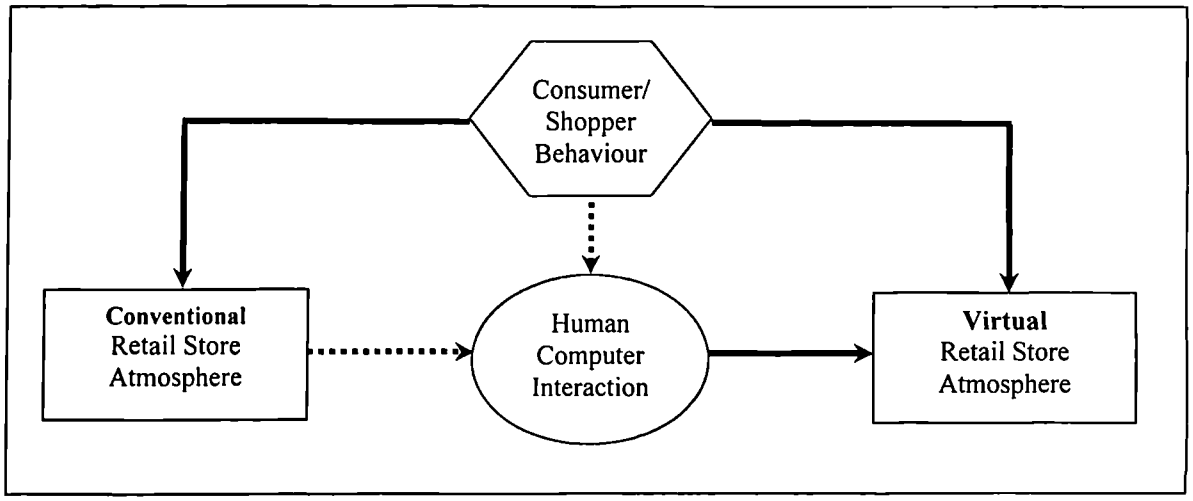


Figure 13: HCI's Mediating Role in the Development of the Virtual Store Atmosphere

Experts and special consultants in developing retail atmosphere in conventional stores, primarily rely on consumer (shopper) behaviour theory and methods (Levy and Weitz 1998). The appropriate virtual retail store atmosphere can be more effectively designed if it considers conventional theory and methods – transformed and adopted, of course,

for the virtual environment – through the help of HCI. HCI can therefore, play a mediating role in the design of virtual store atmosphere.

Finally, it should be noted that usability principles and guidelines should be incorporated by a virtual retail store over the Internet along with those factors that can offer a personalized shopping experience. This means that besides the employment of the basic usability principles and guidelines, an Internet retail store should develop and dynamically provide different shopping interfaces to different consumers, matching through that their specific profiles, needs and wishes. In other words, as "consumers are different" they may perceive and evaluate a specific Web site's usability in a completely different way. Thus, consumer behaviour analysis constitutes a fundamental research tool towards meeting the challenge of providing "one-to-one" instead of an "one-to-many" shopping experience.

Great emphasis is placed at the moment on the investigation and identification of those factors of the shopping interface that constitute the virtual retail store atmosphere determinants and consequently affect consumer buying behaviour (Lohse and Spiller 1999, Elliot et al. 2000, Eroglu et al. 2000, Eroglu et al. 2001). A model developed by Lee in an internal working paper of the City University of Hong Kong and was presented in a study by Gehrke et al. (1999), demonstrates the important role of a successful Web storefront towards consumer satisfaction. This model incorporates an extensive number of virtual store key-determinants that affect consumer buying behaviour. Furthermore, the "sense of being in a store" dimension was found to be of high importance by consumers interested to adopt Internet shopping (Vrechopoulos et al. 2001). Finally, according to Bhatnagar et al. (2000, p.98), "consumers may be apprehensive about buying something through the Internet without touching or feeling it." All the above indicate the high importance of the virtual store atmosphere as a major consumer shopping behaviour influencing factor.

It is apparent that Internet retailing faces a challenging opportunity for developing and testing theories and practices regarding the theoretical background that should support the procedure of designing and providing effective shopping interfaces. According to Rowley (1996, p.33), "Internet shopping has a long way to go in developing the shopping experience."

2.3.2. Web Interface Effects on Consumer Behaviour: Some Indicative Studies

Web's ability to offer customisation effectively and inexpensively has increasingly created interest on the part of commercial organizations (Kling 1994). Palmer et al. (2000), support that controlling the relationship with the end consumer is a key factor in online grocery retailing. However, up to now, much of the analysis about Web content and its effects on consumer buying behaviour has been qualitative, proprietary and partially communicated (Bucy et al. 1999). Similarly, Elliot and Fowell (2000) state that the current Electronic Commerce and Internet Shopping literature does not provide comprehensive answers. However, they state that literature so far points to a number of factors, which can be considered as important influences on the growth of Internet Shopping. These are:

- store/site attributes,
- product type,
- consumer and their experiences

Several indicative studies focusing on consumer attitudes and perceptions towards Internet shopping as well as on the impact of the Web interface on consumer buying behaviour, have been conducted. Some indicative studies are presented below.

2.3.2.1. Consumer Attitudes and Perceptions towards Internet Shopping

According to the findings of Jarvenpaa and Todd (1997, pp. 79-80), "the fact that consumers are looking for better-designed sites does not necessarily mean that they expect state-of-the-art technology; rather, they seem to be looking for thoroughly designed sites that support the way they shop." It is apparent therefore, that as consumers are "different" in terms of profiles, needs, wishes, attitudes and shopping behaviours, they perceive usefulness of an Internet retail store, differently. For example, one customer may find a specific site as very supportive while another may evaluate the same site as not supportive enough. Therefore, questions are raised regarding which type of sites could be characterized as supportive and for which type of customers. In addition, the same phenomenon takes place in conventional retailing, where different customers perceive store supportiveness and usefulness, differently (Mowen and Minor 1998). Nevertheless, conventional retailing differs from virtual retailing in a basic dimension: virtual retailing, technology enabled, can offer an one-to-one shopping interaction experience instead of an one-to-many offered in conventional retailing

(Figure 14). Such a capability constitutes a challenging research and business opportunity (e.g., dynamic selection and offering of a particular store layout based on consumer profile and preferences may contribute towards customer satisfaction, loyalty and enthusiasm).

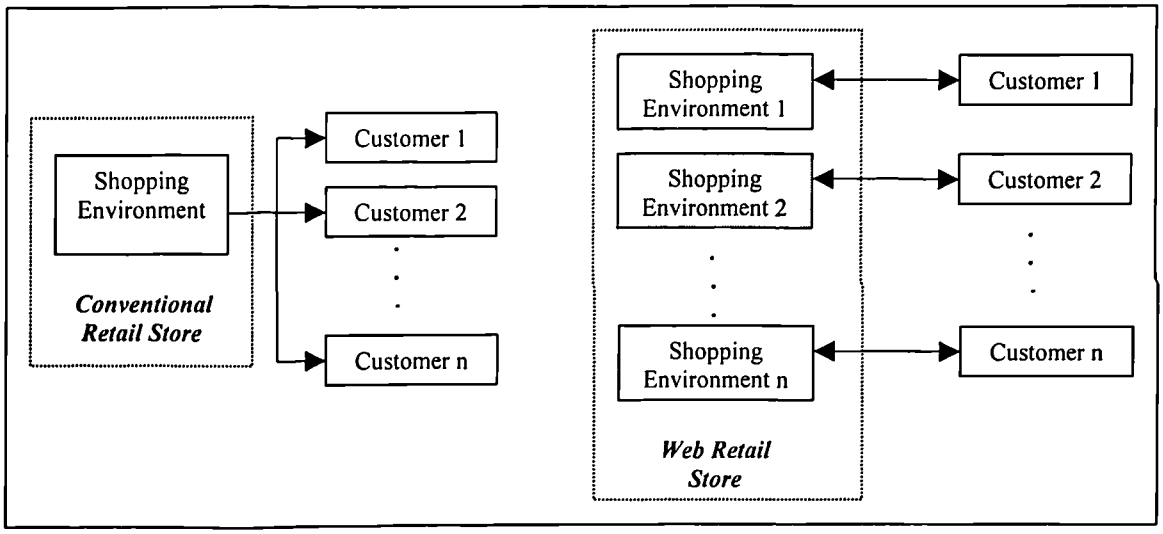


Figure 14: Shopping Environment Customisation Capability within Web Retailing

Jarvenpaa and Todd (1997) studied consumer reactions to electronic shopping on the World Wide Web. They concluded that the Web changes some basic notions of consumer behaviour. They also provide directions for research at the end of their study, some of which are presented below:

- How do consumers view time and effort while shopping on the World Wide Web?
- How do service expectations change in electronic environments?
- Research in the area of site design is important. Research examining novel design alternatives that balance different customer needs and wishes is important.
- Sound recommendations for store design need to be based on a detailed understanding of the relative influence of different factors on consumer behaviour. Furthermore, since the influence of these factors may change, as the World Wide Web markeplace evolves and as consumers gain experience, studies that look at shopping behaviour over time are also required.

Along the same lines, Donthu and Garcia (1999), concluded that continuous research of Internet shoppers should be conducted in the future. They conducted a telephone based exploratory survey focusing on Internet shoppers and non-shoppers. The study revealed that Internet shoppers are convenience seekers, innovative, more impulsive and variety seekers than non-Internet shoppers. They strongly encourage further research to better understand the specific needs and expectations of Internet shoppers and the way that the Internet would affect the marketing mix. Finally, they state that further research is also necessary to understand how to integrate this new technology with conventional marketing activities.

Furthermore, according to Li et al. (1999), orientation towards the Internet, in general, possibly influence Internet usage. More specifically, the same researchers concluded in their study that consumer orientation towards Internet was found to influence the corresponding shopping behaviour. On the other hand, Jarvenpaa et al. (2000) conclude that perceived size and perceived reputation of an online Web store significantly influence the likelihood of purchase.

Bellman et al. (1999) run an ongoing research project begun in 1997, called "Wharton Virtual Test Market" (WVTM), sponsored by the Wharton Forum on Electronic Commerce. This project investigates Web consumer demographic and attitudes about online shopping as well as aims to reveal predictors of online buying behaviour. They found out that convenience constitutes a critical success factor for business effectiveness over the Web, as Web consumers shop online to save time and seek for convenience. They also found out that looking for product information on the Internet is the most important predictor of online buying behaviour.

Furthermore, according to the results of the 10th WWW User Survey, conducted by the Graphic, Visualization & Usability Center (GVU) of Georgia Tech Research Corporation (GVU, 1998), the main problems mentioned by users using the Web include: speed, slow advertisements, broken Web links, graphics, registration, difficulty in finding new information, paying for content and script errors. This survey revealed that one of the factors that influence a user's response to a site is the first impression that will be created upon visiting the site, usually by the site's home page. This impression depends on the overall "look-and-feel" of the site, the colours, the graphics used, the analogy between text and images etc., or in one term, the site's aesthetics.

Vrechopoulos et al. (2001a) run a consumer survey focusing on consumers that were PC users. The objective of the survey was to study the profiles and behaviours of current Internet shoppers and future Internet adopters. The study revealed, among others, that future Internet shoppers attach significantly higher importance to the "sense of being in a store" dimension than current Internet shoppers do. However, both current and future Internet shoppers evaluated the "support and help on exploring the store" attribute as very important.

Bhatnagar et al. (2000) concluded that the perceived product risk (i.e., software vs. clothes) or financial risk (i.e., communicating credit card information) affect perceptions towards Internet shopping. Based on that, they propose that Internet stores' managers should begin thinking on how to reduce risk perception in order to increase traffic and sales.

Jones and Vijayasarathy (1998) run an exploratory, empirical investigation of consumer perceptions towards Internet shopping. They examined how factors like personality and influence of important other people might influence perceptions towards Internet shopping. They found out that perceptions towards Internet shopping differ by individual differences in personality, while opinion leaders' influence investigation also revealed statistically significant differences regarding consumers' individual perceptions towards Internet shopping.

Finally, a laboratory experimental survey conducted by Crisp et al. (1997) showed that consumer attitudes towards computers affect attitudes towards Internet shopping. More specifically, they concluded that prior Internet experience, attitudes towards computers, age, household size, and frequency of shopping via direct marketing channels affect intentions towards Internet shopping.

2.3.2.2. Web Advertising Effects on Consumer Behaviour

Schlosser et al. (1999, p.34) conducted a survey measuring Internet users' attitudes toward Internet advertising. The driving force for conducting this survey was that although many estimates exist regarding who uses the Internet as well as guidelines about how to best design Internet advertising, little was known about Internet users' attitudes toward Internet advertising. Their research serves as a contributing element towards understanding consumer response in an online commercial environment. One of

the major conclusions of this study was that commercial Web sites appear to include features that allow users to benefit from the information richness of the medium.

Furthermore, Hofacker and Murphy (1998) ran an experiment measuring Web banner advertising effectiveness. One of their most interesting results is that the basic imperative phrase "Click here" was proved to be the most effective one compared to other phrases used. They also state (p. 710) that "there are potentially huge numbers of simple physical manipulations that need to be looked at towards achieving advertising effectiveness over the Web...Mechanical features of traditional advertisements such as colour or layout have proved to be important and there is no doubt that they would have an impact on Web advertising as well."

Finally, Stevenson et al. (2000) ran an experiment on the Internet using a student sample. They demonstrated the negative effects of Websites' complexity (generated by competing sights and sounds found on each page) on the effectiveness of a commercial run on such a page. Based on the findings of this research, Bruner II and Kumar (2000) run an experiment using a non-student adult sample. They concluded that increasing Webpage complexity led to the pages being perceived as more interesting. Interestingness, in turn, had a positive impact on viewers' attitudes-toward-the-Website but Webpage complexity had a negative effect. This implied that effects of complexity are not simple since the direct and indirect effects oppose each other.

2.3.2.3. Web Atmospherics Effects on Consumer Behaviour

Eroglu et al. (2000) studied the online retail atmospherics as a major influencing factor of consumer buying behaviour over the Web. They claim that like the case of traditional retailing, virtual retailers can also develop and provide an atmosphere which substantially affects shopping experience and behaviour within the store. They support that virtual retailers are fairly limited in creating an effective store atmosphere via a computer screen. This implies (p. 144) that "the demonstrated importance of store atmospherics in traditional retail formats becomes even more critical in the online retailing context." In addition, Eroglu et al. (2001) support that virtual stores over the Web do also possess an atmosphere. This "atmosphere" can be created by the virtual retailer through the effective use of colours, layouts, sounds and graphics. These "atmospherics" are crucial for the effectiveness of online shopping interfaces as they influence customers' buying behaviour towards:

- selecting a Web site to conduct purchases,
- spending time for shopping activity within the Web site, and
- behaving within the store.

More specifically, one of the most important findings of the same study was that site map and navigation aid cues scored low compared to others (e.g., picture of product, search ability, etc) on a 1-5 scale evaluating helpfulness for making a decision. According to them, this conclusion implies that future research should deal with the issue of whether these two cues should be considered as a separate cue category named "navigation." Finally, the researchers state that there are many unexplored challenging research issues in this area. They strongly propose the beginning of research that will establish the effects of online atmosphere on consumer buying behaviour.

2.3.2.4 Web Site Design Effects on Consumer Behaviour

Lohse and Spiller (1999) conducted an Internet retail survey focusing on the store design and the way user interface influences traffic and sales. They state that the number of Web shoppers and volume of sales are still comparatively low, in part, because of poor interfaces and store navigation. They claim that electronic shopping incorporates many of the same characteristics of conventional shopping. They also examined attributes that shoppers consider when selecting a conventional retail store. Some indicative results of this survey are presented below:

- Improved product lists have a tremendous effect on sales
- A greater number of store "entrances" yields additional visits and sales
- Promotion on the Cybermall entrance screen generates traffic and sales
- The number of levels between home page and end product pages has no significant effect on visits and sales
- Featuring a FAQ section in the store is associated with more traffic

Finally, the researchers expressed their belief that the growth of Internet retail sales will partially depend on interface design issues, and strongly encouraged future research in the area of virtual store design.

Furthermore, Elliot and Fowell (2000) studied consumer's experiences of Internet shopping through an experiment. Their study investigated actual purchase transactions (more than 100 purchases through a wide range of products from Internet sites in five

countries) supporting therefore complete analysis of the transaction experience. It was found that consumers' expectations of convenience, customized service and access to a wider variety of products were realized in 70% of the cases. Finally, they state (p. 336) that "further research is urgently required to more fully explore the nature of groups of factors that determine success in Internet shopping."

Dreze and Zufryden (1997, p. 90) underline that "it is expected that the Web will eventually come closer to fulfilling its potential and promise as the ultimate medium for market segmentation at the individual customer level, that is, for targeting unique individual surfers with individually designed promotions, content, products, services and shopping environments in general, on the Web." Their study evaluated the effectiveness and design of promotional content on the Web through a laboratory experiment setting. They developed effectiveness measures as functions of explanatory variables and found out that number of pages accessed by subjects and time spent within the site could be explained by independent variables representing attributes that included background colour, image size, sound file display, celebrity endorsement, use of java and frames, and operating system. For example, green background colour of the site was found to have a negative impact on the number of pages accessed as well as on time spent within the store. On the other hand, it was found that the tiled background colour had a positive effect on the number of pages accessed but had a negative effect on time spent within the site. Furthermore, celebrity endorsement (adding one major celebrity's endorsement within the main text body of the site) had a positive impact on both the number of pages accessed and time spent within the site.

Dellaert and Kahn (1999) ran four experiments towards investigating consumers' reactions and evaluations of Internet Web sites after waiting. Their results indicate that waiting negatively affects consumer evaluations of Web sites. Such potential negative results can be sufficiently controlled by managing waiting experiences in an effective way.

Hoque and Loshe (1999) research initiative dealt with investigating how subtle changes in the user interface design influence information search costs. In an empirical study they compared 1411 choices subjects made regarding a business to patronise using paper and electronic telephone directories. One of their basic suggestions (p. 393) is that "the streamlined product list navigation, such as the one-click-to-purchase approach of Amazon.com and 1-800-flowers, represents recognition that every additional mouse click reduces the possibility of purchase."

Vijayasarathy and Jones (2001) run an experiment in which they examined online perceptions between two Internet shopping groups: one that used an online shopping aid (i.e., an easy interface to search for a given product on criteria that were product-specific) and another that did not used this aid. They found that the use of a shopping-aid did have impact on subjects' perceptions about online shopping. More specifically, subjects who used this particular aid to assist them in their shopping simulation found online shopping more convenient than those subjects who did not use a comparable shopping assistant.

Finally, based on the results of the study by Dholakia and Rego (1998), the greater the number of links obtained for the home page of a Web site, the higher the amount of Web traffic to the site is likely to be.

2.3.2.5. Cultural Effects on Online Consumer Behaviour over the Web

O'Keefe et al. (2000) ran an extensive experiment comparing subjects' reactions to Web sites in the United Kingdom, the United States and Hong Kong. They used the Web sites of various automobile manufactures. One of the most obvious results of this survey was that they did not observe any interaction between the origin of the site and subject location. In other words, counter to what it was expected, they did not observe any relationship between Web site origin and subject location. They concluded that (p. 628), "The opportunities for further research in the area of the global consumer interface are vast."

Table 4 summarises and classifies the aforementioned research initiatives. Therefore, it is clear that the two major generic research streams of: (a) investigating consumer perceptions and attitudes towards Internet Shopping, and (b) measuring Web interface effects on Consumer Behaviour, can be further classified, as presented in Table 4 and also discussed above.

As thoroughly discussed previously in the dissertation, research in this area still is in its initial steps. However, most researchers strongly encourage further research, which can offer direct managerial implications as well as contribute to the corresponding Internet Retailing theory development, therefore supporting business-to-consumer transactions over the Internet.

Research Area	References
a) Consumer Attitudes towards Internet Shopping	Jarvenpaa and Todd (1997), Crisp 1997, GVU 1998, Jones and Vijayasarathy (1998), Donthu and Garcia (1999), Bellman et al (1999), Li et al. (1999), Jarvenpaa et al. (2000), Bhatnagar et al. (2000), Vrechopoulos et al. (2001a)
b) Web Advertising Effects on Consumer Behaviour	Hofacker and Murphy (1998), Schlosser et al. (1999), Stevenson et al (2000), Bruner II and Kumar (2000)
c) Web Atmospherics Effects on Consumer Behaviour	Eroglu et al. (2000), Eroglu et al. (2001)
d) Web Site Design Effects on Consumer Behaviour	Dreze and Zufryden (1997), Dholakia and Rego (1998), Lohse and Spiller 1999, Dellaert and Kahn (1999), Elliot and Fowell 2000, Hoque and Lohse (1999), Vijayasarathy and Jones (2001)
e) Cultural Effects on Online Consumer Behaviour	O' Keefe et al. (2000)

Table 4: Classification of Consumer Attitudes towards Internet Shopping and Web Interface Effects on Consumer Behaviour Research Streams

Based on the aforementioned analysis, the present study could be placed in two of the aforementioned categories. These are: (1) Web Atmospherics Effects on Consumer Behaviour (area (c) in Table 4), and (2) Web Site Design Effects on Consumer Behaviour (area (d) in Table 4). The study concentrates on investigating the store layout effects on consumer buying behaviour, which is a specific feature of store design (this refers to (d) in Table 4), placed under the generic umbrella of virtual store atmosphere effects on consumer behaviour. It should be noted, however, that both "virtual atmospherics" and "virtual store layout" constitute virtual store atmosphere determining factors (Vrechopoulos et al. 2000). Therefore, (1) and (2) above could alternatively constitute one, instead of two, research streams incorporating various research directions.

2.4. The Role of Store Atmosphere in Internet Retailing

The following section discusses the issue of conventional retail store atmosphere as a major influencing factor of consumer buying behaviour. Based on this analysis, the potential of transforming and testing established theory from conventional to Internet retailing follows. Particular emphasis is placed on the layout factor which is the core research issue of the present study. Layout constitutes one of the virtual retail mix elements (Siomkos and Vrechopoulos 2001) and a major consumer behaviour influencing factor in Internet Retailing (Lohse and Spiller 1999).

2.4.1. Conventional Retail Store Atmosphere

A store's environment is designed in such a way to positively affect customer perceptions, attraction and shopping behaviour, as well as store operations and employee morale (Mason et al. 1991). According to Lewison (1994), store atmosphere is the total sensory experience that a store creates. A successful store atmosphere facilitates the marketing exchange process, enhancing the value for the store's target customers, since the physical environment (i.e., atmosphere) in which the store sells its merchandise is an integral part of the exchange process (Ghosh 1994). A store's atmosphere should be completely consistent with the desired image of the store and the rest of the retail mix elements. Therefore, retailers design their stores in ways that produce specific emotional effects to buyers, which in turn influence their behaviour (Kotler 1973-4). Furthermore, according to Cox and Brittain (1996), the right atmosphere follows from a definition of the target customer market and the identification of their requirements.

According to Lewison (1994), the store environment/atmosphere in conventional retailing is determined by three major factors (Figure 15):

(a) ***Store images:*** Store image is the store's personality and it is comprised of external (e.g., storefront, building, etc.) and internal (e.g., layout of the departments, product display techniques, etc.) impressions. Retailer image is the "personality" of the retailer as perceived by consumers and a key ingredient in the establishment of the retailer's competitive advantage (Martineau 1958, Samli 1989). Retail store image and design is one of the most powerful tools in attracting and satisfying consumers (Lewison 1994). More specifically, retailers concentrate on store layout and design in order to meet the objective of influencing customer buying decisions (Levy and Weitz 1998). In other words, store design refers to the style or atmosphere of a store that helps project an image to the market, while store layout involves planning and designing the internal departments and deciding on the amount of space for each department towards influencing consumer behaviour within the store. Store design is an important image-creating element and should begin with an understanding of preferences, desires and expectations of the store's target market. Therefore, consumer behaviour analysis is an important tool for effectively developing the optimum store image through the employment of the most effective layout and design techniques.

(b) ***Store atmospherics:*** Atmospherics are the characteristics or physical elements of a store's interior which determine its atmosphere. Such characteristics include, among others: the lighting and colors (sight appeal), music (sound appeal), store flavor (scent appeal), ability to test a product (touch appeal), ability to taste a specific product through a sales promotion event (taste appeal). Atmospherics stimulate customers' perceptual and emotional responses and ultimately affect their purchase behaviour (Yalch and Spangenberg 1990, Smith and Burns 1996).

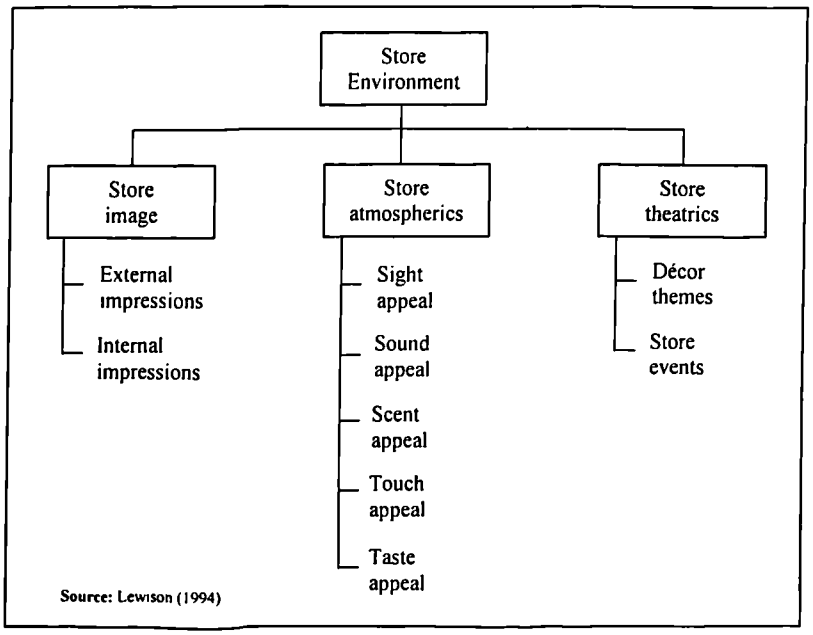


Figure 15: The Conventional Retail Store Environment

(c) ***Store theatrics:*** The notion of "retailing as a theater," or store theatrics which refers to the events and exhibitions taking place within the store, has become a powerful idea. Many retailers like to think of their store as a theater. Like the theater, store design and all its components should work in harmony to support the merchandise rather than compete against it (Levy and Weitz 1998). Store theatrics are based on the idea that a visit to a store is something more than just a shopping trip to purchase various products. Instead, it is more than that; it is entertainment, it is special events, star appearances and the like. Finally, it is proved that store theatrics help the store to increase its sales, build loyalty, and enhance its image (Lewison 1994).

The environment of a retail store is comprised of physical and psychological components. The first include tangible elements of form (e.g., building, land, equipment, fixtures) whose combination results in customer's convenience and comfort. The psychological environment, on the other hand, is the perceived atmospheric setting a

retailer creates, or the mental image of a store which is produced in customers' minds (Lewison 1994).

According to Kotler (1973-4), store atmosphere constitutes a competitive tool under three conditions: (a) the number of competitors is large and increasing, (b) differences among competitors' products and prices are small, and (c) new product introductions in the market target different consumer social classes and life-style groups.

Ghosh (1994, p.521) defines retail atmosphere as "the psychological effect of feeling created by a store's design and its physical surroundings." Music, lighting, or colours for example, may make a store appear cheerful or depressing, while video displays may evoke positive feelings in the shoppers' minds. In addition, consumers make purchase decisions by responding to more than the tangible product or service that is being offered by a store (Kotler 1973-4). Therefore, retailers design their stores in ways that produce specific emotional effects to buyers, which influence their behavior.

Four fundamental dimensions of store atmosphere are identified (Kotler 1973-4):

(a) visual (size, shape, color, lighting)
(b) aural (intensity, tone)
(c) olfactory (freshness, smell)
(d) tactile (temperature, softness, smoothness)

Furthermore, the factors that affect store atmosphere belong to three broad categories (Ghosh 1994, p.519):

(a) The physical environment in the store, which includes store design, merchandise layout and display.
(b) The store's support services, which include acceptance of credit cards, gift wrapping, and return policies.
(c) The efficiency of checkout and other services which are necessary for the completion of retail transactions.

Consumers develop perceptions of products, brands, as well as stores or retailers, based on their own evaluation criteria. Retailer image is therefore defined as the perception a retailer evokes in the mind of the consumer (Lindquist 1974-75). Retail store image is one of the most powerful components of a retail positioning strategy (Bovee et al. 1995) and one of the most powerful tools in attracting and satisfying consumers (Lewison 1994, Spies et al. 1997). However, it should be noted that according to findings in a

study by Oppewal et al. (2000), retailers are more reluctant to change the positioning and the image of the store when confronted with a sales increase than when confronted with a sales decrease. This means that the higher the sales the lower the probability of altering store images.

In sum, store image can be represented as a function of consumer evaluation criteria and perception of the store's characteristics:

Store Image = Total Store Perception by the Consumer

= f (Consumer Evaluation Criteria, Perception of Store Characteristics)

Finally, according to Levy and Weitz (1998), understanding customer needs and buying behaviour is critical for effective retail decision making. They state that when designing or redesigning a store, managers must consider three objectives:

(a) the store's atmosphere must be consistent with the store's image and overall strategy,

(b) the store design should help towards the objective of influencing customer's buying decisions and behaviours,

(c) bare in mind during the design decision process the fixed costs associated with the initial design as well as reoccuring costs.

As far as the second design objective is concerned, they support that retailers concentrate on store layout and space planning issues.

Along the same lines, Lewison (1994, p. 289) states that "selling floor layouts are extremely important because they strongly influence in-store traffic patterns, shopping atmosphere, shopping behaviour, and operational efficiency." Furthermore, Arnold et al. (1977, 1983) suggested that ease of navigating through the store is strongly associated with store perceived convenience.

2.4.2. Conventional Types of Retail Store Layout

The layout of a conventional retail store should maintain a balance between the available space to customers and the available space for the merchandise (product) displays. In

addition, store layout should be designed in such a way as to lure and influence customers to visit the entire store and buy more products than they have initially planned. There are three major types of store layout (Lewison 1994, Levy and Weitz 1998, Ghosh 1994, Mason et al. 1991, Cox and Brittain 1996):

(a) Grid

This is the most common type of layout primarily used by groceries and convenient stores that sell refreshments, magazines, etc. It is proved that the grid layout facilitates planned shopping behaviour providing consumers with flexibility in identifying their pre-selected products which appear on their shopping list, quickly. Therefore, it is widely used by the grocery sector as the majority of customers visiting grocery stores have planned their purchases.

The grid layout is a rectangular arrangement of displays and long aisles that generally run parallel to one another. It allows the most efficient use of selling space because the total product display space is significantly increased in comparison to other types of layout. Grid layout simplifies shopping by creating clear, distinct traffic aisles and therefore facilitates routine and planned shopping behaviour. However, the customer is forced to follow a certain path in the store (e.g., to reach another aisle the customer should drive through the central aisle). In the grid layout, merchandise is distributed in a structured geometric fashion. Products are placed in long aisles and "gondolas". Aisles and "gondolas" are distributed in a repetitive way as shown in Figure 16. As mentioned above, this pattern is mostly used by grocery stores in which customers can locate products very easily.

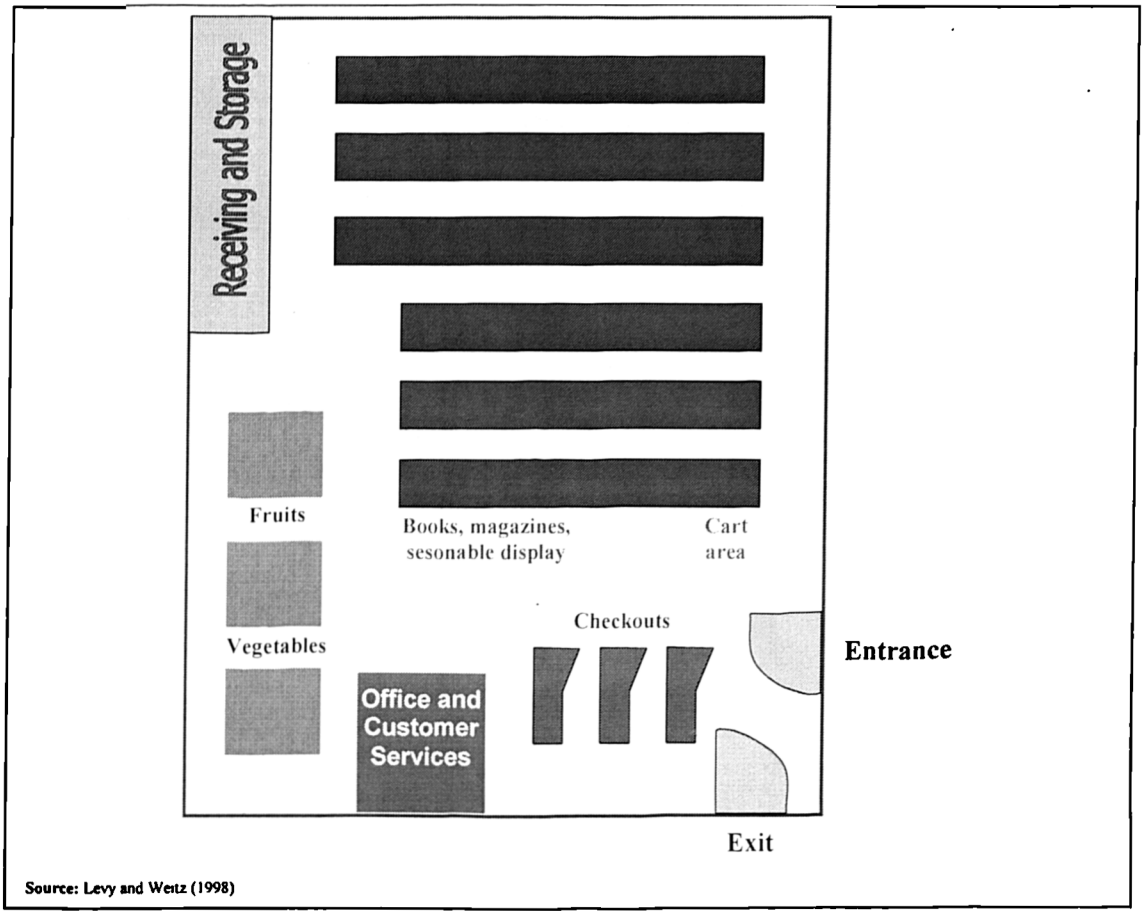


Figure 16: Grid Store Layout

However, the grid layout is not very aesthetically pleasing and creates a sterile atmosphere. Sometimes shoppers have to walk down long aisles in order to reach product(s) they are looking for. On the other hand, the grid layout is very cost efficient as space productivity is enhanced and thousands of products can be effectively placed within such a type of store layout. It should be noted that since grocery stores usually offer a wide variety and number of products, the employment of the grid layout seems to be an imperative decision. Since aisles and gondolas can have multiple self-levels, the amount of the merchandise displayed can be significantly higher than in any other type of layout.

The repetition of aisles and long gondolas is presented in Figure 16. Usually the customer can get in an aisle using one of the two main paths that are located on the left and on the right of the store. However, Figure 17 presents an alternative type of the grid layout. In this version, a central path is used to assist navigation and browsing by decreasing the time that customers should spend walking through the long aisles in order to reach another aisle within the store.

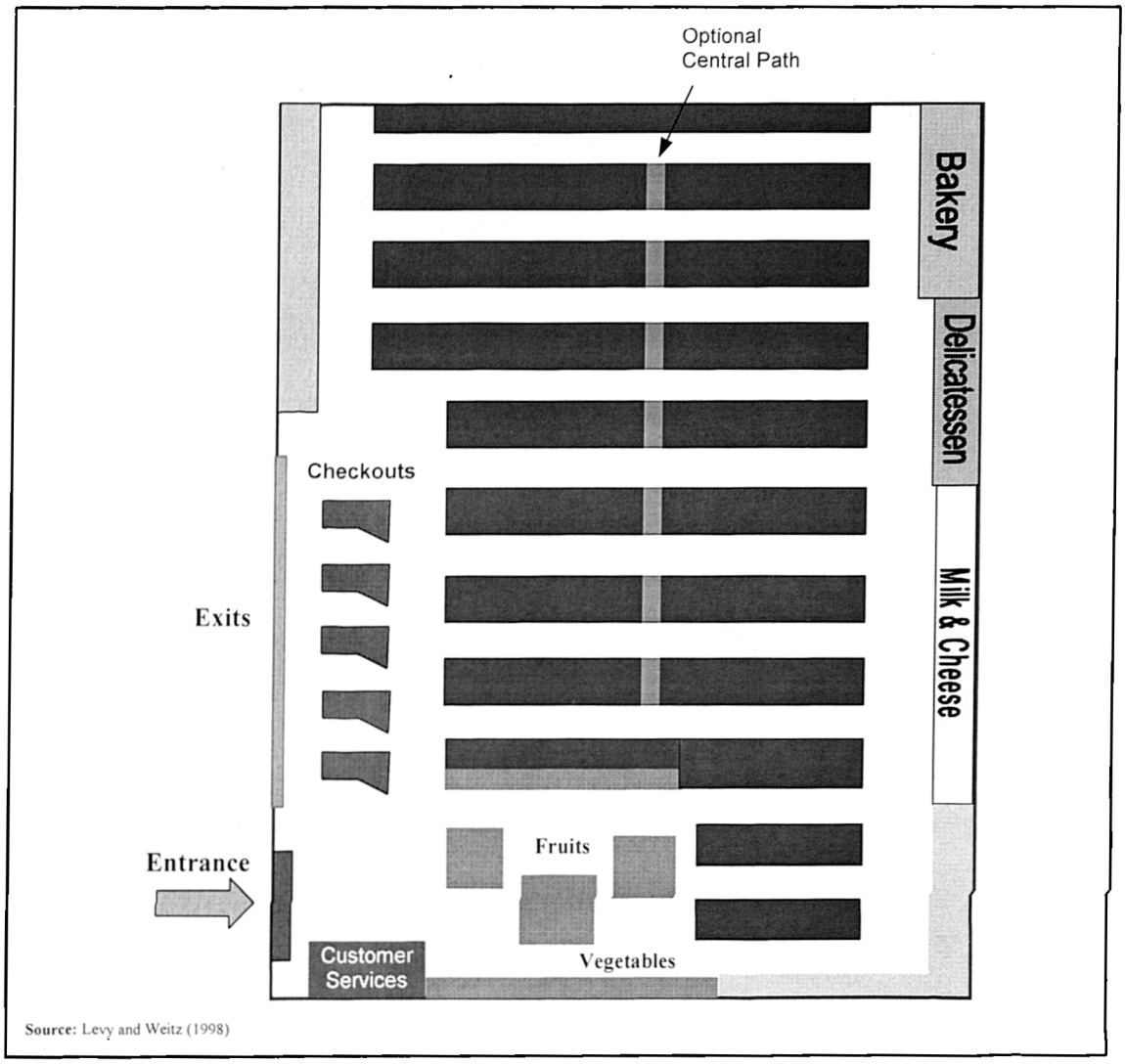


Figure 17: Alternative Store Layout based on Grid

Nevertheless, in all cases, the customer must return to one of the main aisles of the store in order to enter a different aisle. Customers that frequently visit a specific grocery store have a good knowledge of its store structure and therefore they can easily find their way to a specific product category or single product.

Usually, products are placed in the retail store based on category management principles and strategies. A customer getting into the store is confronted with some aisles or gondolas that are in front or near the store's entrance. They can even start navigating within a specific aisle, or through different gondolas, or even ask for guiding assistance from a store employee in order to quickly locate certain desired products.

(b) Free-form

The free-form layout arranges displays and aisles in a free-flowing pattern and asymmetric fashion, employing a variety of different sizes, shapes, and styles of displays. It is mainly used by large department stores (e.g., fashion stores) or smaller specialty stores in which the distinction among several departments is the basic managerial objective. In other words, the type of "shops-in-a-shop" is applied.

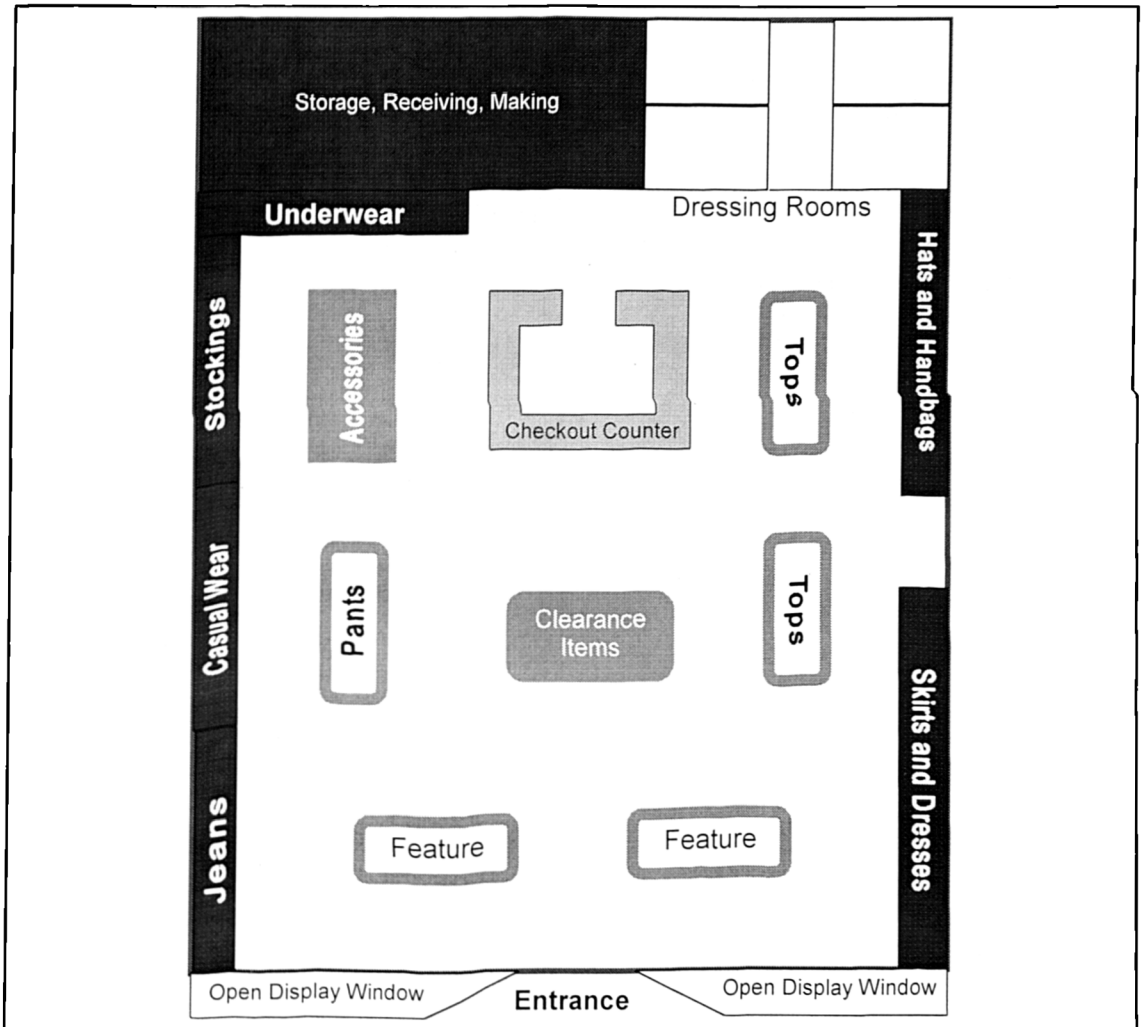


Figure 18: Free-Form Store Layout

The free-from layout was shown to increase the time that consumers are willing to spend in the store while enhancing the convenience during shopping activity (Levy and Weitz 1998, Lewison 1994).

To that end, the example of the Duty-free shops located at airports, is very representative. The majority of such kind of shops employs the free-form layout. One of

the main reasons behind this strategic decision is that these shops' target group consists of travelers who always have limited time for shopping, seeking convenience and ease in using store structure in order to conduct their shopping quickly.

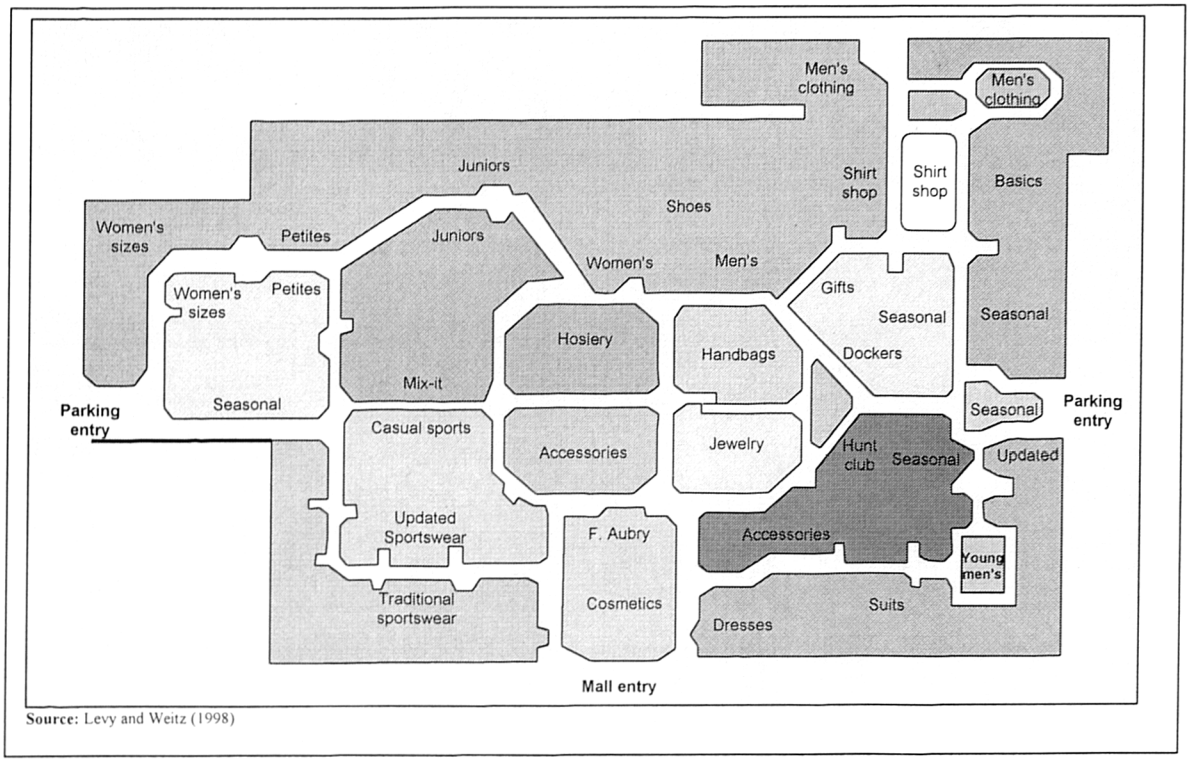
In this pattern, the customer enjoys considerably more freedom to move in any direction within the store. However, a free-form store sacrifices some storage and display space to create a more spacious environment. A typical free-from layout design is shown in Figure 18.

Once the customer enters into the store, he/she has visual access to almost every part of the store and almost all the product categories within the store. However, customers have a more precise and clear view of the products that are located near their current position. The direct view of the product categories or even single products along with the layout structure capabilities, enable customers to move directly to any direction within the store.

(c) Racetrack/Boutique

The racetrack/boutique layout arranges the sales floor into individual, semi-separate areas, each built around a particular shopping theme. The retailer who adopts this layout creates an unusual, interesting and entertaining shopping experience. The racetrack/boutique store layout leads the customer through specific paths to visit as many store sections or departments as possible since the main aisle/corridor facilitates customer movement in the store (Figure 19). Consequently, this layout pattern is appropriate to encourage shoppers to move throughout the entire store and, to visit more departments in comparison to other alternative store layouts. This implies that customers are exposed to more promotional activities than in stores employing the grid or the free-form layouts.

Furthermore, the racetrack store layout encourages impulse purchasing. This means that customers visiting stores employing the racetrack layout buy more products than initially planned in their shopping lists.



Source: Levy and Weitz (1998)

Figure 19: Example of a Racetrack Layout

In the racetrack pattern, the sections or departments are arranged in the form of individual specialty shops targeting specific market segments. It is therefore, particularly useful and suitable for large department stores. The racetrack layout (also known as "loop") provides a major aisle to facilitate main customer traffic. The aisle loops through the store provide access to boutiques (departments that resemble smaller stores). Minor loops can also be used and can be accessed through the main loop. Although this design does not offer an economical use of space, it does allow more complete and effective orientation of design geared to specific target groups. The placement and distribution of departments is very important. For example, the most important departments can be placed toward the rear of the store and the newest items can be placed along the main aisle.

However, the decision regarding the optimum assortment of departments and their corresponding product categories and products within the store, is based on category management principles and strategies under the umbrella of the ECR (Efficient Consumer Response) initiative in the retailing sector.

As soon as customers enter the store, they face only those product categories that are placed near its entrance. Therefore, in order to reach other product categories, customers should follow one of the corridors beginning at the entrance of the store. Since

customers do not have visual access to all product categories at once, they may spend time on browsing the product categories that are located along the corridors that they follow/navigate through, until they reach the product category they are looking for.

This layout does not impose a strict geometric structure on aisles and gondolas as the grid layout does. However, a number of major and minor loops of corridors are used. This layout therefore, incorporates some elements from both the grid (i.e., aisles) and the free-from (i.e., displays/departments) layouts.

Customers are able to have different viewing angles to different categories of products although limited compared to the number of different viewing angles offered by the free-form and grid layouts. Therefore, they are "forced" to focus on a limited number of products each time during a shopping trip. This constitutes one of the main reasons that this particular layout encourages impulse purchasing and promotion effectiveness.

2.4.3. Indicative Store Atmosphere Studies

Obermiller and Bitner (1984) supported that the importance of atmospherics in brand evaluation may vary by level of involvement and product type. Gardner (1985) suggested ways in which in-store point-of-purchase settings may affect consumer mood states, which in turn may affect in-store beliefs and evaluations. Gardner and Siomkos (1986) investigated methodologically the influence of atmospherics on consumer perceptions of physical sensations caused by products in a store. Their study's findings supported the feasibility of simulating store atmospherics with written descriptions. Such descriptions proved to systematically affect consumer perceptions of physical sensations. Needel (1998) presented a virtual reality shopping simulation, known as "Visionary Shopper," which allows researchers to consider the sales implications of changing product assortments and layouts in the store without the cost, timing, or other difficulties of in-store testing. He also states (pp. 66-67) that "such systems can create reasonable simulations of retail environments and let researchers make inferences regarding the effects of changes in the store layout on the consumer buying behaviour, quickly, cost effectively and reliably, providing them with a powerful tool for understanding the consumer responses to changes in the retail environment." Park et al. (1989) studied the effects of knowledge of the store design on shoppers' behaviour. They found that store design knowledge, regardless of shoppers' time availability, has a positive effect on the absolute levels of consumers' brand or product switching. Bellizi

and Hite (1992) showed that the creative use of colour can enhance a store's image. The study showed that cool colours (i.e., blue, green) have opposite physiological and psychological effects than warm colours (i.e., yellow, red). Warm colours were found to increase respiratory rate and blood pressure, and attract customer attention, although sometimes they could be unpleasant or distracting. Machleit et al. (1994) and Eroglu and Machleit (1999) studied consumer perceptions about crowding in retail stores. They found that crowding may potentially influence consumer responses either positively or negatively. Additionally, crowding in a store is sensed by shoppers when the store's environment is judged to be "dysfunctionally dense." Such judgements depend on time pressure, expectations and personal tolerance level of each individual shopper. Koelemeijer and Oppewal (1999) ran an experiment among members of a large existing consumer panel in the Netherlands. In an application to florist stores, they found that in-store purchase decisions are affected by the size and composition of the assortment as well as by the presence of a competing store. However, in-store purchase decisions were found to not being affected by store ambience. More specifically, they found that in-store decisions of customers about whether to purchase at the present store, at a competing store, or to not purchase at all, are not much affected by the store's ambience. Areni and Kim (1994) studied lighting's influence on consumer behaviour in the store. They conducted an experiment in a central retail store using soft and luminous lighting in different time intervals. The study showed that a more luminous lighting inside the store resulted in shoppers' increased browsing of the merchandise. However, total sales were not affected by lighting. Finally, a study by Schlosser (1998) concluded that store atmosphere influences consumer perceptions of social identity products, while it has little effect on perceptions of utilitarian products. The same study indicated that store atmosphere elicited different shopping motives and purchasing intentions.

2.4.4. Corresponding Conventional to Virtual Store Atmosphere Components

Based on the findings of relevant research initiatives presented above, it is clear that there are many factors which constitute the virtual retail store atmosphere. As also discussed above, a comprehensive model of Internet consumer satisfaction and loyalty developed by Lee and presented in Gehrke et al.'s (1999) study, demonstrates the important role of a successful Web storefront towards consumer satisfaction. According to this model, security, reliability, speed of operation, ease of use (convenience) and

content are the factors that determine the Web-site storefront effectiveness (Figure 20 – "Key Web Driven Determinants" part of the model). It should be noted that the "personalization" factor was also added to this model. Based both on this model and on Lewison's (1994) retail store environment model (Figure 15), Vrechopoulos et al. (2000) introduced the VIrtual REtail STore ATmosphere Model (VIRESTAM) aiming at providing a comprehensive model for the development of an effective Web site shopping environment/atmosphere (Figure 20). Virtual retailers could employ this model as a research instrument towards measuring the impact and influence of the various virtual store atmosphere factors/variables on the consumer buying behaviour within a virtual shopping environment over the Internet. The proposed model demonstrates the transformation procedure of the conventional retail environment components to the corresponding determinants of the virtual retail environment by incorporating the key Web-driven determinants. This procedure should take input from the following research streams:

- ***Consumer behaviour analysis*** (e.g. consumer surveys focusing on Internet shoppers): It is extremely important for the virtual retailer to collect information about potential customers of the virtual store in order to incorporate their needs, wishes and preferences in the design and development phase of the virtual store environment. To satisfy customer needs, retailers must thoroughly understand how customers make store choice and purchase decisions. Levy and Weitz (1998) proposed a multiattribute model which indicates what information customers use to decide which store to visit. Based on that model, in order to develop a programme for attracting customers, the retailer must conduct market research to collect the following information: (a) alternative stores that customers consider, (b) characteristics or benefits that customers consider when making their store evaluation and choice, (c) customers' ratings of each store's performance on the characteristics, and (d) the importance weights that customers attach to the characteristics. Such type of information is crucial for the effective transformation of the conventional retail environment determinants to the virtual ones. Armed with this information, the retailer can use several approaches and user interface design methods to influence customers and build brand loyalty, ensuring frequent shopping and customer satisfaction.

- ***Strategic Marketing planning***: The virtual retailer should design the store based not only on consumer behaviour analysis feedback but also on the combination of this feedback with the strategic marketing planning guidelines of the company.

- ***HCI principles***: Human Computer Interaction provides the principles/guidelines for the effective transformation of the existing retail management tools in the virtual marketplace, in the sense that it contributes to the effective "casting" of the conventional retail environment determinants within a human-computer interface environment. It sets some "presentation constraints" and design guidelines while generating many alternative presentation scenarios within the Web trading environment context.

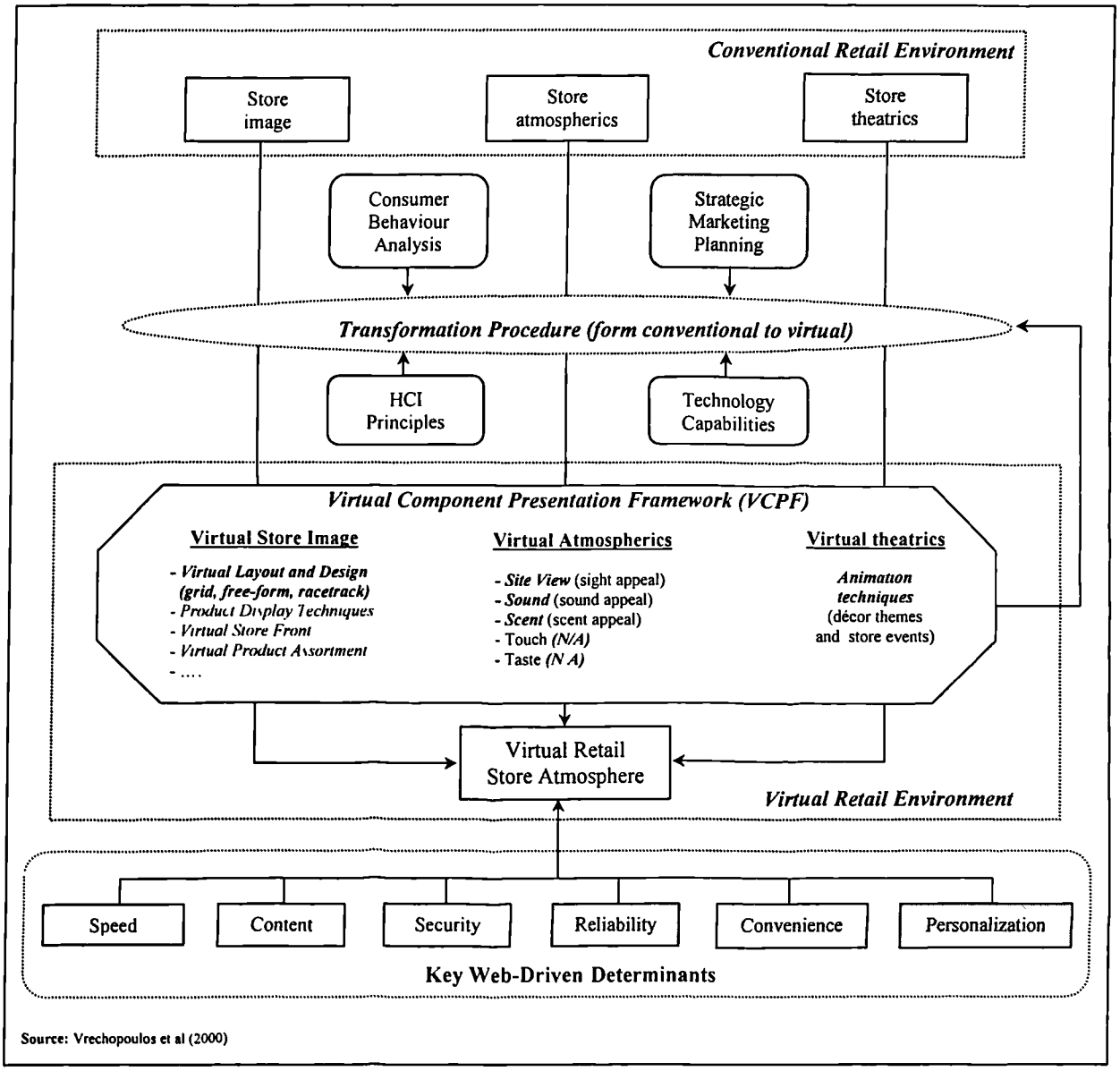


Figure 20: The VIrtual REtail STore Atmosphere Model (VIRESTAM)

- ***Technology capabilities***: The designers of such systems should always be aware of "state of the art" technology capabilities which should act not only as a supporting function, but rather as an "idea generation mechanism". For example, Digiscent

(www.digiscents.com) offers the "scent" alternative to its customers through its Web store (customers can smell the displayed perfumes) enabling through that virtual retailers to apply the "scent" virtual atmospheric service.

It should be noted that the creation of an effective virtual store atmosphere is based on the optimum combination of the key Web-driven determinants and the Virtual Component Presentation Framework (VCPF).

The Virtual Component Presentation Framework (VCPF), as a part of the VIRESTAM model, includes the three transformed components of the conventional retailing environment: **(a) store image:** based on Lewison's model (1994 – Figure 15), it is evident that the store image when applied on the Web, includes only the internal store impressions since the external ones (e.g., building) are not applicable, **(b) store atmospherics**: it is apparent that the application of the conventional "touch" and "taste" tools within the context of Web retailing is not applicable due to the new shopping medium constraints, and **(c) and store theatrics**: these can be effectively implemented within a Web shopping interface through the use of animation techniques.

As far as the virtual layout and design component is concerned, Figure 21 presents the transformation of the three fundamental alternative conventional retail store layout patterns to the corresponding virtual ones, following the same concept, rules and navigation capabilities applicable in conventional retailing (Vrechopoulos et al. 2000). The three transformed layouts are described below:

(a) The ***"tree or hub"*** structure ("grid" in conventional retailing), where customers should pass through a hub (e.g., home page, product catalogue) in order to enter another product category either by utilizing the back-forward facility or the existing links. This structure simulates conventional retailing's grid type of layout, where customers should pass through the main aisles of the store in order to reach another product category. More specifically, the shopper in a conventional retail store can not approach at once different product categories located in aisles far apart from one another. Correspondingly, in the virtual store, shoppers' freedom could also be limited via navigation constraints. In its virtual version, the grid type of store layout provides customers the alternative to select a product category through an hierarchical/tree format. Finally, all products belonging to a specific product category are demonstrated to customers in a seperate Web page.

(b) The ***"pipeline"*** structure ("free form" in conventional retailing), where customers can access every product category in the store directly, by utilizing the multiple links provided at each Web page of the store. This means that customers are able to locate and buy their desired products at once. Thus, comparing this type of layout to the other two types it becomes apparent that it enables customers to conduct their purchases faster.

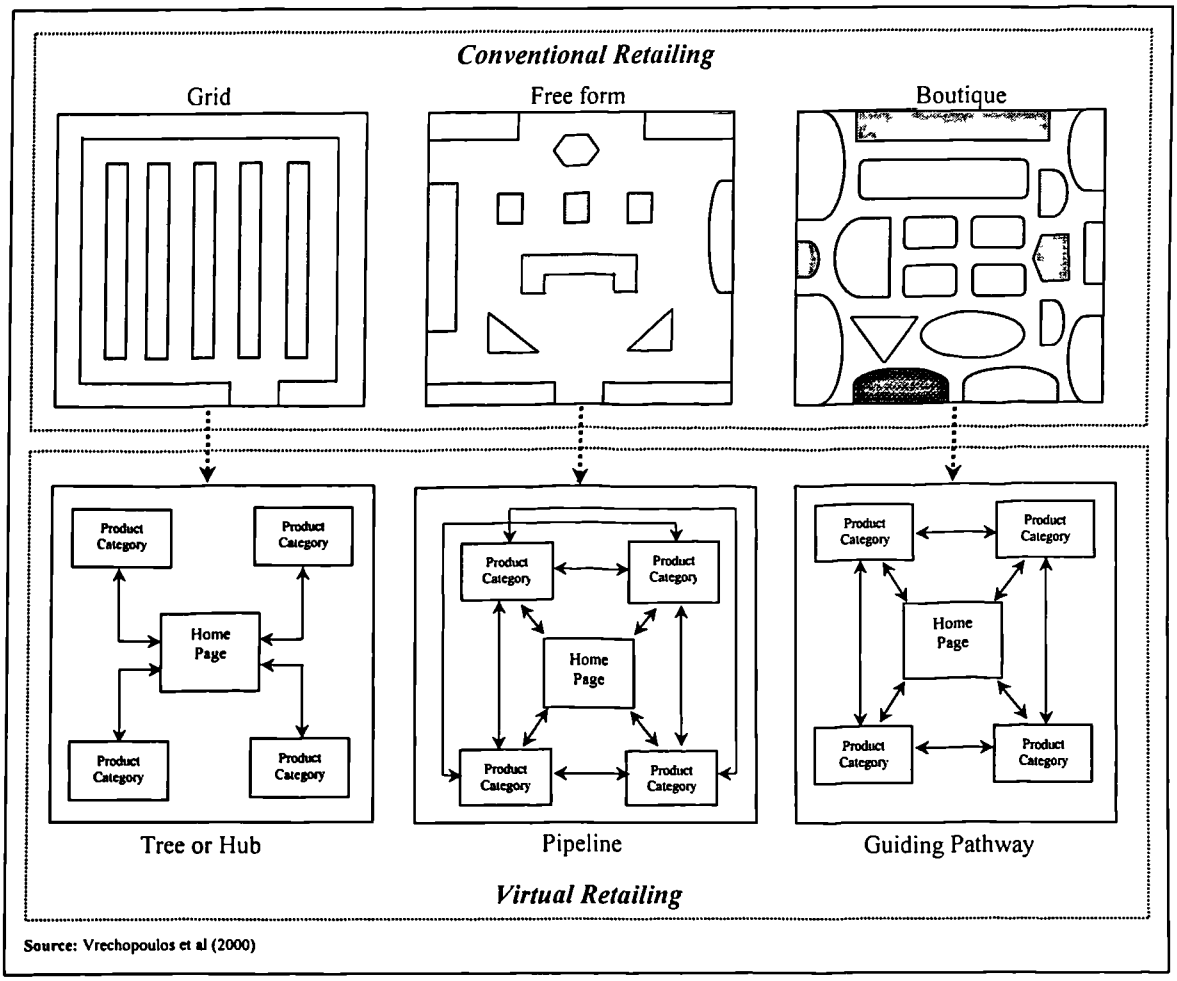


Figure 21: The Corresponding Store Layout Alternatives for Virtual Retailing

(c) The ***"guiding pathway"*** structure ("racetrack/boutique" in conventional retailing), where customers are guided by the system to navigate through specific paths of the store in order to reach the products they want. The racetrack type of store layout can be simulated through compulsory back-forward navigation, while the only links provided enable customers to reach only neigbouring product categories either directly (from one category to another) or by navigating through the corridor in which they are at a point in time.

Based on this transformation scheme, Vrechopoulos et al. (2001b) run an Internet survey focusing on existing virtual retail stores on the Web in order to present the status of the existing types of layouts and design issues, in general. They used the aforementioned corresponding layout alternatives, adopted for virtual retailing, as the main layout-classification instrument. One of the findings was that almost half of the examined Web sites (i.e., 51,3%) employed a "pipeline" layout.

On the other hand, "virtual atmospherics" include the following dimensions:

- site view (e.g., colour, brightness, size, shape, etc.)
- sound (e.g., background music, rhythm and intensity)
- scent (e.g., applied in cosmetics)

As far as the site view dimension of virtual atmospherics is concerned, colour and brightness are similar to the conventional characteristics. Information technology applications enable designers and developers of a virtual retail store to transfer accurately both colour and brightness of store elements on the screen. On the contrary, size and shape in a virtual environment refer to the images on the screen. The virtual store shopper has many more alternatives than the conventional store customer in terms of customization of his/her personal information needs. Many sites provide options for adjusting the size and shape of the virtual store components like virtual shelves, virtual aisles, images of products, shopping basket, advertising frames, searching machines, etc. The sound dimension in the virtual environment can be optionally introduced by the store designer through background music which the customer has the option to shut off. Since the customer has this option, the appropriate selection of rhythm and intensity of the music background for the virtual shop is significant. Finally, as mentioned above, touch and taste dimensions are not applicable.

Theatrical effects appeal to the shopper's need for hedonic consumption or the psychological and social experience that he/she seeks through shopping. In the virtual store environment theatrical effects are implemented through the use of animation (e.g., an on-line demonstration of a product). Animation can offer shoppers feelings of excitement, pleasant mood and enthusiasm. The use of video animation in retail sites is increasingly becoming wider, capitalizing on the technological advances, which can customize animation to fit the specific user's requirements.

On the other hand, factors like content, security, reliability, speed, convenience and personalization contribute significantly to the creation of an effective virtual retail store

environment. These key Web-driven determinants of the Web-site storefront contribute significantly to the creation of an optimum store atmosphere within a virtual retail store having an effect on customer satisfaction and loyalty. According to Vrechopoulos et al. (2000), these factors depend heavily on: (a) available technology capabilities (i.e., contribute to speed, security), (b) design/development expertise (i.e., contribute to convenience, personalization), (c) strategic alliances and brand name image (i.e., contribute to security, reliability), (d) knowledge and information databases (i.e., contribute to personalization and content provision), and (e) multidisciplinary approach (i.e., contribute to convenience and personalisation).

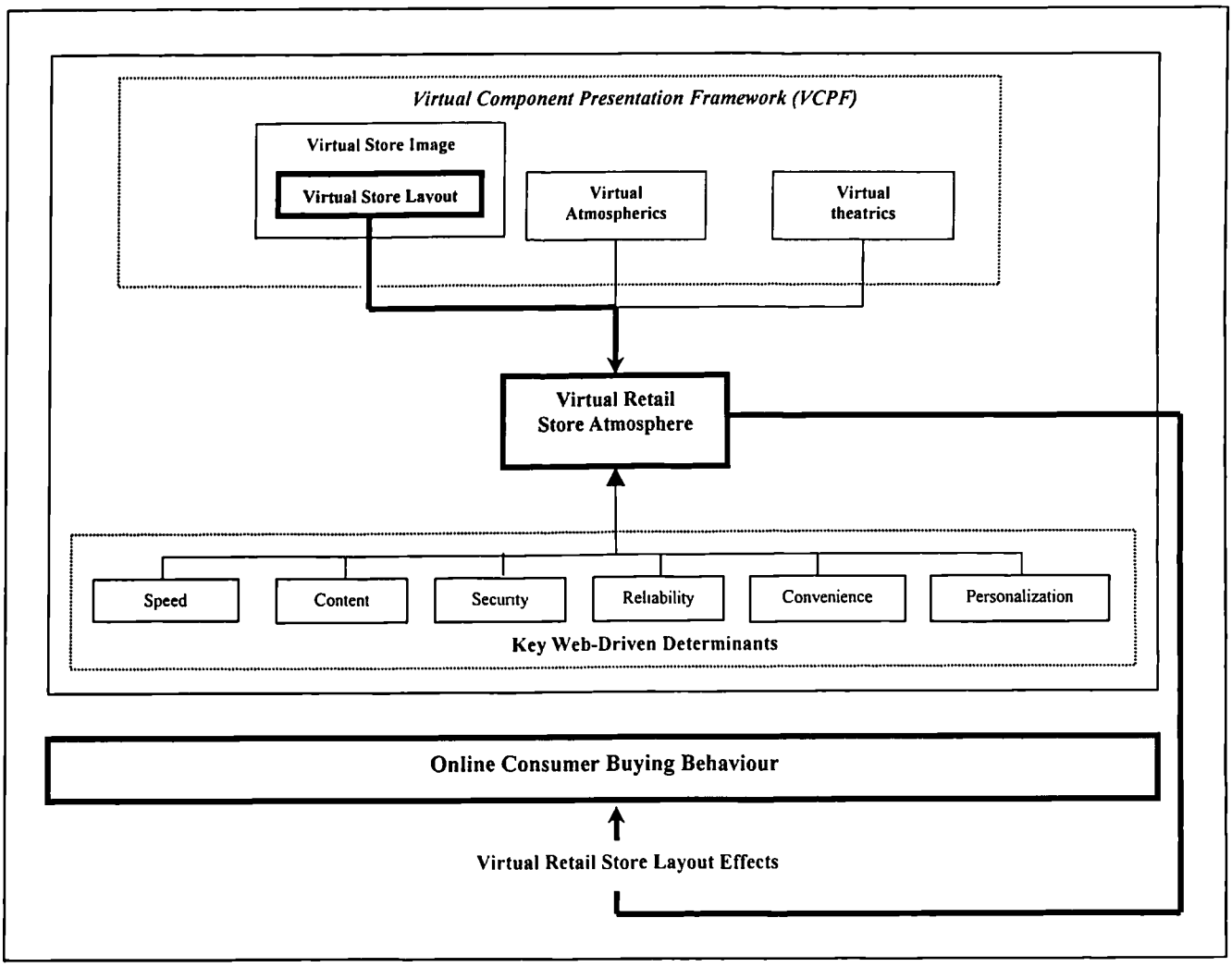


Figure 22: The Research Focus of the Study

Figure 22, which is derived from Figure 20, clearly presents the research focus of the present study. More specifically, the present study focuses on the investigation and measurement of virtual store layout effects on consumer buying behaviour. It is apparent, however, that virtual store layout constitutes just one of the virtual store image and furthermore one of the virtual store atmosphere determinants. Therefore, in order to

provide enhanced and reliable findings, the consumer behaviour effects caused by other determinants (e.g., virtual atmospherics, virtual theatrics, etc.) should be controlled. For example, a researcher aiming to effectively measure consumer purchase behaviour effects caused by the store's layout (either in conventional or virtual retailing) through a laboratory or field experiment, should control possible effects caused by other store variables. This could be effectively implemented by changing the store layout within certain periods of time, while keeping all other store atmosphere and also other determinants (e.g., prices, product variety, etc.) the same. Through that, potential changes in behavioural patterns can be more easily explained (i.e., causal type of research). Similarly, such kind of research should also pay great attention to keeping all other attributes characterised as "potential consumer behaviour influencing factors" (i.e., speed, content, security, personalization, etc.) the same, while retaining layout as the only differentiating factor among the three alternative versions of the laboratory virtual store.

In addition, based on the research findings of the present study, feedback to the VIRESTAM (Vrechopoulos et al. 2000) presented in Figure 20, was provided. More specifically, this research aims to test whether the virtual retail store layout constitutes a consumer buying behaviour influencing factor within Internet Retailing. In other words, this research aims to test whether consumers visiting virtual retail stores over the Internet have any particular preference for a specific type of layout. Moreover, the present research findings revealed whether or not the layout effects on consumer buying behaviour are different or not compared to the corresponding effects in conventional retailing (e.g., is the grid the most effective layout also for grocery stores over the Web?). The use of the three conventional layout formats allows for such kind of direct comparison. All these were implemented by investigating and measuring the store layout effects on customers buying behaviour. Therefore, VIRESTAM model formed the basis upon which the specific research question was generated. In addition, the part of the VIRESTAM model which refers to the layout *contribution to the virtual store* atmosphere which in turn influences consumer behaviour, was tested at the end, based on the feedback provided by the research findings.

2.4.5. Web Shopping Personalisation Capability: Key Research Issues

Theoretically, a virtual store can be laid out in any way an individual shopper wishes to have it. Virtual stores can be very easily customized to fit individual consumer needs.

The virtual retailer can respond to different consumer demands very fast by simply adjusting the software and leaving the physical surroundings of the store intact. Palmer et al. (2000) state that Internet grocery shopping, technology enabled, provides the opportunity to companies to develop rich customer relationships through customizing and personalizing the transaction process.

A critical issue as far as Web trading is concerned, deals with the fact that technology capabilities are sometimes treated as a "panacea" for business effectiveness. This means that in many cases there is not any significant attention paid on what Internet retailing theory dictates.

The personalisation capability of the shopping interface to the specific needs and wishes of individual customers raises many research issues. For example, the fact is that "technology enabled" customers could be easily offered the "full-capability" situation of creating the shopping environment based on their own preferences and wishes and on the alternatives provided. According to Field (1996), customers within the Internet environment can control the nature of the relationship, the way products are structured, and the way products and services are promoted and presented. This means that customers could for example, select the colour, the music, the store layout, etc., right before beginning their shopping activity. However, this scenario of providing such kind of "independence" to customers would not allow the virtual retailer to apply its marketing strategies effectively (Vrechopoulos et al. 2000). To that end, the following questions are raised:

- **Impulse purchasing:** how can virtual retailers increase impulse purchasing within a limited space (i.e., Web interface) and a limited shopping interaction time (i.e., quick information search and purchasing of products) compared to conventional retailing?

- **Shopping time and promotion:** how can virtual retailers make their customers spend more time in their stores than initially planned and promote their products more effectively?

More specifically, the one-to-one communication capability through a tailored user interface should be mainly controlled by the virtual retailer and not by the customer. In other words, the retailer should be the one who decides about the degree and type of freedom that should be provided to each customer individually. Thereby, the virtual

retailer can capitalize on technology capabilities and effectively utilize consumer and market data in order to design personalized shopping environments by matching the company's strategic marketing objectives and customer wishes. However, customers should be provided at least with the "feeling of participating in the personalization process of the virtual store." In other words, the personalization procedure of the virtual store interface should be mainly conducted by the virtual retailer and not by the customers in order for the virtual retailer to be able to influence them during their shopping activity. This constitutes a very "critical success factor" for virtual retailing. For example, a customer may prefer the grid layout when visiting a specific virtual retail store. However, the virtual retailer has clear evidence that this specific customer spends more money when he/she visits the free-form layout. In addition, the virtual retailer knows (e.g., through personalized consumer survey findings) that the layout type does not constitute a store-selection criterion for the specific customer, which implies that the specific customer is a loyal one and will continue to conduct purchases from the same virtual store independently of the type of layout that this specific store provides to him/her. Therefore, in case the virtual retailer provides him/her the alternative for selecting the desired layout (grid), the specific customer will spend less money than in the case of visiting the free-form layout. In this example it is apparent that the virtual retailer should continuously monitor the layout factor as a store-selection criterion for the specific customer. In case it is revealed that store layout constitutes a store-selection criterion for the specific customer, the virtual retailer should directly provide to him/her the desired layout in order to keep him/her as a customer. Otherwise, the virtual retailer can keep on offering to him/her the layout which proved to increase sales (i.e., the free-form in this case).

Along the same lines, a search facility, which enables customers to locate their desired products at once, may not always serve the objectives of the retail store. For example, "impulse" purchasing products (e.g., beers, chewing gums, etc.) should somehow be presented to the customers during the interaction process. This means that whenever customers use the search facility in order to locate and purchase their "shopping list-products" (planned purchases), the impulse products may not be able to be promoted and communicated to these customers due to the limited "interaction time" and "interface space" within the virtual store. As presented above, racetrack layout in conventional retailing, is a type of store design that encourages impulse purchasing as customers' eyes are forced to take different viewing angles at a limited number of product categories each time, instead of looking down one aisle as in the grid design, or looking at all product categories at once as in the free-form layout (Levy and Weitz 1998).

Consequently, virtual store's management should identify the type of layout that could both serve customer's specific needs as well as store's business objectives (e.g., impulse purchases increase).

However, according to Pramataris et al. (2000a), at the moment most of the retail Web sites implementing personalization techniques keep their stores' structure and layout the same (i.e., amazon, sainsbury's, etc.). This means that they apply personalization techniques into, other than the layout, specific cases (i.e., personalised product recommendation, personalized e-mails, personalized advertisements, etc.). These virtual retailers provide the same layout to all their customers even for a quite long period of time. However, there are many cases when alternative ways of purchasing products are offered (i.e., one-click-to-purchase approach of Amazon.com and 1-800-Flowers). Thus, customers are able to navigate through an alternative other than the usual layout towards purchasing their desired products. However, also this case does not constitute a "layout personalization" service implemented by the Web site, but rather, it is an alternative shopping method offered to customers to conduct their purchases. Based on that, it should be clarified that the objective of the present study is not to introduce a "layout personalization framework", but rather to first of all test whether the layout affects consumer buying behaviour over the Web and then based on that, to introduce (if applicable) an optimum layout pattern for Internet retailing. Such a research, therefore, will undoubtedly contribute both to the "Internet retailing store layout" theory development and to the provision of direct managerial implications.

2.5. Summary

In this Chapter, the role of strategic marketing planning and consumer buying behaviour research towards Internet Retailing were investigated. Human Computer Interaction principles and guidelines towards effective Web design were also discussed, as they constitute important tools towards designing effective Web shopping interfaces. Particular emphasis was placed on the store atmosphere as a major consumer buying behaviour influencing factor both for conventional and virtual retailing. However, store layout, as a major determinant of store atmosphere, was more in depth investigated, since it constitutes the main research topic of the present study. Furthermore, several studies measuring the effects of store atmosphere on consumer buying behaviour both in

conventional and virtual retailing were also discussed. Based on this review, the specific research questions and objectives of the present study were clearly formed.

The next Chapter proceeds with the discussion of the methodology followed in order to meet the specific objectives of the present study and provide meaningful and contributing answers to the research questions developed herein.

CHAPTER 3. RESEARCH METHODOLOGY

The purpose of this Chapter is to elaborate on the methodology followed towards meeting the objectives of the present study and answering to the corresponding research questions formulated in Chapter 2. Therefore, the Chapter begins with formulating the research hypotheses, which are generated based on the literature review conducted in Chapter 2. Then it proceeds with presenting the methodological steps followed towards testing these hypotheses. Great emphasis is placed on discussing the research design and the corresponding research model adopted by the present study. At the end, this Chapter discusses the marketing research tools used to process the present study's results.

3.1. Research Hypotheses

The following research hypotheses were developed in light of major research findings from the existing literature and the research objectives presented in Chapter 1. They investigate the effects of the virtual store layout on consumers who have already planned their purchases before entering the store. According to Mason et al. (1991), Lewison (1994), Ghosh (1994), and Levy and Weitz (1998), consumers visiting conventional grocery stores normally plan their purchases before entering the stores. In other words, grocery shopping refers to a routine shopping behaviour in the sense that customers usually plan their purchases, developing lists of products before visiting conventional grocery stores, based on their needs. Planned purchases may refer either to cases where customers fill out a shopping list before visiting the store or at least have in their minds such a list of products. It is apparent that customers served by the grocery sector know their needs well both in the cases of conventional and electronic retailing, as these needs are characterised by certain replenishment rates (e.g., 5 cartons of milk per week, 1 bottle of whiskey per month, 2 boxes of detergent bimonthly, etc.) which are known to each customer in the context of his/her household replenishment process. While most customers plan their shopping before entering a conventional grocery store, increasingly they are making decisions regarding the specific products they will buy only after they are in the store, where they are influenced by a series of factors (Cobb and Hoyer 1986). Thus, as also discussed in Chapter 2, a store's layout can probably have a significant impact on consumer purchases. The following hypotheses therefore, aim to test whether consumers with planned shopping behaviour, have a particular preference for a specific type of Internet grocery store layout, or not.

H1: Consumers perceive the grid layout as more useful than the freeform and racetrack layouts, as it facilitates their shopping activity towards searching for and buying the products on their shopping list.

The basis for this hypothesis lies with consistent research conclusions from conventional retailing case analyses, according to which, the grid layout facilitates routine and planned shopping behaviour (Lewison 1994, Ghosh 1994, Mason et al. 1991, Levy and Weitz 1998, Cox and Brittain 1996), providing consumers with flexibility in identifying and purchasing their pre-selected products quickly. Referring to the grid pattern in particular, Ghosh (1994, p. 525), claims that it "helps customers develop routine patterns of movement through the store so they can shop quickly." In general, however, Davis (1989) states that a system that requires less effort is perceived to be more favourable than a system that requires more effort.

H2: Internet grocery store customers perceive free-form layout stores as easier to use, than other stores employing the grid or the racetrack layouts.

Davis (1989, p.320) defines ease of use has been defined as "the degree to which a person believes that using a particular system would be free of effort." According to research findings by Jarvenpaa and Todd (1997) and Bhatnagar et al. (2000), shopping through the Web makes shopping easy (ease of use). In addition, Mason et al. (1991) showed that the free-form layout pattern in conventional retailing cases is designed for customer convenience and allows customers to move in any direction within the store easily and wander freely. Furthermore, Ghosh (1994) supports that low displays, as a basic characteristic of stores employing the free-from layout, make the entire selling floor visible from any point in the store, allowing therefore, customers to easily navigate within it. Thus, this hypothesis tests whether consumers, evaluate the free-form layout, compared to the grid and racetrack layouts, as the easiest (most convenient) to shop from. In other words, H2 tests whether the free-form layout enhances convenience and ease of using the store during shopping activity within an Internet grocery store as it does in conventional retailing (Mason et al. 1991).

H3: The racetrack layout of the virtual grocery store, in comparison to the grid and free-form layouts, offers more entertainment during shopping activity to customers.

Hypothesis H3 draws from relevant research findings (Cox and Britain 1986, Mason et al. 1991, Lewison 1994, Ghosh 1994, Levy and Weitz 1998) in conventional retailing cases. According to these findings, the retailer who adopts the racetrack layout creates an unusual and interesting shopping experience offering through that entertainment to its customers. Therefore, this hypotheses tests whether an Internet retail store employing the racetrack layout also offers significantly more, than the other two layouts, entertainment to the customers visiting it.

H4: Consumers spend more shopping time within an Internet grocery store employing the free–form layout than in Internet grocery stores employing the other two layout patterns (i.e., racetrack and grid).

According to Herrington and Capella (1995), store layout decisions certainly relate to the issue of the time that customers spend for shopping. In addition, according to Eroglu et al. (2001) the virtual retail store layout influences the time that customers spend within a Web site. Furthermore, Heijden (2000) and Li et al. (1999) state that Web site characteristics determine the duration of a Website visit. Furthermore, Hypothesis H3 draws from relevant research findings in conventional retailing cases, in which free-from layout was shown to increase the time that consumers are willing to spend in the store (Lewison 1994, Levy and Weitz 1998). However, as the present study deals with the grocery sector, the aim of this hypothesis is to focus on the planned shopping behaviour and test whether the free-form layout is the one that makes customers spend more time within an Internet grocery store. Despite the fact that the free-form layout is not commonly used by conventional grocery stores, H4 tests free-form effects in the Internet grocery sector. In testing this hypothesis, the "real time" that customers spend in different layout types of the virtual grocery store was measured and examined.

H5: The percentage of total sales, which reflects purchases of promotional items by consumers, is greater within an Internet grocery store employing the racetrack layout than one employing either a grid or a freeform layout.

In conventional retailing cases, racetrack store layout leads the customer to visit as many store sections or departments as possible through specific paths. This means that customers are "forced" to focus on a limited number of products each time during their shopping trip and, therefore, promotion effectiveness is enhanced (Lewison 1994, Levy and Weitz 1998). In addition, according to Ghosh (1994), customers visiting stores employing the racetrack layout, are exposed to almost all the departments of these stores. Furthermore, dissimilar shapes commonly used by racetrack layouts displays, create contrast and a point of emphasis in the store, enhancing therefore promotion effectiveness (Mills and Paul 1974). This implies that racetrack store customers may be exposed to more promotional activities than in stores employing the grid or the free-form layout. Thus, this hypothesis tests whether the racetrack layout of the virtual grocery store encourages customers to buy more promoted products (as a percentage of their total purchases) compared to customers visiting stores that employ the other two layouts. It should be noted that this percentage both refers to the budget spent for purchasing promoted products and to the number of different promoted products purchased. Therefore, this specific hypothesis will be tested in two ways.

H6: The racetrack layout of an Internet grocery store, in comparison to the grid and free-form layouts, makes customers purchase more products ("impulse purchasing") than initially planned in their shopping lists.

As proved in conventional retailing cases, racetrack store layout encourages impulse purchasing (Lewison 1994, Ghosh 1994, Levy and Weitz 1998). All departments within a store employing the racetrack layout have frontage onto the loops of the store. This channels the flow of shoppers through the entire store, exposing them to all the departments, therefore encouraging browsing and impulse buying at many departments. Thus, hypothesis tests whether the racetrack layout of the virtual grocery store in comparison to the freeform and grid layouts, encourages impulse purchasing as it does in conventional retailing.

3.2. Analysis Variables and Measuring Methods

Based on the research hypotheses presented above, two types of dependent variables were developed: those that will be measured directly by the system (i.e., sales of promotional items, shopping time, sales of non-shopping lists type of products) and

those (i.e., perceived usefulness, ease of use, entertainment) that must be measured through the use of other data collection instruments (i.e., questionnaires, etc.)

Constructs

According to Hair et al. (1992, p.428), a construct is "...a concept that the researcher can define in conceptual terms, but which cannot be directly measured (e.g., the respondent cannot articulate a single response that will totally and perfectly provide a measure of the concept) or measure without error. Constructs are the basis for forming causal relationships as they are the "purest" representation of a concept possible." Furthermore, constructs are nonobservables, while variables, are observables when operationally defined (Kerlinger et al 1986). They also add that a construct is a concept which has the added meaning of having been deliberately and consciously invented or adopted for a special scientific purpose. According to Malhotra and Bricks (2000), constructs contain items (questions) and each item measures some aspect of the construct measured by the entire scale.

Research Hypothesis	Analysis Variables	Measuring Method
H1	- Layout type (grid, free-form, racetrack) - TAM Construct: "Perceived Usefulness" (PU)	- Automatically from the system - Scalar Questions (1: Strongly Disagree; 7: Strongly Agree) equal to the number of construct items (i.e., 6 items: PU1 to PU6)
H2	- Layout type (grid, free-form, racetrack) - TAM Construct: Ease of use (EOU)	- Automatically from the system - Scalar Questions (1: Strongly Disagree; 7: Strongly Agree) equal to the number of construct items (i.e., 6 items: EOU1 to EOU6)
H3	- Layout type (grid, free-form, racetrack) - Construct "Entertainment" (ENT)	- Automatically from the system - Scalar Questions (1: Strongly Disagree; 7: Strongly Agree) equal to the number of construct items (i.e., 4 items: ENT1 to ENT4)
H4	- Layout type (grid, free-form, racetrack) - Shopping time	Automatically from the system
H5	- Layout type (grid, free-form, racetrack) - Sales of promotional items	Automatically from the system
H6	- Layout type (grid, free-form, racetrack) - Sales of non-shopping list products	- Automatically from the system - Compare shopping list products (planned purchases) and purchased products (actual purchases)

Table 5: Research Hypotheses, Analysis Variables and Measuring Methods of the Research

In light of the above, and as Hypotheses 1, 4 and 6 call for measuring respondents' evaluation against specific concepts through the use of data collection instruments (e.g.,

questionnaire), appropriate constructs were developed and used. As the aim of the research was to measure consumer reactions and attitudes toward the Web, "perceived usefulness" and "ease of use" were used for testing Hypotheses 1 and 2, respectively. They both constitute two of the Technology Acceptance Model's (TAM) constructs, while the essence of TAM is that perceived usefulness and ease of use can predict computer acceptance behaviour. (Davis 1989, Adams et al. 1992, Segars and Grover 1993, Hendrickson et al. 1993, Gefen et al. 2000). In addition, TAM asserts that the principal influence of beliefs is on attitudes that subsequently impact behaviour, while it predicts user acceptance of end-user applications by specifying causal relationships. According to Heijden (2000, p. 415), "so far, little research has been undertaken to examine whether TAM model also hold for Websites." In addition, the "entertainment" construct by of O'Keefe et al (2000) was also employed for testing Hypothesis 3. A more detailed description of the constructs used is included in Appendix A. Table 5 illustrates a "matching framework" of the aforementioned research hypotheses and their corresponding analysis variables.

3.3. Methodology of the Research

Figure 23 graphically presents the various phases of the research methodology. A discussion of each of the phases follows.

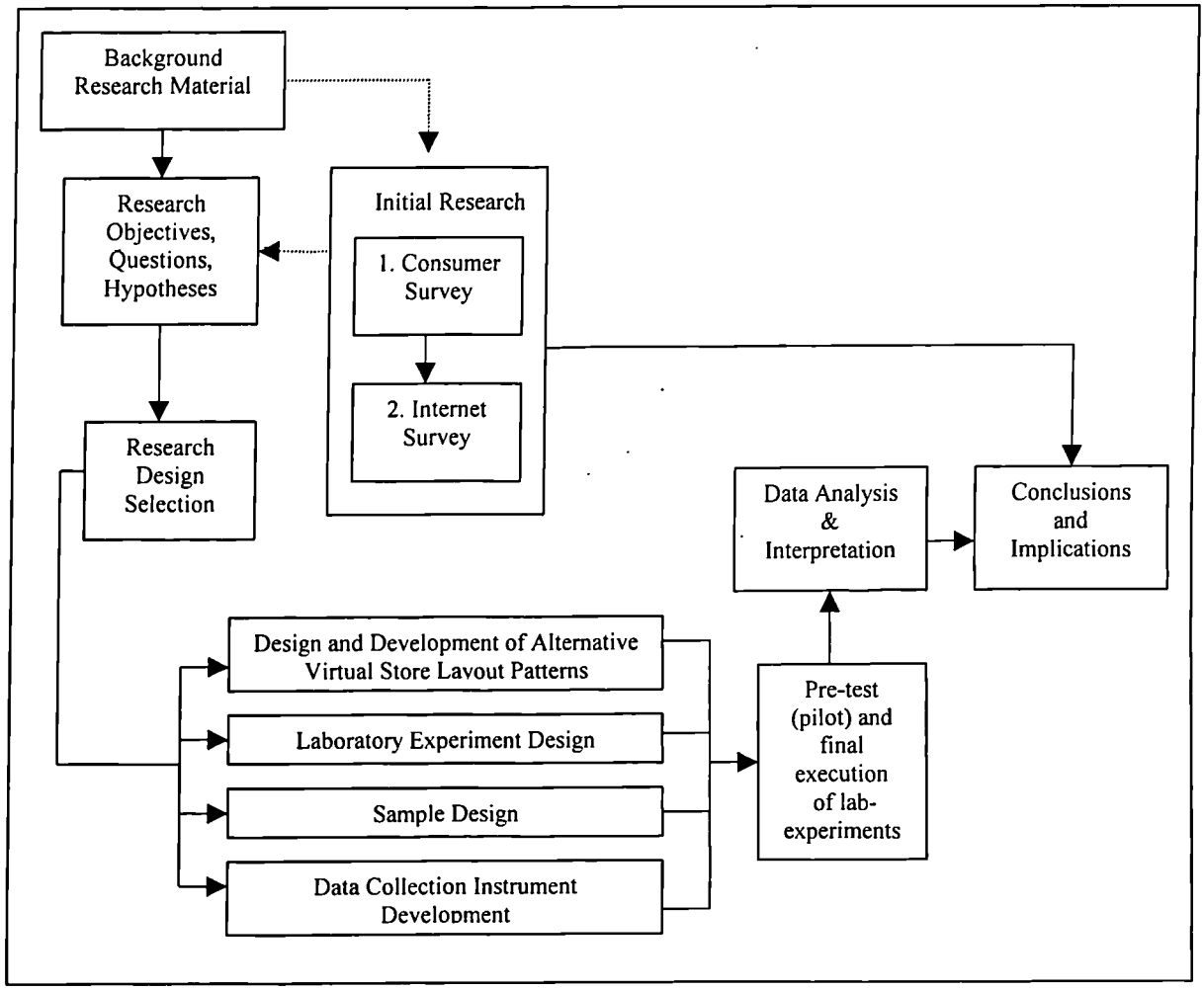


Figure 23: The Phases of the Research

3.3.1. Initial Research

Two initial research efforts were conducted: one focusing on consumers that were PC users (Vrechopoulos et al 2001a) and the other investigating existing Internet retail store layouts and shopping interfaces in general (Vrechopoulos et al. 2001b). The following sections provide documentation for the decision to conduct these surveys while they are both discussed in detail in Chapter 4.

3.3.1.1. The Consumer Survey

The study was conducted as part of the ACTIVE project (2000). The sample of the survey comprised of 500 respondents who were customers of a large supermarket chain operating in the greater area of Athens.

The objective of this survey was to study the profiles and behaviours of the current Internet shoppers in comparison to future Internet adopters. The survey indicated that future Internet shoppers attach high importance to the "sense of being in a store" dimension. This finding supported and motivated the present study's research questions and objectives in the sense that it revealed the crucial role of store atmosphere/shopping environment as a major consumer behaviour influencing factor in the context of Internet retailing. Furthermore, the findings of this initial research effort also stimulated the conduct of the Internet retail survey. This survey focused on shopping interface issues (e.g., layout) and was primarily conducted for studying the current status of existing Internet retail store layouts. Through that, a comparison between the main dissertation results with the Internet retail survey corresponding findings provided meaningful managerial implications which are discussed in Chapter 7.

3.3.1.2. The Internet Survey

An initial survey focusing on existing virtual retail stores on the World Wide Web took place. A total of 551 URL's from the Ernst & Young 2000 Global Online Retailing Report (2000) were used. The aim of this survey was to:

- Present the current status of the existing types of layouts on the Web.

- Provide a list of attributes characterising the existing layouts and shopping environments in general. The same variables used in the cybermall store survey by Spiller and Lohse (1998) were also examined in this survey. In addition, a preliminary Internet survey focusing on a random sample of these URL's (per country and per business sector) was utilised in order to enrich Spiller and Lohse's attribute framework, especially for its layout part.

- Produce meaningful categories of layouts of the existing retail Web stores towards investigating whether there are distinct layout categories as in conventional retailing.

To that end, the specific attributes which characterise the three alternative conventional store layouts (i.e., grid, free-form, racetrack) were transformed to the Web (i.e., the virtual lab-store). These then served as a guide towards the classification of the Internet stores. For example, in order for an Internet store to be included in the grid layout category, it should offer/include the menu bars, product catalogue and home page button attributes.

- Compare the results of this survey to the laboratory experiment results. According to the lab-experiment results, useful conclusions and recommendations are provided. For example, in case one type of layout (e.g., grid) has different effects on consumer buying behaviour than another (e.g., free-form layout), recommendations for the effective adoption of these results by the existing virtual stores, are developed (e.g., recommendation about the employment of a specific layout only for the promoted products), depending on which layout category they belong to.

3.3.2. Research Design Selection

Following the formulation of the research questions and postulation of the research hypotheses, a decision was made regarding the appropriate type of research design. Since the research purpose calls for testing causal relationships among variables and for capturing the cause-and-effect relationships by eliminating competing explanations of the observed findings (Luck and Rubin 1987, Kotler 1997, Galliers 1992, Churchill 1999, Dix et al. 1998, Eberts 1994, Preece at al. 1996, Olson and Olson 1997), the laboratory experiment research design was selected.

According to Churchill (1999, p. 148), "an experiment is capable of providing more convincing evidence of causal relationships than are exploratory or descriptive designs and this is why experiments are often called causal research .... an experiment has greater ability to supply evidence of causality because of the control it affords investigators." Experiments manipulate and measure variables under controlled conditions, in order to test the hypotheses (Dix et al. 1998). They state that there are two types of variables: the independent or experimental (i.e., those that are manipulated) and the dependent variables (i.e., those that are measured).

The key feature of laboratory experiments is the identification of precise relationships between chosen variables via a designed laboratory situation, using quantitative

analytical techniques, with a view to making generalizable statements applicable to real-life situations. The strength of a laboratory experiment is that it ensures the solution and control of a small number of variables, which may then be studied intensively (Galliers 1992). Furthermore, according to Burke (1996), consumer behaviour can be effectively explored through a laboratory setting.

The laboratory experiment typically has greater internal validity (i.e., ability to attribute the effect that was observed to the experimental variable and not to other factors) because of the greater control it affords. As far as external validity (i.e., whether the effect can be generalized to other populations and settings) is concerned, field experiments are typically more externally valid than laboratory experiments (Churchill 1999). A basic purpose of laboratory experiments is to refine theories and hypotheses and build theoretical systems. Most laboratory experiments are theory-oriented, aiming to test hypotheses derived from theory and study the precise interrelations of variables and their operation (Kerlinger et al. 1986).

The decision to select a laboratory instead of a field experimental design for the purpose of this research was based on the following reasons:

- **Peculiarity of the problem:** Test the effects of the manipulated variable/moderating factor (i.e., layout type) to the dependent variables (e.g., ease of use) within a controlled environment, ensuring therefore internal validity through the control of a small number of variables, which may then be studied intensively.
- **Business Environment:** Difficulty to convince a virtual retailer to employ all three different types of layout both in the United Kingdom and Greece and test them against real customers.
- **Innovativeness of the research:** Transforming the three alternative conventional store layouts to the Web environment requires a thorough analysis and design. Such a project is more suitable to run within a laboratory environment in which the only decision maker is the experiment administrator. In the case of the field experiment, the executives of the virtual store would probably set some new - beyond the scope of the project - requirements, consequently influencing the final result (i.e., the virtual store). The innovativeness of this research requires, therefore, a precise transformation procedure for transforming and adapting the three conventional layout types to the Web environment. In addition, the documentation of every action taken is

crucial for the reliability of the results. Moreover, the fact that there is no relevant literature to document all actions taken, further supports the selection of the laboratory experiment as the appropriate research design, in the sense that such an action provides flexibility and freedom to the experiment administrator with respect to methodological and other aspects of the research procedure (e.g., brands of offered products).

- **Elimination of biased results:** One of the basic reasons for deciding to proceed with the development of this store within a laboratory setting was to eliminate biased results due to potential "brand factor" effects on consumer buying behaviour (e.g., effects of Tesco or Wal-Mart brand names vs. effects of an unknown virtual grocery store on the Web).

3.3.3. Research Model

As mentioned above, the context of the research model refers to "planned shopping bahaviour" and "small consumer goods." The research model used is presented in Figure 24.

According to Hair et al. (1987, p.11), "...a dependence technique may be defined as one in which a variable or set of variables is identified as the dependent variable to be predicted or explained by other, independent variables." Furthermore, Kerlinger et al. (1986) classify variables in: (1) "independent" and "dependent" variables and (2) "active" and "attribute" variables. They also emphasize (pp.32-34) that an independent variable is the presumed cause of the dependent variable, the presumed effect. However, manipulated variables are also called "active" variables. "Manipulation" implies doing different things to different groups of subjects (Kerlinger et al. 1986). Finally, variables that cannot be manipulated and constitute human characteristics, for example demographics (e.g., gender, socioeconomic status), are considered as "attribute" variables.

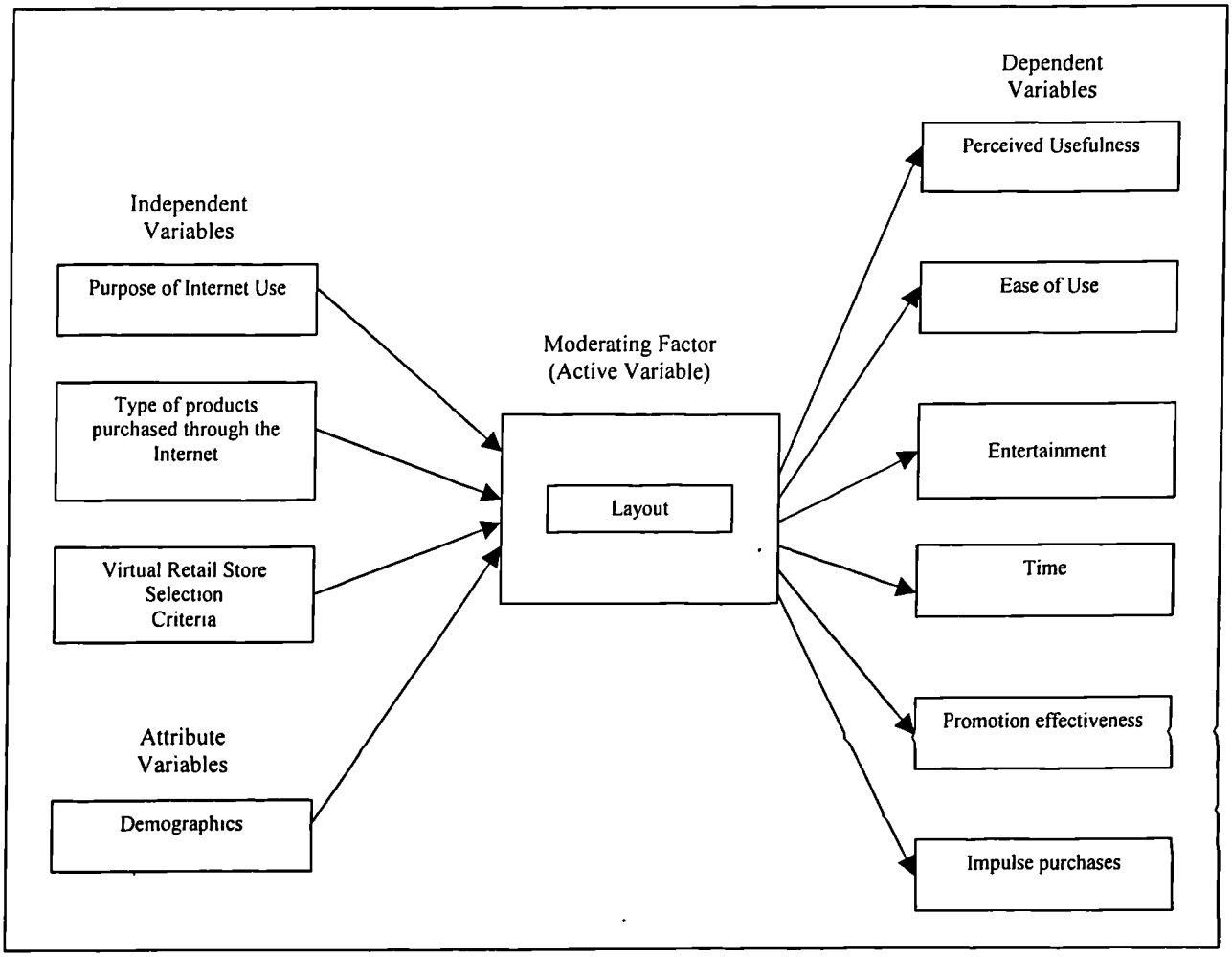


Figure 24. The Research Model

As shown in Figure 24, layout is the only "active"/manipulated variable, or in other words the only "moderating factor" of the experiment since it exercises a moderating influence on subjects' behaviour during their shopping activity within the laboratory virtual store. On the other hand, independent variables served as the presumed cause of any change in a response or dependent variable (Hair et al. 1987) through the influence/intervention of the moderating factor.

The procedure for deciding which independent and attribute variables to use/measure was based on an effort to investigate and select the customer characteristics that constitute "critical factors" towards Internet shopping behaviour formation. Useful managerial implications could then be provided, contributing significantly to the provision of a theoretical set of guidelines as far as the "personalization" services over the Web is concerned.

The documentation for the specific selection of independent variables follows:

- **Purpose of Internet Use:** According to Belllman et al. (1999, p.37), "the most important information for predicting online shopping habits are measures of past behaviour." Furthermore, they state that (p.35-38), "looking for product information on the Internet is the most important predictor of online buying behaviour ... people who spend more money online have a more wired lifestyle, are on the Net more, and receive more email compared to other Internet users." Therefore, the decision to include the "purpose of Internet use" as an independent variable in the research model was to investigate whether there were any significant differences among subjects that use the Internet for different purposes, with respect to virtual store layout effects (moderating factors) on consumer buying behaviour. To that end, the following factors and corresponding variables introduced by of O'Keefe et al. (2000) were used (Table 6), while presented in detail in Appendix A:

Independent Variables	
1	Social Communication
2	E-Commerce
3	Information Search
4	Hobby

Table 6: Purpose of Internet Use

- **Type of products purchased through the Internet:** Donthu and Garcia (1999) state that it is very important to understand who the Internet shopper is and what his or her attitudes and opinions are. Their study reveals that Internet shoppers are different from typical Internet users. According to the findings of their study, Internet shoppers are more convenience and variety seekers than Internet users (non-shoppers). Furthermore, they strongly believe that the specific needs and expectations of Internet shoppers are likely to vary by product category and they strongly recommend further research to that end. In addition, the initial Internet consumer survey discussed in Chapter 4 (Vrechopoulos et al. 2001a) also revealed that Internet shoppers behave differently than Internet users (i.e., non-shoppers) when visiting a virtual retail store on the Web, having therefore different preferences for shopping interface related issues (e.g., layout). Based on that, the purpose for

using this independent variable was to test whether there were any significant differences among subjects that have different shopping habits on the Internet (e.g., have purchased only intangible products through the Internet, have never purchased anything through the Internet, etc.), with respect to shopping environment effects (i.e., the moderating factor) on consumer behaviour. Therefore, useful managerial implications may arise regarding "personalised" marketing strategies in Internet Retailing (e.g., personalised shopping recommendation through the most effective and customer-supportive layout). Based on the specific characteristics of the Web (i.e., capability of immediate downloading/purchasing of "digital" products), the product categories (i.e., purchases made through the Internet) used for measuring this independent variable, are formulated as follows (Table 7):

Independent Variables	
1	Digital (intagible) products (e.g., music, software, etc.)
2	Non-digital (tangible) products (e.g. hardware, grocery products, etc.)
3	Digital and non-digital products
4	Neither of the above

Table 7: Type of products purchased through the Internet

- **Virtual Retail Store Selection Criteria:** After a review of the available conventional retailing literature regarding store selection attributes/criteria (Lindquist 1974-1975, Hansen and Deutscher 1977-1978, Lumpkin 1985, Mazursky and Jacoby 1986, Hirschman 1978, Singson 1975, Hansen and Deutscher 1977-1978, Centry and Burns 1977-1978, Dickson and Albaum 1977, Burke and Berry 1974-1975, McDougall and Fry 1974-1975, Mason et al. 1991, Lewison 1994, Ghosh 1994, Levy and Weitz 2001), a list including only those attributes that are applicable in the context of Internet retailing was developed. For example, prices of the merchandise, quality of merchandise etc, are applicable in the context of Internet retailing, while parking, distance, etc. are not. While some attributes are included in all the aforementioned studies under the same title (e.g., prices of merchandise), some others overlap one another. In such cases, the most representative and inclusive attribute was selected. In addition, as discussed above, some attributes that are not applicable within the context of virtual retailing (e.g., quality of sales personnel, convenient location, cleanliness, etc.) were excluded or adapted to the new conditions (e.g., the "short time to reach store" attribute was replaced by the "quick access to the store's Web site / Web site's speed"). In general, the aim was to

include every attribute found, placing, however, particular emphasis on grouping relative attributes under a representative title (e.g., according to theory, "store layout" and "product display techniques" are included in the "store atmosphere" attribute). Furthermore, based on the findings of Vrechopoulos et al. (2001a) and Vrechopoulos et al. (2000) studies, some critical Web-generated store selection attributes (e.g., secure transactions, availability of the displayed merchandise, etc.) were also included, while at the same time serving as a guide towards employing appropriate titles for the transformed attributes, as described above. Therefore, the following list includes twelve attributes which constitute the main store selection criteria employed by customers when visiting virtual retail stores over the Web.

1. Prices of the merchandise
2. Quality of the merchandise
3. Variety/Assortment of merchandise
4. Store Atmosphere (i.e., product display techniques, store décor, background music, store layout, etc.)
5. Customer Service and Support (i.e., personalised support during shopping, delivery/pick up service, alternative payment methods, etc.)
6. Quality of advertising
7. Sales and specials (i.e., in-store promotions)
8. After Sales Support (i.e., information about new products and special offers through e-mail, etc.)
9. Store Reputation
10. Quick access to the store's Web site / Web site's speed
11. Availability of the displayed merchandise (i.e., minimal stock-outs)
12. Security in transactions

The purpose of using these independent variables was to relate subjects' evaluations on the aforementioned variables with their corresponding layout evaluations in order to provide useful managerial implications regarding personalised marketing activities. To that end, a factor analysis was conducted for data reduction and summarization. According to Malhotra and Briks (2000), Kinnear and Taylor (1996) and Hair et al. (2000) a large number of variables can be correlated and reduced to a manageable level. Relationships among sets of many interrelated variables are examined and represented in terms of few underlying factors. Having generated new independent variables (factors), a regression analysis was performed towards analysing and associating relationships between a metric-dependent variable and one

or more independent variables. In other words, the result of regression is an equation that represents the best predicition of a dependent variable from several independent variables. Consequently, it was possible to determine the degree to which the variation in the dependent variable can be explained by the independent variables, or the strenght of the relationship. However, it should be clarified that although the independent variables may explain the variation in the dependent variable, this does not necessarily imply causation (Kinnear and Taylor 1996, Hair et al. 2000). Finally, according to Malhotra and Briks (2000), in order to conduct a factor analysis, there should be at least four or five times as many observations (sample size) as there are variables (the sample consisted of 60 subjects, as discussed later in the Chapter).

- **Demographics:** Demographic characteristics constitute one of the basic influencing factors of consumer buying behaviour (Siomkos 1994, Crisp et al. 1997, Li et al. 1999). This means that occupation, educational level, age, gender, etc., may probably affect consumers' store layout evaluations. Based on a cross-tabulation analysis, therefore, important managerial implications may be provided regarding the interrelation of layout preferences and demographic factors.

3.3.4. Design and Development of Virtual Store Layout Patterns

According to Baecker et al. (1995, pp.80-82), "in experimental simulations a real system is created in the laboratory and used for experimental purposes by real users." Trying to make the setting as real as possible, the three conventional layout patterns (i.e., grid, racetrack, and free-form) were analysed, designed and transformed to a Web-based business-to-consumer interface so that they would:

- follow the same characteristics and rules that govern their operation in conventional retailing, and produce/establish clear and distinct differences among them.

- keep all the potential influencing factors (e.g., colour, prices, product variety, sound, etc.) the same in order to eliminate any undesired effects on subjects' buying behaviour.

An attempt was made to outline the way in which the navigation concept of each type of layout could be effectively applied in a virtual shopping environment on the Web (e.g.,

the grid layout should force customers to navigate through the main page/aisle of the site in order to reach another product category).

Based on the design guidelines provided, a virtual retail store was developed in a number of different versions to equal the number of layout pattern categories provided by the conventional retailing theory (i.e., three). The only differentiating factors among these versions of the electronic store were the different layout patterns ("moderating factor") that they employ, while the rest of the factors ("control variables") remained the same (e.g., number of available products, colours, text content and style, product display techniques, etc). The step-by-step process followed toward the development of the three conventional layout types on the Web is discussed in detail in Chapter 5.

In addition, through this phase of the research (Chapter 5), design guidelines are provided to those retailers that want to employ any of the layouts used in the laboratory store, based on the corresponding findings of the present study (e.g., employ a specific layout to increase promotion effectiveness; offer personalized layouts to customers based on their demographic characteristics, etc). More specifically, a virtual retailer can follow the analysis, design and development phases followed in the present study regarding how the three alternative conventional retailing layout types could be effectively transformed and implemented on the Web.

3.3.5. Laboratory Experiment Design

In order to investigate whether the different layout patterns affect consumer buying behaviour within the store, three different versions of the same virtual retail store were tested against real customers in a "between-groups" laboratory experiment. A "between groups" instead of a "within groups" experimental design was selected in order to eliminate "learning effects" (Dix 1998, Baecker et al. 1995). Since the only differentiating factor among the three alternative interfaces was the layout (moderating factor), while all other factors or control variables (e.g., colour, product display techniques, etc.) remained the same, it was easy for a subject to "learn" how to use the shopping environment and transfer this knowledge to the other layouts in case of a "within-groups experiment." Moreover, "if the theory states that subjects will form a conceptualization of the problem which will transfer to another interface design, then this information would indicate that a between-subjects design would be the best" (Eberts 1994, p.85).

The same experiment run both in Greece and the United Kingdom. It was unknown from the beginning whether these two samples should be treated as one having been drawn from the same population or not. Such an analysis was tackled through the use of a *t*-test analysis which is discussed in detail in Chapter 6. However, it should be noted that incorporating country effects as one of the experiment's moderating factors was beyond the scope of the dissertation at the beginning.

Furthermore, English was used as the official language of the virtual lab-store, since all Internet users in Greece are familiar with navigating through sites employing the English language. However, the supporting material (e.g., instructional leaflet, questionnaire, etc.) was developed both in English and Greek in order to avoid any situations of bias introduction and misunderstanding. As presented in Table 8, 60 subjects participated in each experiment (in the United Kingdom and in Greece).

Each subject was given a 20 pound or a 12,000 GRD (the equivalent in Greek Drachmae) budget to conduct purchases within the laboratory. This implied that after the end of the experiment/shopping activity, the "purchased" products were actually purchased by "real" stores (i.e., Sainsbury's in the United Kingdom and Vassilopoulos in Greece) and physically delivered to the participants. Information about the shopping budget was communicated to the subjects through the instructional leaflet that was provided to them (Appendix B3), along with all other necessary information/details about the experiment right before the beginning of the interaction process. The reason for deciding to provide subjects with a real shopping budget was based, on one hand, on the effort to provide a strong "participation motive" and on the other, to make them behave as real shoppers, spending it for covering some of their real and current needs. By "simulating a real shopping experience" environment, the reliability and quality of results are enhanced.

The instructional leaflet provided information like: guidelines on how to enter the store, delivery lead time (when the products will be delivered to the subjects), scope and objective of the research, and so on. In addition, a form including user name and password was provided to subjects in order to enable them to enter the store and start shopping (Appendix B6).

Furthermore, all the subjects were asked to construct a shopping list on a paper form provided to them before starting shopping (Appendix B5). As the product assortment of

the lab-store was not very extensive, subjects were informed accordingly through the instructional leaflet, and were encouraged to fill out the shopping list by inserting types of products instead of brands (e.g., "Detergent" rather than "Tide"). Therefore, impulse purchasing, was counted for product types/categories instead of brands (e.g., in case a subject bought wine and wine was not included in his/her shopping list, this product counted as impulse purchasing).

Layout (Moderating Factor)	Country	Number of Subjects per cell
Grid	Greece	20
Racetrack		20
Freeform		20
Grid	United Kingdom	20
Racetrack		20
Freeform		20

Table 8: The Experimental Design

Finally, the following information about subjects was gathered by the experiment administrator through the use of an administration form (Appendix B2) before the beginning of the experiment:

- Name
- Telephone
- E-mail

The experiment tasks were conducted with the following sequence:

- Subjects were asked to select/tick an available number from 1 to 60 for the experiment run in Greece, and the same for the UK's experiment (i.e., 61 to 120) through the employment of an appropriate form (Appendix B1). According to Luck and Rubin (1987), participants in a survey should be randomly selected in order to ensure reliability of results and elimination of learning effects. Furthermore, according to Aczel et al. (1993, p.380), "a completely randomized design is a design in which elements are assigned to treatments completely at random." In the present study, the experiment took place at Athens University of Economics and Business (Greece) and at Brunel University (UK) through the

use of the same laptop in order to eliminate any undesired speed effects. This means that the same Web site speed was ensured for all participants. Groups of people, instead of individuals, were requested to participate at predefined time intervals. Therefore, these subjects were randomly requested to participate in one of the experimental modes (e.g., visit the grid layout) through the use of the above-mentioned placement procedure.

- Based on the selected number, each subject was put in the respective place on the administration form and information about him/her (name, telephone, e-mail) was recorded on the special form (Appendix B2).

- Subjects were provided with the Instructional Leaflet (Appendix B3).

- Subjects were provided with Part A of the questionnaire (Appendix B4).

- Subjects were provided with the Shopping List form and asked to fill it out with their desired products (Appendix B5).

- Subjects were provided with the (in accordance to the layout that they had been placed) User Name and Password Form (Appendix B6), and requested to enter the store.

- Subjects spent as much time as they liked to for shopping in the laboratory store.

- Subjects were provided with Part B of the questionnaire (Appendix B7). As described above, Part A, which included the independent and attribute variables, was given to subjects before they entered the virtual store, while Parts B and C were given to subjects right after they exited the store.

The lab store mainly offered euro-brands (e.g., Coke, Heineken, Pringles, Tide, Johnnie Walker, etc.) in order to ensure shopping preferences' compatibility among users from different countries. Own label products were also included in the laboratory store placed

under the label "own label products". However, in the instructional leaflet, it was clarified that these products would be purchased from "Sainsbury's" and "Vassilopoulos" for the United Kingdom and Greece, respectively. It should be noted that both "Sainsbury's" and "Vassilopoulos" are well known hypermarkets in the two countries. A detailed product and brand list offered by the laboratory store is included in Appendix C4.

In addition, promotional activities (e.g., promotional banners) took place within each type of layout. The content and type of these activities were similar among the three different versions of the lab-store so that possible bias effects on consumer's buying behaviour were eliminated.

Finally, a pre-test/pilot test was conducted in order to finalise the settings of the experiments and avoid unanticipated situations. This is discussed in detail later in this Chapter.

3.3.6. Sample Design

As a number of tasks and decisions are involved in sampling (Luck and Rubin 1987, Malhotra and Birks 2000), the following list presents the steps that were followed. Also these steps are diagrammatically depicted in Figure 25.

d) **Definition of the population from which the sample is to be drawn:** Internet Shoppers and non-Internet Shoppers comprised the population from which the sample was drawn. Participants who were non-Internet shoppers were experienced Internet users using the Web daily. Also, they are visiting either conventional or Internet grocery stores to conduct purchases. All these ensured familiarity with the virtual interface/shopping environment and provided the experiment with quality results.

e) **Determine the sampling frame:** The sampling frame serves, in a sense, as the boundaries that circumscribe the population. The subjects that participated in these laboratory experiments were from Brunel University – Department of Information Systems and Computing (United Kingdom) and from the Athens University of Economics and Business – Department of Technology Management (Greece).

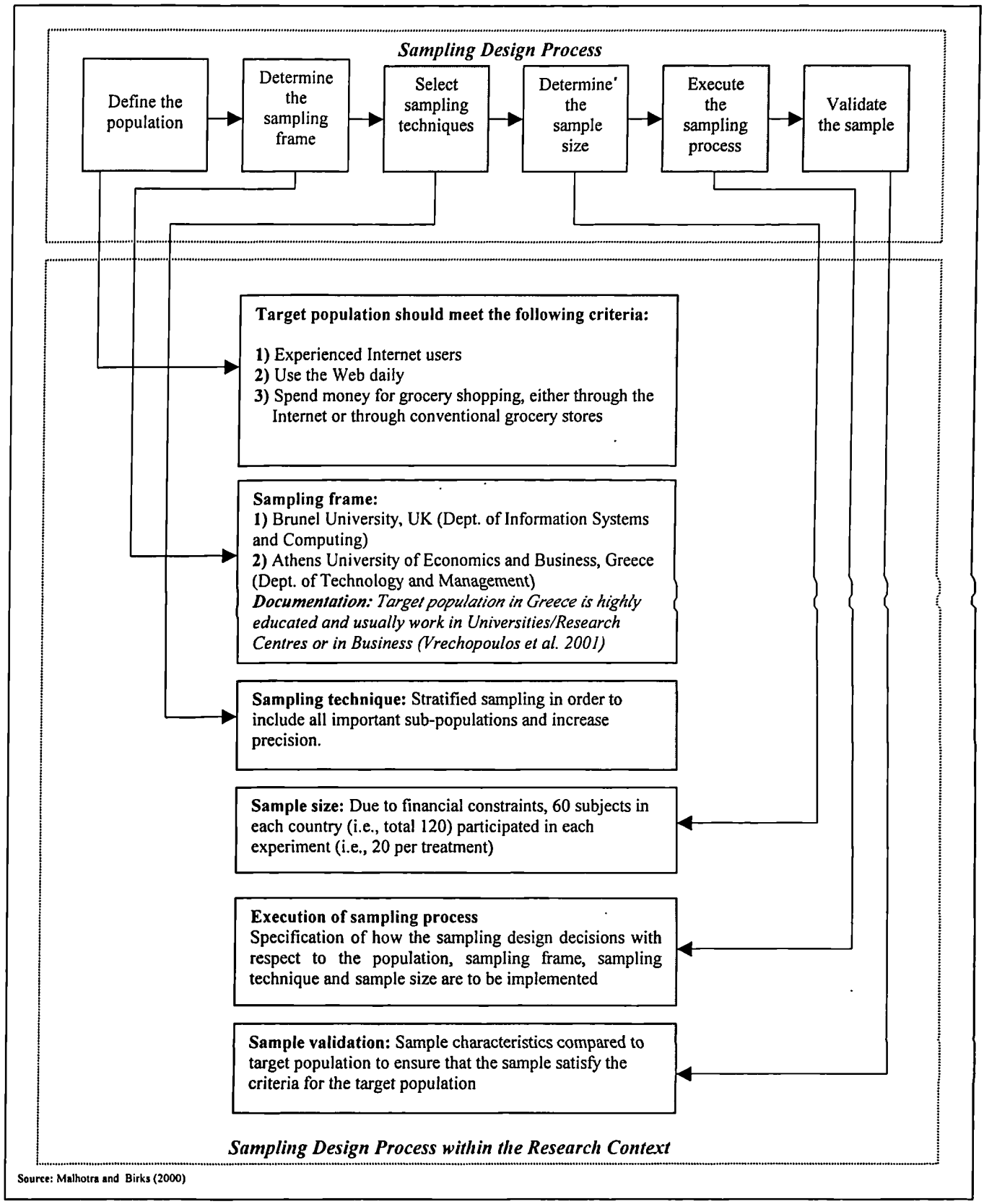


Figure 25: The sampling design process of the research

c) Selection of the sampling technique: The two qualities mostly desired in a sample are its representativeness and stability. Stratified sampling was selected among other

sampling techniques (Figure 26) as the sampling technique of the present study, in order to include all important sub-populations and increase precision. The population was portioned into sub-populations or strata using specific stratification variables which in the case of the present study was the "occupation." In addition, proportionate stratified sampling was used (instead of disproportionate) and, therefore, the size of the sample drawn from each stratum is proportionate to the relative size of that stratum in the total population. However, as the objective was to keep the same number of subjects per sub-populations between Greece and UK (in order to compare results), the aforementioned procedure of proportionate stratified sampling was followed for each country and then the average number of subjects per strata for both countries was used. This procedure is presented in Table 9.

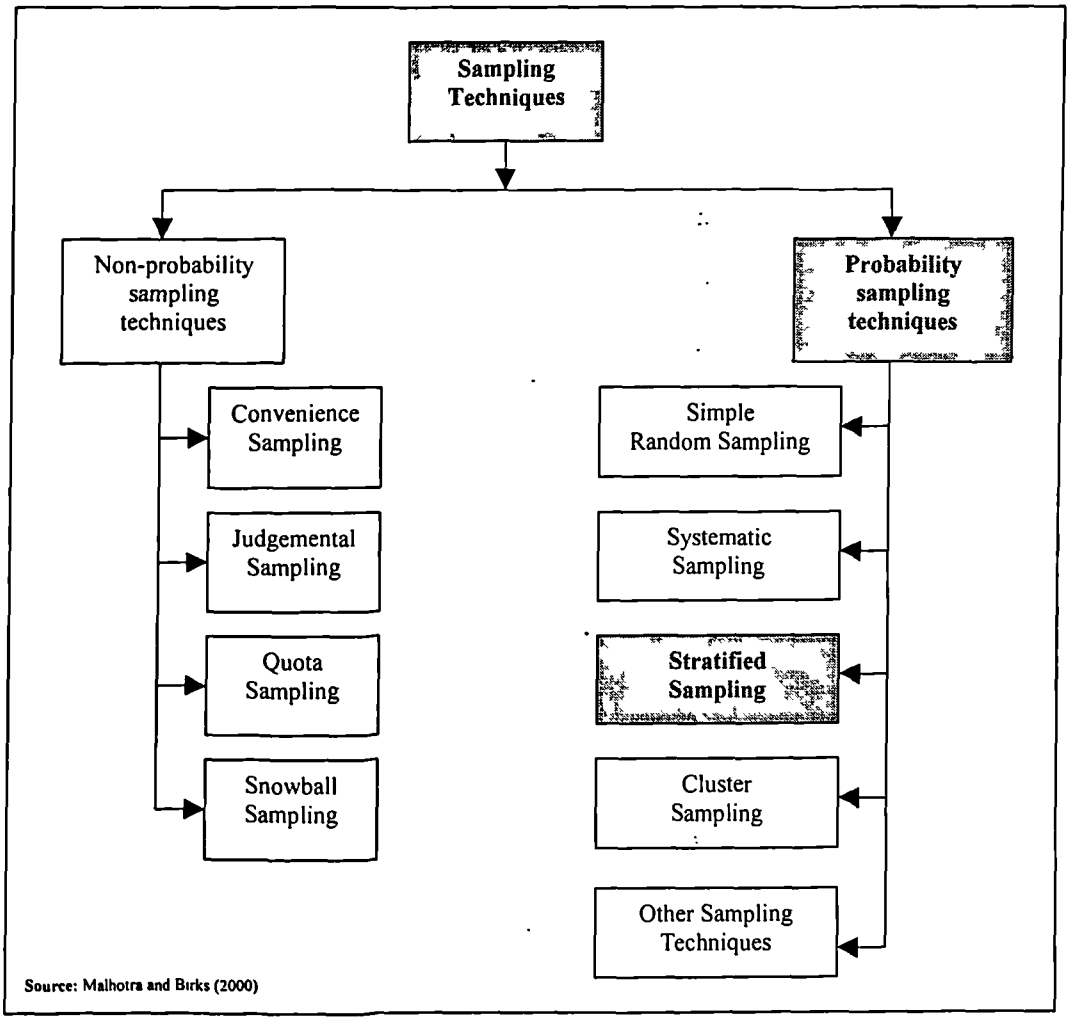


Figure 26: A Classification of Sampling Techniques

d) **Determination of the sample size:** As discussed above, the decision about the sample size was made in a subjective manner due to budget constraints. Therefore, based on these constraints, the total number of 120 subjects was achieved. However,

this sample size provided 20 subjects per layout type in each country, which provides 40 subjects per layout in total.

A/A	Sub – Populations/Stata	UK sampling frame population	Greece sampling frame population	*UK number of elements per stratum*	*Greece number of elements per stratum*	Final (average) number of elements/subjects per sub-population
1	Researchers (e.g., Department's Ph.D. students, etc.)	40	36	*13*	*11*	**12**
2	M.Sc. students (i.e., Department's M.Sc. students)	80	90	*26*	*27*	**27**
3	Employees (i.e., Department's staff)	15	34	*5*	*10*	**8**
4	Academics (i.e., Department's faculty)	37	16	*12*	*5*	**8**
5	Business Executives (i.e. these that directly co-operate with the department in projects, etc.)	10	24	*3*	*7*	**5**
TOTAL		182	201	*60*	*60*	**60**

Table 9: Procedure of Selecting the Elements/Subjects for each Stratum

e) **Execution of the sampling process:** Subjects were selected from each stratum by Simple Random Sampling (SRS), a random procedure. This means that each element in the population had an equal probability of selection. Therefore, elements/subjects from each sub-population were drawn by a random procedure from the sampling frame through the use of an equivalent to a lottery system method. This was done, by assigning to each element/subject a unique identification number. Then, random numbers were generated (e.g., with a computer routine) and the elements to be included in the sample were determined. Finally, selected elements were placed in specific time slots (i.e., from 09:00 am to 21:00 pm; one per hour).

f) **Sample validation:** After the execution of the experiments and the collection of the questionnaires, the sample characteristics were compared to target population towards ensuring that the sample satisfy the criteria for the target population. Therefore, based on questionnaires' parts A and C, it was found that the sample

characteristics satisfied the criteria for the target population (i.e., occupation, Web experience, etc.) without a single exception.

3.3.7. Data Collection Instrument Development

A questionnaire was designed and used as the basic data collection instrument in the laboratory experiments, for the following reasons (Dix et al. 1998):

- it facilitates the process of reaching a wider subject group,
- it takes less time to administer,
- it can be analysed more rigorously.

Therefore, extensive questionnaires were used as data collection instruments before and at the end of the laboratory experiments as discussed above (Appendix B4 and B7). More specifically, the following interrelated standard steps were followed in developing the questionnaires for the present research study (Luck and Rubin 1998):

a) Determination of the specific data sought:

The three (3) constructs (Perceived Usefulness, Ease of Use and Entertainment) provided the input for the determination of data to be included in Part B of the questionnaire. Part A included questions about the independent variables. Its design was based on the research objective of the investigation of interrelations among virtual lab-store environment effects (moderating factor: type of layout) on consumer buying behaviour and the independent variables (i.e., purpose of using the Internet, types of products purchased through the Internet and virtual retail stores' selection attributes). As far as Part C of the questionnaire is concerned, questions were developed to gather the demographic data (attribute variables) of the participants in an effective way. Questions that included were relevant to the objectives of the current research study. At this stage of the process, consideration was also placed on gathering data in a form appropriate for the analytical techniques used in the present research.

b) Determination of the interviewing process:

The interviewing process was completed through self-administered personal surveys. Respondents were given the questionnaire by the administrator and any questions that they might had, were directed to him. Moreover, an instructional leaflet with useful

details and guidelines about the experiment was provided to respondents. Finally, at the end of each experiment, a personal interview was conducted and tape recorded in order for a qualitative analysis to be conducted, enabling comparisons between the quantitative with the qualitative results. The qualitative analysis procedure is discussed in detail at the end of this Chapter.

c) Evaluation of the question content:

Three basic criteria were used to evaluate the content of each question: (a) ensure that respondents understood the question, and (b) had all the necessary information so that they were able to answer it.

d) Determination of the response format

Based on the above analysis, constructs were used for measuring the following dependent variables through scalar questions. In a scale of this type, each item measures some aspect of the construct and the items should be consistent in what they indicate about the characteristic (Malhotra and Birks 2000). The specific constructs used are the following (they are presented in detail in Appendix A):

- **Perceived Usefulness (TAM construct):** According to Davis (1989, p. 320), this construct has been defined as "the degree to which a person believes that using a particular system would enhance his or her job performance." According to Heijden (2000, p.417), "the perceived usefulness in a Website context is defined as the degree to which an individual believes that using the site will contribute to reaching a particular objective." In the case of the present study, therefore, this objective refers to the searching and purchasing of the shopping list products or, in other words, to the effective conduction of planned purchasing behaviour.

- **Ease of Use (TAM construct):** According to Davis (1989, p. 320), this construct has been defined as "the degree to which a person believes that using a particular system would be free of effort." In the case of electronic commerce, the ease of navigation construct is meant to function as the Website version of the "perceived ease of use" construct (Heijden 2000). Furthermore, Gefen et al. (2000) use the "ease of use" construct as it was initially introduced, also for electronic commerce.

- **Entertainment:** This construct, used by O'Keefe et al. (2000), measures the perceived entertainment value of the Web site. Therefore, this construct is used by the present study in order to measure the customers' perceived entertainment during their shopping activity in each of the three alternative versions of the laboratory virtual retail store.

In addition, the "Purpose of Internet Use" construct introduced by O'Keefe et al. (2000) was used. This was measured by employing a scalar question including 4 factors (i.e., social communication, electronic commerce, information search, hobby).

The styling of the questions was as follows (Dix et al. 1998):

- General (for establishing the background for the subject)
- Scalar (asking the subject to judge a specific statement on a numeric scale). Scales 1 (i.e., not important) to 5 (i.e., very important); and 1 (i.e., strongly disagree) to 7 (i.e., strongly agree) were used, thus allowing subjects to differentiate their responses adequately, while at the same time retaining clarity in meaning.
- Multi-choice (asking the subject to select one of the alterative responses). This style of questions is useful for gathering information on a subject's previous experience.

In order to reduce the effort that subjects would place completing the questionnaires and as the research calls for using constructs to measure a set of variables, close-ended scales for questions were mostly used (Dix et al. 1998). Moreover, according to Eberts (1994), rating scales have all the advantages of close-ended questions with the additional advantage that traditional statistical techniques, such as analysis of variance, can be used to analyse the answers. Rating scales, therefore, were mostly used in this questionnaire.

e) Determination of question wording

"Unfortunately, in developing a questionnaire, there are no hard and fast rules in determining the exact question wording for the individual questions" (Luck and Rubin

1987, p.191). Luck and Rubin (1987) developed a set of guidelines for the determination of question wording. The same guidelines were followed in the present study:

- Simple language and familiar vocabulary were used
- Lengthy questions were avoided, except for cases where additional explanation was needed
- Effort was placed to enhance specificity of questions
- Double-barreled, leading and loaded questions were avoided
- Estimates were avoided by using specific time reference points

f) Determination of the questionnaire structure

Part A of the questionnaire, which refers to the Internet usage and shopping behaviour, was placed at the beginning and was given to the subjects before entering the virtual store. Since this part of the questionnaire included the independent variables under study, it was more effective and valid to ask subjects to fill out such type of data before their interaction with the virtual store. In other words, the experience and psychological effects created by the experimental conditions might have affected the validity of these types of data if Part A had been given at the end of the experiment (e.g., subjects might fill in wrong information since they would have been probably tired from their shopping activity in the virtual store). Part B (Shopping Experience Evaluation) was given right after the end of the shopping activity in order for the subjects to give the requested information, which dealt with their experience within the virtual store. Demographics as descriptive facts (Part C) were placed at the end of the questionnaire for two reasons: (1) subjects are normally unwilling to reveal personal information early in the questionnaire, and (2) they direct the subject's thinking toward different matters than those that the interviewer wants to ask about (Kinnear and Taylor 1996, Hair et al. 2000).

g) Determination of the form's physical characteristics

Based on Luck and Rubin's (1987, p.197) guidelines, "...the self-administrated questionnaire physical characteristics are more important than with an interviewer-administrated questionnaire because the respondents are usually not motivated to do a good job. Therefore, the appearance can be influential in securing the cooperation of the respondent." Quality of the paper, typography and printing process comprise critical success factors toward the enhancement of the physical appeal of the questionnaire and

increase the chances that the respondent will take time to participate and complete it by providing quality answers. In addition, a clear, adequately spaced (for open-ended questions), short sized and not confusing questionnaire, enhances the quality of the results. The development process of the current research questionnaire followed all of the aforementioned design guidelines, therefore contributing to the high quality of the results.

h) Questionnaire's Pretest, Revision, Reliability Test & Final Draft

Because the researcher does not completely anticipate what would take place when the questionnaire will be used in the field, its pretest phase is "mandatory" as it is the only way to detect faults. According to Luck and Rubin (1987, p.199), "a pretest is an accurate miniature of the planned study, of a sample of only ten to fifty people." To that end, they recommend the following steps that should take place during and after a pretest phase of a research study and which were also followed by the present study:

- Investigation of whether the respondents understood and responded to the questionnaire
- Study of the nature of information provided by respondents
- Estimation of the time required for the whole process to be completed
- Investigation of particular problems encountered

According to Kerlinger et al. (1986), in order to inquire how much error of measurement there is in a measuring instrument, a reliability test should take place ("reliability" refers to the accuracy or precision of a measuring instrument). Furthermore, according to Malhotra and Birks (2000, pp. 306-307), "...if several items (questions) are used to measure one dimension (construct), internal consistency reliability can be computed for each dimension .... internal consistency reliability is used to assess the reliability of a summated scale where several items are summed to form a total score. In a scale of this type, each item measures some aspect of the construct measured by the entire scale, and the items should be consistent in what they indicate about the characteristic." The most effective approach to measure internal consistency is to use coefficient alpha or Cronbach's alpha. This coefficient varies from 0 to 1. A value of 0.6 or less generally indicates unsatisfactory internal reliability and in such a case, one or more items should be removed from the scale in order for Cronbach's alpha to increase (Malhotra and Birks 2000). Based on that, reliability analysis through the use of Cronbach's alpha was

conducted right after the pilot test in order to check the used constructs and remove any unreliable item from the corresponding scales. This analysis is discussed in detail in the first part of Chapter 6.

Finally, according to Malhotra and Birks (2000, p.336), "ordinarily the pilot-test sample size is small, varying from 15 to 30 respondents." Based on that, the present research requested 15 subjects to participate in a pilot-test, so that 5 treatments for each hypothesis could be provided. The pilot-test was conducted only in Greece. Given, however, that the objective was to run the same experiment in both countries and the reliability tests might have provided different results if two pilot-tests were run with the two different groups of subjects, a subjective decision was taken to use only the Greek pilot-test as a guide. Besides, it was impossible to compare the samples in case of two pilot tests as the number of observations would have not allowed a *t*-test analysis to be conducted towards investigating whether the pilot samples are from the sample population or not.

After the pre-test and the revision phases of the data collection instrument development process, the virtual lab-store's debugging procedure was completed, and final corrections took place, both in:

- the questionnaire format (e.g., removal of unreliable items from constructs through reliability tests, improvement of obscure questions, etc.), and
- the virtual lab-store.

3.3.8. Data Analysis, Interpretation & Report

The following data analysis process was used (Luck and Rubin 1998):

a) Assemble the data

b) Bring the data into order

c) Summarise the data

d) Select appropriate analytical methods

e) Examine differences and test the research hypotheses

In cases where there are two independent samples, the z-test or the t-test can be used while analysis of variance (ANOVA) is used for cases of more than two samples

(Malhotra and Birks 2000). ANOVA is used as a test of means for two or more populations and employs one dependent measure (Hair et al. 1992). Moreover, ANOVA can test the differences among more than two groups, whereas the *t*-test can be applied to two groups only (Kerlinger et al. 1987). Based on that, it is normally recommended that ANOVA be used for measuring experimental effects and testing the corresponding research hypotheses as the groups under study are more than two (i.e., 3 groups, each one participating in one of the three alternative layouts). Therefore, ANOVA was employed to examine the differences in the mean values of the dependent variables associated with the effect of the "controlled/manipulated" variable (i.e., layout).

Furthermore, as it is thoroughly discussed in Chapter 6, normality tests (i.e., basic assumption for running parametric tests like ANOVA and *t*-tests), Kruskal-Wallis non-parametric tests, factor analysis, multiple regression analysis, *t*-tests, and cross-tabulation analysis were also used for analysing the present study's results.

3.3.9. Qualitative Analysis

At the end of each experiment, the qualitative part of the present study took place. Despite the fact that the present study is undoubtedly characterised as a "quantitative" one, it was decided to also use a qualitative research approach towards explaining and supporting the corresponding quantitative findings more effectively, enhancing therefore the realiability and the quality of the findings.

Therefore, personal interviews was selected as the qualitative research procedure for the dissertation's research (Figure 27). The reason for selecting this type of qualitative research technique was to ensure a direct communication with the subjects through which it was expected to collect personal opinions that would be difficult to be expressed through the questionnaires. Furthermore, it was expected that subjects may not feel free to express their real preferences and opinions for this particular laboratory store within a group interview (i.e., focus groups).

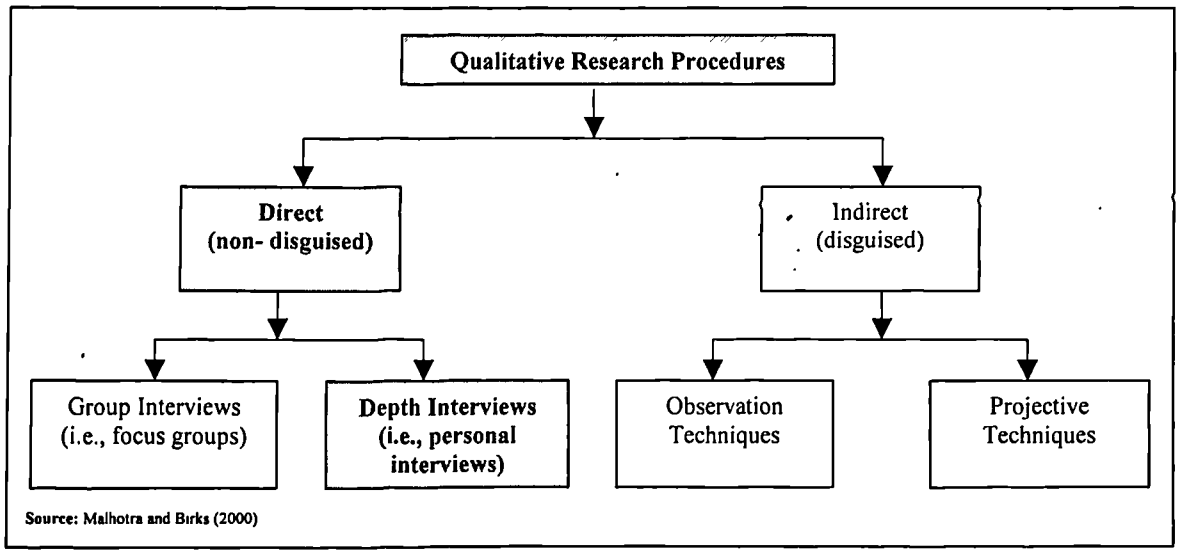


Figure 27: A Classification of Qualitative Research Procedures

Furthermore, it was decided to use the same specific questions for each of these personal interviews in order both to be able to directly compare the corresponding results and avoid any lengthy (i.e., babbling) and useless interviews. These questions (presented below), are very comprehensive, representative and cover the basic research issues of the present study:

1) How did you find the layout of the store you just visited?
2) What did you like most in this store regarding its navigation capabilities?
3) What did you dislike most in this store regarding its navigation capabilities?
4) Would you like to add anything else about the store's layout (e.g., general recommendations, improvements, past-experience, etc.)?

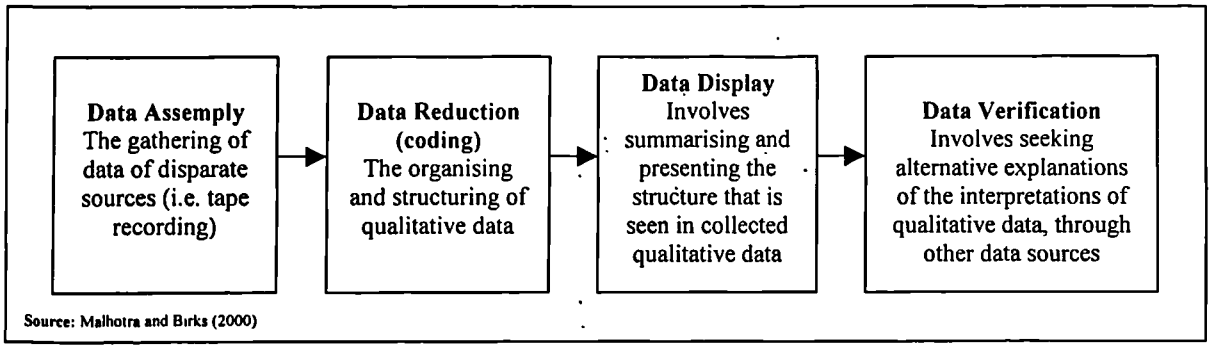


Figure 28: The Stages of the Qualitative Data Analysis followed

The stages followed in analysing the qualitative data of the present study are presented in Figure 28 (Malhotra and Birks 2000), while they are thoroughly discussed at the end of Chapter 6.

3.3.10. Application/Experimental Area

In light of the preceding discussion and due to the fact that Electronic Commerce is not an appropriate trading channel for all types of products, services and stores, the "Grocery" sector was selected as the application research area. This particular sector is characterised by high turnover and high volume of business-to-consumer transactions on a daily basis, and therefore constitutes a challenging research issue. In addition, research interest in this area is justified by the fact that the Grocery sector comprises a rapidly growing market both in traditional and in virtual marketplaces. Finally, expertise regarding the operation of the Grocery sector has been gained through participation in the "ACTIVE" (Advertising and Commerce Through the Internet in the context of the Virtual Enterprise) project - ESPRIT Programme, Framework IV - Commission of the European Union. The objective of this project was to design and develop an electronic retail store based on consumer characteristics, preferences and behaviours through which promotion and commerce activities will be implemented in a dynamic, effective and tailor made way, offering customers a personalised shopping interface and an one-to-one marketing situation.

3.4. Summary

This Chapter was entirely dedicated to the research methodology followed to meet the objectives of the present study. It discussed all the appropriate research tools developed towards the provision of rigorous answers to the corresponding research questions. Particular emphasis was placed on following a structured approach and presentation format towards facilitating both the reader and the future research steps. All the appropriate methodological tools were developed before proceeding with the development of the laboratory store and the execution of the experiment. This facilitated the research to a great extent by accelerating the production of the relevant research insights.

The research hypotheses are "packed-up" with specific relevant references both from conventional and virtual retailing. Based on these hypotheses, a suitable methodology was developed, incorporating several different steps and supporting tools. However, the innovativeness of the present study, along with the need to follow a multidisciplinary approach, provided a challenging research opportunity towards developing a tailor-made methodology to the specific research needs.

CHAPTER 4. INITIAL RESEARCH

This Chapter presents two initial research efforts conducted within the context of the present study. The first is a consumer behaviour survey focusing on current and future Internet shoppers. This survey investigates Greek consumer attitudes towards Internet shopping and identifies some "critical success factors" for Internet retailing. The second research effort is to an Internet survey focusing on the layout patterns of existing online retail stores over the Web. It provides a layout classification framework for Internet retailing.

4.1. A Consumer Survey for Internet Retailing

The objective of the initial research was to investigate Internet shopping behaviour towards Internet retailing and identify the critical factors that affect Internet shoppers and non-shoppers behaviour. The research employed was of an exploratory-descriptive combination type (Kotler 1997) aiming at developing profiles of consumers who have already conducted shopping through the Internet and of those who are interested to adopt Internet shopping as an innovation. Based on the theories and processes of consumer adoption decision and diffusion of innovations, this study measured demographic and behavioural characteristics, as well as perceptions and preferences of Greek consumers towards distance shopping in general and Internet retailing in particular. The survey offered insightful preliminary empirical data based on which detailed profiles of Internet shoppers ("innovators") and interested-to-adopt Internet shopping ("early adopters") were developed according to the typology of consumers in the diffusion of innovation process. In addition, this survey served as a tool for identifying factors that influence consumer attitudes toward Internet shopping.

The research findings and insights presented herein contributed towards the documentation of the dissertation's research objectives and the corresponding formulation of the dissertation's specific research questions. Furthermore, except for the direct exploitation of its empirical findings for the documentation of the dissertation's research question, it also provides relevant managerial implications which are enhanced when combined with the main dissertation research findings. Finally, this initial research effort sets the foundation and emphasises the need for future research in the area of Internet retailing shopping interface effects on consumer buying behaviour, encouraging therefore the conduction of the present research study (i.e., the experiment).

4.1.1. Introduction

The survey undertaken lead to the segmentation of the market in two major customer groups (i.e., Internet shoppers vs. interested to adopt Internet shopping) and identified the characteristics of the most attractive customer segments for electronic commerce. The differences and similarities among the two groups against Internet shopping, and the identification of the critical success factors that a virtual retailer should consider in order to satisfy each of these groups effectively, were then discussed.

4.1.2. Methodology and Sample

As was also discussed in Chapter 3, the study was conducted as part of the ACTIVE project[1]. The sample comprised of 500 respondents who were customers of a large supermarket chain operating in the greater area of Athens. The chain currently operates 87 stores, with 5,000 employees, it covers a sales area of 105,000 square meters, and its sales turnover exceeds 200 billion GRD.

The selection of the sample participants was conducted based on random sampling procedures from nine different areas of Athens. The basic criteria for inclusion in the sample were age range 18-45 and use or ownership of a PC. The questionnaire was pretested for identifying possible problems in clarity, comprehensiveness, accuracy and functionality, before it was given out to the sample. The fieldwork lasted for three weeks.

The sample was more well-balanced in terms of some basic demographic characteristics (i.e., sex, age, marital status) of the respondents, and more skewed (toward the higher levels) in terms of family income and education. The last observation might be due to the criteria that were applied for participation in the survey.

[1] *Active project -EP 27046 (2000), ESPRIT Programme (Framework IV), Commission of the European Union.*

4.1.3. Analysis of Results regarding Internet Adoption and Use

4.1.3.1. Demographic Characteristics

Based on the analysis of the demographic characteristics of participants, three separate profiles were developed (one for each of the following: Internet shoppers, interested and not interested to do shopping through the Internet). Details appear in Table 10.

Internet Shoppers

Consumers who have already used the Internet for shopping purposes are mainly young males, of the highest education level. Half of them are single and most of them earn more than the average family income, and are either private employees, scientists or free lancers. It is therefore, possible to cluster Greek Internet shoppers into a specific customer segment possessing a series of common characteristics.

VARIABLE	LEVEL	Internet Shoppers (%) (n=29)	Interested to adopt Internet shopping (%) (n=175)	Not Interested to adopt Internet shopping (%) (n=242)
SEX	Male	58.6	52.6	46.3
	Female	41.4	47.4	53.7
AGE	18-24	17.2	23.4	20.7
	25-34	41.4	44.0	38.0
	35-44	41.4	32.6	41.3
EDUCATION	Elementary School			0.4
	High School	17.2	21.7	21.1
	Technical College	10.3	17.1	23.1
	University	48.3	52.6	47.5
	Master	24.1	8.6	7.9
AVERAGE FAMILY INCOME (IN GRD)	up to 300,000	10.3	9.7	11.6
	300,001-500,000	20.7	32.0	38.4
	500,001-1,000,000	31.0	42.3	33.1
	1,000,001-2,000,000	17.2	5.1	5.8
	more than 2,000,000	3.4	6.9	2.5
	Don't know/No answer		4.0	87
FAMILY STATUS	Single	55.2	45.7	45.0
	Married	44.8	52.0	54.1
	Divorced		2.3	0.8
OCCUPATION OF HEAD OF HOUSEHOLD	Company holder	3.4	4.6	2.9
	Executive Manager	3.4	4.0	3.3
	Private Employee	27.6	38.9	36.0
	Trade	3.4	6.9	4.5
	Public Servant	10.3	11.4	16.9
	Scientist	27.6	14.9	13.6
	Free lancer	17.2	9.7	11.2
	Labourer		0.6	
	Pensioner	6.9	1.7	5.8
	Military		2.9	0.8
	Other		4.6	5.0

Table 10: Demographic Characteristics of the Sample

Interested to Adopt Internet Shopping

These are consumers who have decided to adopt Internet shopping in the near future. Half of them are male, married and university graduates. Almost 40% of them are private employees, with average monthly incomes.

Not Interested to Adopt Internet Shopping

Almost half of the sample belongs to this category (i.e., 242 participants); 54% of them are female, while almost 80% are between the ages of 25 and 44 years old. Almost half of them hold a university degree, while their monthly income lies between the average and the lower level. Finally, half of them are married and more than one third are private employees.

Respondents interested to adopt Internet shopping in the near future, differ slightly from current Internet shoppers in terms of their demographics characteristics. More specifically, Internet shoppers are slightly more educated than future Internet shoppers. The Internet shoppers group consists of more scientists and free-lancers. This can be easily explained by the fact that university research centers and consulting businesses were the first organisations that adopted the Internet.

4.1.3.2. Behavioural Characteristics

"Distance shopping" (e.g., through phone, TV, Internet, etc.) has become one of the alternative shopping modes for both aforementioned groups, with wider acceptance among Internet shoppers (Table 11). However, it is also evident that distance shopping is in its infancy at the moment.

The 24-hour shopping capability along with the "save of time" opportunity, are the two main reasons for which both groups prefer buying products remotely. Because, however, the Internet is the main distance shopping medium which offers a 24-hour basis order capability (unlike other media like TV, phone, etc. which do not usually offer a 24-hour order processing), it is expected that it will remain the main distance shopping medium in the future.

		Internet Shoppers (%) (Already Buy; n=29)		Interested to adopt Internet shopping (%) (n=175)	
HAVE USED FOR PURCHASING PRODUCTS	Through advertising material and store printed catalogues	10.3		14.3	
	Phone order	17.2		9.1	
	Through TV (Telemarketing)	10.3		9.1	
	Through Internet	100		0	
	From newspapers and magazines advertising material	6.9		7.4	
	Else	3.4		2.9	
HOW OFTEN CONDUCT SUCH TYPE OF SHOPPING		Through Internet	Through other ways	Through Internet	Through other ways
	Very-very often	3.4	6.9	0.0	1.1
	Very often	6.9	0.0	0.0	2.3
	Often	10.3	6.9	0.0	5.1
	Sometimes	48.3	13.8	0.6	9.1
	Few times - once	27.6	13.8	0.6	8.0
	Don't know - Don't answer	3.4	58.6	98.9	74.3
MOST IMPORTANT REASONS TO BUY PRODUCTS FROM HOME	24-hour shopping	44.8		13.1	
	Save time	75.9		17.1	
	Avoid crowding in stores	20.7		8.6	
	Better briefing about products	34.5		4.0	
	More time for product evaluation and selection	20.7		6.3	
	Avoid parking problems	3.4		4.0	
	Is the only way to buy some products	27.6		12.0	
	Else	3.4		1.7	

Table 11: Behavioural Characteristics of Internet Shoppers vs. Interested to Adopt Internet Shopping

4.1.3.3. Perceptions and Preferences

Table 12 presents perceptions and preferences of Internet shopping between current and future Internet shoppers. The products that both groups already buy or would buy remotely, include: hardware and software, CD or disks, books and magazines, travel tickets and electronics. On the contrary, clothes, furniture and cosmetics are products that both groups would primarily buy only from a physical store. Furthermore, cash on delivery was evaluated as the most preferred shopping method for both groups, while low prices constitute one of the most valuable services that an Internet store can offer.

Internet shoppers evaluated "high quality service/quick delivery" offered by the Internet store as its most valuable service. This particular finding relates to previous results about Internet shoppers evaluating the "save time" dimension as the most important reason for buying products from home. Correspondingly, future Internet shoppers evaluated the "wide product variety" offered by the Internet store as the most valuable service to them. In addition, sales promotions and low prices were found to be the most effective

incentives for both groups for buying through the Internet. Furthermore, most of the respondents (65%-70%) stated that they would not buy from a virtual store if prices were higher, although both groups agreed with the existence of a minimum purchase limit for free home delivery.

		Internet Shoppers (Already Buy; n=29)			Interested to adopt Internet shopping (n=175)		
		Already Buy	Would Buy	Only in Store	Already Buy	Would Buy	Only in Store
PRODUCTS THAT ALREADY BUY OR WOULD BUY FROM HOME OR JOB	Hardware and Software	58.6	6.9	20.7	17,2	51,7	31,0
	CD or Disks	41.4	58.6	6.9	55,2	58,6	10,3
	Books and Magazines	41.4	31.0	13.8	62,1	55,2	17,2
	Travel Tickets	13.8	37.9	13.8	27,6	62,1	27,6
	Electronics	13.8	24.1	34.5	37,9	41,4	34,5
	Clothes	3.4	0.0	86.2	37,9	20,7	65,5
	Furniture	3.4	0.0	55.2	6,9	24,1	89,7
	Home equipment	3 4	13.8	44.8	37,9	34,5	41,4
	Cosmetics	3 4	10.3	48.3	24,1	37,9	55,2
	Sport	3 4	10.3	31.0	20,7	41,4	44,8
	Food and Drinks	3 4	10 3	55.2	6,9	51,7	65,5
	Else	3 4	0 0	3 4	0,0	10,3	0,0
ALTERNATIVE PAYMENT METHODS PREFERRED	Credit card through phone or fax	20.7			7.4		
	Credit card through Internet	34 5			0.6		
	Credit card on delivery	20.7			4.0		
	Cash on delivery	41.4			17.7		
	Through bank account debit	13.8			3.4		
MOST VALUABLE SERVICES THAT AN INTERNET STORE CAN OFFER	Branded products	20.7			32.6		
	Wide product variety	37.9			56.0		
	Low prices	51.7			48.6		
	High quality service-quick delivery	58.6			36 0		
	24 hours service	37.9			43.4		
	Home/Job delivery	27 6			40.0		
	Safe payments	24 1			22.3		
	After sales interest for the customer	10 3			6.9		
	Else	0 0			1.1		
	Don't know/No Answer	0.0			0.6		
INCENTIVES FOR BUYING THROUGH INTERNET	Low prices	51.7			70.3		
	Sales Promotions	55.2			69.7		
	Participation in contests	6.9			8.6		
	Discount in the total amount of purchases	34.5			33.7		
	Else	17.2			6.9		
	Don't know/No Answer	3 4			2.3		
WOULD BUY FROM A VIRTUAL STORE IF PRICES WERE HIGHER	Yes	24 1			22.3		
	No	69 0			65.7		
	Don't know/No answer	.6 9			12.0		
TOLERABLE PERCENTAGE OF HIGHEST PRICES	0-10%	20 7			18.3		
	10-20%	3.4			2.9		
	20-30%	0.0			0.6		
	Don't know/No answer	75.9			78.3		
THERE SHOULD BE A MINIMUM PURCHASE LIMIT FOR FREE HOME DELIVERY	Yes	65 5			74.3		
	No	27 6			21.7		
	Don't know/No answer	6.9			4.0		
MINIMUM TOLERABLE PURCHASE LIMIT FOR FREE HOME DELIVERY	up to 5,000	10.3			12.0		
	5,001-10,000	24.1			15.4		
	10,001-15,000	0.0			7.4		
	15,001-20,000	10.3			20.6		
	20,001-30,000	10 3			10.9		
	30,001-50,000	3.4			4.0		
	50,001+	3.4			1.7		
	Don't know/No answer	37 9			28.0		

Table 12: Perceptions and Preferences regarding Internet Shopping (numbers refer to percentages)

Based on the preceeding discussion, it can be concluded that Internet shoppers are "innovators" and interested–to–adopt Internet shopping are "early adopters," according to the typology of consumers in the diffusion of innovation process (Gatignon and Robertson 1991, Ram and Jung 1994, Kyungae and Dyer 1995, Schiffman and Kanuk 2000). This observation is well justifiable based on all demographic and certain behavioural characteristics and perceptions presented in Tables 10, 11 and 12. Furthermore, consumer belonging to the same category have certain common characteristics and therefore, marketers develop strategies to target each consumer category separately (Brown 1992, Rogers 1983).

4.1.3.4. Evaluation of Virtual Retail Store Characteristics

Internet shoppers and future adopters evaluated Internet shopping on sixteen dimensions, using a 5-point scale (1=not important at all; to 5=very important). Figure 29 presents the means of the two groups on all sixteen dimensions. The means were plotted on a snake-plot and t-tests were run in order to identify statistically significant differences between each pair of means (Lehmann 1989). Results indicated that the most significant differences (at significance level α=.005) are in the evaluation of the characteristics "sense of being in a store," "recommendations about products" and "entertainment," with Internet shoppers systematically assigning lower evaluations on them. Other statistically significant differences (α=.01) were the evaluations of the "on-screen projection of shopping list" and "immediate help on exploring the store" characteristics. Less significant differences identified, had to do with the evaluation of the dimensions: "product image on the screen," "video projection of products" and "personal support during shopping" at α=.025; "direct cost calculation of total purchases" and "recommendations about products through e-mail" at (α=.05). For all these statistically significant differences, future adopters had higher evaluations than Internet users. The only exception was the "quality comparison among alternative products" (at α=.025). Finally, the other five dimensions gave differences which were not statistically significant.

Both groups rated clearly high the following characteristics of an Internet retail store:

- Information and price comparisons among alternative products (i.e., information about product prices, costs, product characteristics, images on

screen, product comparisons using alternative factors, etc) which facilitate consumer product comparisons, evaluations and final choices.

- Quick access of the store's Web site. This dimension was evaluated with the same high positive score (i.e., 4,5) from both groups.

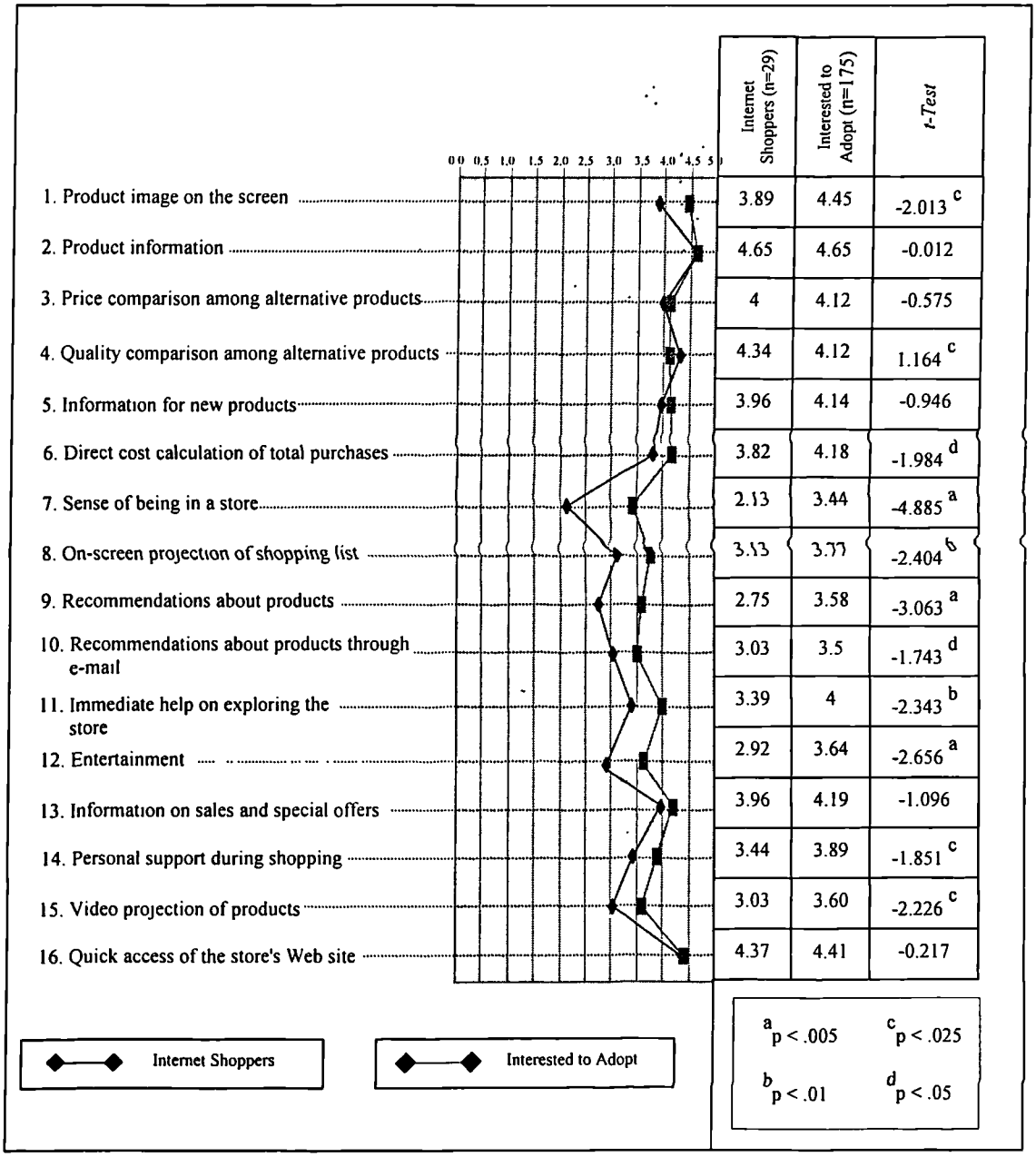


Figure 29: Evaluation of Virtual Retail Store Characteristics by Internet Shoppers and Interested to Adopt Internet Shopping

Both groups evaluated "support and help on exploring the store, through a personalized manner" with above average scores. These observations refer to the evaluation of characteristics of the virtual store's layout and design along with the supportive

mechanisms provided. In addition, Internet shoppers who already have the actual experience, rate the "sense of being in a store" dimension below average, while future adopters perceive store atmosphere as an important element of an Internet store. This means that the "store atmosphere" constitutes a store selection criterion, or in other words a very important attribute of an Internet store, for those customers that are interested to adopt Internet shopping in the future.

Overall, for the majority of the relevant dimensions, the results indicate that future adopters, who do not have the experience with Internet shopping yet, evaluated almost all dimensions with higher scores than those assigned by current Internet shoppers.

4.1.4. Profiling Innovators and Early Adopters: Managerial Implications and Future Research Perspectives

Summarizing the results from the preceeding analysis, the profiles of the two groups under study were developed (Table 13). In categories where multiple levels of characteristics are presented, they appear in order of frequency of responses. The table's presentation format allows for quick reference by marketing managers to special characteristics of each group. For example, demographic and behavioural characteristics of consumers interested to adopt Internet shopping, help managers develop promotion strategies for targeting them, as well as using them, at a later stage – after their adoption of the innovation – as opinion leaders who will persuade other consumers from the "early majority" to also adopt. In addition, information on perceptions and preferences regarding Internet shopping, contribute toward the design of the total product offering, e.g., characteristics of services offered, payment, purchase limits, presentation of products, information provided, etc.

Combining results from in Table 11 and Figure 12, several managerial implications, future research directions and critical success factors for business effectiveness over the Internet are provided:

- Virtual retailers should pay great attention to the shopping interface design issues. This need is clearly supported by the finding that future Internet shoppers evaluated the dimension "sense of being in a store" as very important, while Internet shoppers do not. It is apparent, therefore, that the shopping interface

affects differently consumer buying behaviour. To that end, consumer surveys are strongly encouraged in order to capture consumer requirements and incorporate them into the design phase of the virtual store's shopping interface.

- Another critical success factor is the provision of "alternative payment methods" in virtual retailing. The fact that both current and future Internet shoppers rate the "cash on delivery" as the most desired payment method (probably for security reasons or due to the fact that they do not possess a credit card), implying that they probably use this as a store selection and choice criterion. Therefore, the provision of this particular alternative payment method is strongly recommended for virtual retailers. Similarly, all those identified criteria that customers use for selecting an online store on the Web, should be closely and systematically monitored by virtual retailers through consumer surveys.

Characteristics	Internet users	Interested to adopt
Sex	mostly male	male and female
Age	25-44	18-44
Education	university graduates & postgraduate studies	university graduates
Avg. Monthly HH Income (GRD)	300,000 - 2,000,000	300,000 - 1,000,000
Family Status	Single	married
Occupation	scientists; private employees; free lancers	private employees; scientists; public servants
To purchase products, they use (how often)	Internet; phone orders (sometimes; few times)	advertising material & store catalogues; phone orders; telemarketing
Reasons for buying products from home	to save time; 24-hour shopping; better briefing about products	save time; 24-hour shopping; the only way to buy some products
What products buy from home/job	hardware & software; CD or disks; books & magazines; travel tickets; electronics	already buy: books & magazines; CD or disks; electronics; clothes; home equipment; travel tickets; cosmetics; sport items
Buy only in store	clothes; furniture; cosmetics	furniture; clothes; cosmetics
Preferred payment method	cash on delivery; credit card through Internet	cash on delivery
Most valuable services offered by Internet store	high quality service – quick delivery; low prices; 24-hour service; wide product variety	wide product variety; low prices; 24-hour service; home/job delivery
Incentives for buying through Internet	sales promotion; low prices; discount in total amount of purchases	low prices; sales promotions; discount in total amount of purchases
Would buy from virtual store if prices were higher	No	no
% tolerable higher prices	0-10%	0-10%
Believe should be a min purchase limit for free home delivery	Yes	yes
Min tolerable purchase limit for free home delivery	up to 10,000 GRD	up to 20,000 GRD

Table 13: The Profiles of Internet Users ("innovators") & Interested-to-Adopt ("early Adopters")

- "Product information," "price comparison among alternative products" and "quick access to the store's Web site" constitute three important elements that any virtual store's management should consider and offer to its customers, as all these attributes were evaluated as very important from both current and future Internet shoppers. However, except for the "quick access to the store's Web site" the other two factors are directly related to the store's shopping interface, and therefore emphasis should be placed on investigating how these services should be implemented within a virtual retail store shopping environment over the Web.

- "Prices" of the virtual retail store must not be higher than those of the physical stores as both current and future Internet shoppers stated that they would not buy from a virtual store in case prices were higher, regardless of the free delivery service offered to them.

Several alternative types of research are suggested as future research extensions and perspectives of this work. Exploratory, descriptive and causal types of research, tailored to the peculiarities of each market, would undoubtedly accelerate Internet adoption as a shopping medium. However, there are many research directions that should be taken towards achieving competitive advantages through the Web. Two indicative research directions arising from this survey are the following:

- **Strategic business decisions:** Examination of alternative payment methods, product prices, minimum order limits for free-home delivery, etc.) for identifying ultimate combination for the product and store offer.

- **Shopping interface design:** A causal research initiative measuring the effects of different types of store layout on consumer buying behaviour within an experimental setting could provide useful insights for the design and development of effective virtual retail store shopping interfaces.

However, one could not neglect the fact that customer needs, wishes and behaviours towards Internet shopping, strongly differ among different business sectors (e.g., Retailing, Tourism, Banking). Therefore, the limitations of this initial research effort suggest that researchers should replicate the present study to other business sectors (e.g., tourism, banking, etc.).

Based on the empirical findings and future research directions of this consumer survey, along with the insights provided by the literature review discussed in Chapter 2, it is apparent that "virtual store atmosphere" constitutes a major consumer buying behaviour influencing factor and a "critical success factor" for business effectiveness in Internet retailing. In addition to what has been discussed above, the fact that both current and future Internet shoppers evaluated the importance of the "support and help on exploring the store" store attribute with above average scores, reinforced the need for examining the role of the shopping interface as a major consumer buying behaviour influencing factor in the context of Internet retailing.

4.2. A Comparative Retail Web Sites' Layout Survey

As a result of the observations discussed previously, a decision was made to conduct an Internet survey that would focus on existing virtual retail stores on the Web, and would investigate the current status of the shopping interface/environment. A thorough investigation of the "layout" employed by these stores was conducted. The present study analysed the current status of the layout that Internet retail stores employ. Results and the methodology of the study can assist virtual retailers to place themselves in the classification framework provided by the comparative retail Web sites' layout survey presented herein. Moreover, virtual retailers will be advised to incorporate a completely different layout or improve their current layout through appropriate modifications, based on a combination of the results presented herein with the respective dissertation's findings. The methodology that virtual retailers should follow towards combining these findings is thoroughly discussed in the managerial implications section in Chapter 7.

4.2.1. Introduction

According to Gillenson et al. (2000), little work exists on categorising and describing Web site structures and sub-structures. The aim of this survey was to present the current status of the Internet retailing business-to-consumer interfaces and navigational capabilities through the development and use of a corresponding attribute selection framework, while producing meaningful layout-based categories of virtual retail stores. Conventional types of store layouts (i.e., grid, free-form and racetrack) along with their

corresponding virtual alternatives (i.e., tree, pipeline, guiding pathway) served as a guide (see Chapter 2).

4.2.2. Research Methodology

The research methodology followed five sequential steps:

Step 1- Preliminary Survey for Defining the Attribute Selection Framework

The same variables used in the cybermall store survey by Spiller and Lohse (1998) were examined in the present survey, as well. In addition, a preliminary Internet survey focusing on a random sample of the Uniform Resource Locator's (URL's) under examination (see step 3 of the methodology) was utilized in order to enrich Spiller and Lohse's attribute framework, especially its layout part. The resulting attribute selection framework formed the data collection instrument used in the current survey (Table 14).

Step 2 - Initial Data Coding

An initial data coding (Table 14) was completed based both on Spiller and Lohse (1998) attributes, and on the new ones derived through the preliminary survey (step-1 of the methodology).

Step 3 - Internet Survey

A list of 551 retail Web sites from Ernst & Young 2000 Global Online Retailing Report (2000) was examined through their Uniform Resource Locations (URL's). The Attribute Selection Framework constituted the Data Collection Instrument.

Step 4 - Initial Analysis of Results and Revision of the Data Collection Instrument

Through the use of the attribute selection framework, the 551 interfaces were investigated. The analysis provided feedback regarding the characteristics of the surveyed Internet retail stores through the use of the data-coding format. Based on the feedback provided from the analysis, a revised data-coding scheme was developed. This was done because the initial data coding was developed for the purpose of conducting an "exploratory research" which was transformed to a "descriptive" type of research along the way (i.e., as soon as knowledge of this specific research field was obtained). Therefore, based on the results of the exploratory research, the data coding part of the attribute selection framework was enhanced through the development and employment of more representative and meaningful ranges and scales. The revised attribute selection

framework results are presented in Table 14. It should be noted that the data coding section of some attributes remained the same as it was found to sufficiently depict the situation of the corresponding attribute.

	Attributes	Initial Data Coding	Revised Data Coding	Results
1	Number and type of different shopping modes	Number and type	1: Only through product categories >1: More alternatives	1: 365 >1: 186
2	Number of hyperlinks to a different site on the first page?	Number	0: No hyperlinks >0: Existence of hyperlinks	0: 318 >0: 233
3	Number of products on the end page	Number	1: One product placed at the end page >1: More than one products placed at the end page	1: 347 >1: 204
4	Links between related product pages	0: NO 1: YES	0: No links >0: One or more links	0: 467 >0: 84
5	Is product price shown in the product list, end page?	0: NO 1: YES	0: Price not shown in the product list, end page >0: Price shown in the product list, end page	0: 49 >0: 502
6	List of product Three Categories	1 Product name 2 Product name and description 3 Name, Description and Image	1. Only the brand name is appeared 2: Both brand name and product description are appeared 3: Brand name, product description and product image are appeared	1: 26 2: 79 3: 446
7	Number of navigational signs at the home page of the site	Number	<AV: Lower than the average number of buttons of the 551 sites >AV: Higher	<AV: 302 > AV: 249 AV=47
8	Menu bars on all pages and their form	0 NO 1. YES, Text 2 YES, Image	0. No menu bars are used >0: Menu bars are used	0: 17 >0: 534
9	Background colour on first page	Colour	W White Background N W: Coloured Background	W: 415 NW: 134
10	Use of images on first page	0: NO 1: Only for products 2: For products and buttons	0: No use of images >0: Use of images	0: 100 >0: 451
11	Number of hierarchies between home and end page Is this number the same for all end pages?	Number 0: NO 1: YES	<AV: Lower than the average number of hierarchies of the 551 sites >AV: Higher than the average number of hierarchies of the 551 sites	<AV: 254 >AV: 297 AV= 3,5
12	Lines of text describing the product on end page	Number	0: No lines 4-5: 4-5 lines >5: More than 5 lines	0: 67 4-5: 139 >5: 345
13	Gifts and coupons on the first page	0 NO 1. YES	0: No gifts and coupons on the first page 1: Gifts and coupons are offered on the first page	0: 358 1: 193
14	FAQ	0. NO 1 YES	0 No FAQ 1: Existence of FAQ	0: 414 1: 137
15	Product catalogue or search engine	0 Catalog 1 Search engine 2 Both	0. Only product catalog 1: Both product catalog and search engine	0: 107 1: 444
16	Information about the company	0 NO 1 YES	0: Information about the company is not provided 1: Information about the company is provided	0: 159 1: 392
17	Help on interface usage Everywhere (Y/N)?	0 NO 1: YES	0: Help is not provided 1: Help is provided only on the first page 2. Help is provide in the entire site	0: 239 1: 41 2: 271
18	What's new First page	0: NO 1. YES	0: There is not a "What's new" section 1: Existence of a "What's new" section	0: 424 1: 127
19	Advertisements, description and position	0 NO 1 YES	0: No advertisements 1: Existence of advertisements	0: 480 1: 71
20	Number of levels between the "entrance" page and the home page	Number	0: No existence of an "entrance" page 1: Existence of an "entrance" page	0: 478 1: 73
21	Appearance of application form	0. Start 1:End	0: At the beginning 1: At the end 0,1: Both	0: 12 1: 416 0,1: 123
22	Appearance of company label	Position and colour	L: Left on the screen C: Center on the screen R: Right on the screen	L: 425 C: 112 R: 14
23	Time for page loading	0 No satisfied 1:Satisfied	-	Not Objective
24	Product ordering and selection	0 Keyboard 1 Mouse	1: Through mouse 0,1: Both through mouse and keyboard	1. 284 0,1: 267
25	Button for access to the first page from other pages	0.NO 1: YES	0. No existence of home page button 1. Existence of home page button	0: 43 1: 508

Table 14: Attribute Selection Framework

Step 5 - Selection and Documentation of Specific Navigational Attributes towards Layout Classification

Within this phase of the methodology, specific navigational attributes (Table 15) served as a guide for classifying the surveyed Internet retail stores in the corresponding layout categories presented in Figure 21 (Chapter 2). For example, in order for an Internet store to be included in the tree-hub (i.e., grid layout) layout category, it should offer components like the product catalogue, home page button and menu bar. The documentation of the specific attribute selection follows:

Attribute No	Attribute Name	Description/Documentation
4	Links between related product pages	Enables visitors to reach related product pages within the site
8	Menu Bar	Enables visitors to select/reach a store function
15	Product Catalogue	Enables visitors to reach a product category, sub-category or an end-product
15	Search Engine	Enables visitors to directly search and find something within the store
25	Home Page Button	Enables visitors to reach the home page from any location within the site they are

Table 15. Description of the Selected Attributes

In order for a specific Web store layout to be classified in any one of the three alternative virtual store layout types provided through Vrechopoulos et al. (2000) study (Chapter 2), it should meet the following conditions:

- **Tree or Hub** (Grid in conventional retailing): Home Page Button **AND** Product Catalogue **AND** Menu Bars.

  Documentation: Product Catalogue component enables customers to select a product category (aisle in conventional retailing) through a hierarchical structure format. According to Levy and Weitz (1998) and Lewison (1994), the customer should drive through the central aisle in order to reach another aisle within a grid layout. Furthermore, through the use of the Home Button component, customers can return to the "entrance" of the store – home page (i.e., main aisle in conventional retailing) and select another product category by using the product catalogue component. As far as the navigation within the product category is concerned (i.e., navigation within an aisle in conventional retailing), customers can use the "backward and forward" components offered by the Internet browser and locate the products they are looking for. Finally, menu bars enable customers to reach a specific store function (e.g., cashier), which is also

applicable in conventional retailing (i.e., customers leave one aisle and proceed to the cashiers through the main aisle of the store).

- **Pipeline** (Free-form in conventional retailing): Home Page Button **AND** Menu Bars **AND** Product Catalogue **AND** Search Engine.

  Documentation: As in conventional retailing (Levy and Weitz 1998; Lewison, 1994), customers are enabled to immediately access every product category, sub-category, end-product or service within a virtual retail store employing the full pipeline layout's provision of the corresponding components (e.g., search engine). It should be noted that these components include all the basic navigation facilitation components of the attribute selection framework list.

- **Guiding Pathway** (racetrack/boutique in conventional retailing): Links between related product pages.

  Documentation: Virtual stores employing this type of layout, guide customers to navigate through specific paths in order to reach products that they search for, by providing them with direct access only to neighbouring categories. The selected attribute (i.e., links between related product pages), therefore, enables customers to access only related product categories (i.e., neighbouring product sections in conventional retailing) within the virtual store.

Nevertheless, other layout types could also arise. For example, a potential layout type could be one employing only the "menu bar" and the "product catalogue mechanisms". However, since this layout type could not be classified in any one of the corresponding layouts for virtual retailing provided through the conventional retailing theory, (Vrechopoulos et al. 2000), it was considered to be out of the scope of this initial research effort.

4.2.3. Analysis of Results

4.2.3.1. Shopping Interface Determinants

The initial results of this particular research effort are included in Table 14. The following discussion, however, deals with the "interface determining attributes" of the virtual retail stores that were studied.

It is clear that the most commonly employed shopping mode is implemented through the product categorisation component. However, price comparisons, brand searching, etc., are also used. Most of the examined sites do not employ links to other sites in their home page. In cases where such links are provided, customers are usually linked to trusted third party organisations. As far as the number of end-page products is concerned, it was found that the majority of the investigated sites offer one (1) product. There is quite a small number of sites (15%), offering links to other product related pages within the site (e.g., store magazine, expert advice). Finally, almost all sites (91%) illustrate product prices.

The majority (81%) of the sites illustrates the product's image, name and description. White background is most commonly used, while only 18% of the sites do not use images on their home page. Regarding the number of levels from the home to the end page of the site, the average number was found to be 3,5. Most of the sites use more than five (5) lines describing each product, while 1/3 of them offer promotional incentives (e.g., gifts) on their home pages. A "Frequently Asked Questions" (FAQ) section is offered by 25% of the examined sites, while the help component is offered by approximately half of the surveyed sites (in all their pages). Company information is offered by about 70% of the sites. The "*What's new*" promotional technique on the home page of the site is not commonly used (25%), while 87% of the examined sites do not advertise anything. It should be clarified, however, that advertising differs from the sales promotion activities described above, as advertising is placed as one of the seven promotional mix elements under the umbrella of the promotional mix (Kotler 1997) and in such a way it was measured.

A quite small number of sites (13%) employs an "entrance" page which presents customers with some information about the store before entering its home page, or asked to enter their user name, password or post-code in order to enter the store. Customer application forms are mostly (75%) provided at the end of the shopping interaction. Company label mostly (77%) appears on the left side of the page. As far as the sites' loading time is concerned, it should be clarified that such kind of information requires a separate analysis due to the fact that Internet speed is affected not only by one variable (i.e. the site content) but also by other variables (i.e. network speed and traffic). However, most of the sites' loading time was satisfactory. Finally, the product ordering procedure is implemented by half of the sites through the use of a mouse and by the rest through the combined use of a mouse and a keyboard.

4.2.3.2. Classification of Virtual Store Layouts

Based on the aforementioned analysis, the layout classification of the examined Internet retail stores is presented in Table 16. The conditions of the specific attributes (#4, #8, #15, #25) employed at the "Selection and Documentation of specific Navigational Attributes towards Layout Classification" phase of the research methodology, is also used in this Table.

Types of Layout	Conditions	Number and % of sites employing the layout
Tree Hub (Grid)	Home Page Button (Attribute 25) AND Product Catalogue (Attribute 15) AND Menu Bar (Attribute 8)	117 (21,2%)
Pipeline (Free-form)	Home Page Button (Attribute 25) AND Menu Bar (Attribute 8) AND Product Catalogue (Attribute 15) AND Search Engine (Attribute 15)	283 (51,3%)
Guiding Pathway (Racetrack/Boutique)	Links between related products (Attribute 4)	8 (1,5%)

Table 16: The Classification of Internet Retail Store Layouts

As presented in Table 16, half of the examined sites (51,3%) were found to employ the pipeline layout. Only 21,2% was found to employ the tree-hub layout, while only 1,5% employed the guiding pathway layout. The rest of the sites (26%) were not classified in Table 14, as they did not meet the conditions presented at step-5 of the research methodology.

Furthermore, it was found that almost all the examined sites (97%) provide menu bars, while 81% of them provide both product catalogues and search engines. Finally, 92% of the investigated sites provide home page buttons at all site pages.

The fact that more than half of the investigated virtual retail stores employ the pipeline layout could be explained by the "technology capabilities" offered within a Web-context shopping environment. In other words, a virtual retailer can easily adopt, apply and offer to its customers a fully-navigational supported shopping environment (i.e., provision of search engines, etc.) enhancing through that the effectiveness towards locating desired products or services.

It was also found that Web sites selling food and general merchandise were found to employ the tree-hub layout, much more frequently in comparison to other categories of

products (e.g., electronics, flowers, etc.). This research insight could be explained by the fact that conventional retailing strategy (i.e., the employment of grid layout to facilitate planned shopping behaviour within grocery sector) was transformed and adopted somehow on the Web, regardless of the technology capabilities offered. However, also in this case, pipeline layout is mostly employed.

4.2.4. Conclusions

This survey identified a strong trend among virtual retail stores to implement mainly the pipeline layout (i.e., free-form in conventional retailing), which provides search product engines and leads customers to make choices through product lists, that meet their corresponding preference criteria. In addition, the kind of merchandise sold (e.g., grocery vs. electronics) was found to directly affect the store layout implemented by most virtual stores. However, questioning is generated whether there is any underlying theory that supports virtual retailers' decision to implement a particular layout or not. According to the literature review insights (Chapter 2), it is evident that research measuring store interface effects on consumer buying behaviour in the context of Internet retailing is on its infancy while many researchers have stated that Internet retailing follows a "technology" rather than a "consumer" focus approach (Chapter 2). Therefore, it is concluded that virtual retailers' decision to provide a particular layout type is not based on any theoretical Internet retailing guidelines, but rather on some basic usability principles for effective Web site design and mostly on the expertise and "fantasy" of Web developers. In other words, this means that virtual retailers are not aware at the moment about the effects caused by their stores' layout on their consumers' buying behaviour. Therefore, such an issue undoubtedly constitutes a challenging research area with direct managerial implications.

The core contribution of this initial research to the main research effort, is the fact that it investigates in an exploratory research approach a "critical success factor" for Internet retailing effectiveness which also constitutes the main research issue of this dissertation. Through that, this study revealed that while different layouts are used by different virtual retail stores over the Web, there is not any well-established underlying theory referring to layout effects on consumer buying behaviour based on which these retailers have implemented their corresponding layouts. On the other hand, this initial research effort enables virtual retailers to use the specific attributes and the research methodology used herein and classify their online store layout into one of the presented layout patterns. Of

course, there will be many cases where existing store layouts cannot be classified in any of the three alternative patterns, something which constitutes a limitation of this initial research effort. However, this study showed that 75% of the investigated sites were classified in one of the alternative layout categories, which is a quite big percentage. Therefore, existing virtual retailers knowing in which layout they belong to, they can effectively use the findings of the dissertation's research. This means that based on the experiment findings, they will be able to improve or modify their Web sites according to what these findings dictate. It is apparent, therefore, that this initial research effort, significantly contributes to the enhancement of the managerial implications provided by this dissertation. In addition, it provides future research directions which encourage the execution of the main research effort of this dissertation (i.e., the experiment).

Finally, another contribution of this initial research effort refers to the fact that the attributes used for classifying the existing retail stores were also used in the same way in the development of the virtual laboratory store for each layout type. For example, the home page button was used for the grid layout, as the others (i.e., menu bars and product catalogues) are sufficiently represented by the structure of the virtual laboratory store (i.e., aisles, shelves, view basket button). This also contributes to the present study managerial implications, as the reliability regarding the direct comparison between the existing and the corresponding laboratory store layouts will be enhanced.

4.3. Summary

Based on the findings of the two initial research initiatives, it is apparent that the shopping interface of an Internet retail store constitutes a "critical success factor" for business effectiveness over the Net. Based on that, future research on investigating Internet retail store atmosphere effects on consumer buying behaviour is strongly encouraged by both these initial research efforts. More specifically, based on the results of the first study, it was found that customers interested to adopt Internet shopping in the near future, pay special attention to the store atmosphere as they evaluated the "sense of being in a store" dimension as a very important store function. In addition, both current and future Internet shoppers evaluated the "support and help on exploring the store" also as a critical store function. Nevertheless, this dimension is comprised of several components, one of which is the layout. The second survey indicates that there are many variations regarding the layout that Internet retail stores employ world-wide. The fact

that pipeline layout (i.e., free-form) is used by half of the examined stores, however, does not necessarily mean that this layout is the most effective one. Therefore, it is evident that future research should focus, among other things, on the measurement of the layout effects on consumer buying behaviour in order to support business decisions towards the employment of the most effective layout for the grocery sector, which is the application area of the present study.

CHAPTER 5. DEVELOPING ALTERNATIVE VIRTUAL STORE LAYOUTS

This Chapter presents the methodology used towards developing the three store layouts under study within a Web-based shopping interface. It begins by reviewing the existing hypermedia design methodologies and the graph theory that is used as a consumer navigation representation tool. Then, it proceeds by adopting the methodology developed through the above discussion, towards designing the concept that each of the three layouts under study should follow within the virtual laboratory store. Finally, this Chapter presents the methodological steps followed towards the implementation phase of the virtual laboratory store.

5.1. Hypertext/Web Design Approach

5.1.1. Design Approach

The development of the alternative virtual store layouts (i.e., grid, freeform, racetrack) incorporated in the Web-based virtual laboratory store as a prerequisite to run the corresponding experiment, requires an understanding of the consumer behaviour within each particular type of conventional store layout. To that end, an appropriate customer navigation representation instrument was employed, followed by the discussion and selection of a particular methodology for hypertext application development. Then, the selected methodology was followed to implement each particular store layout.

5.1.2. Visual Representation and Graphs

Proceeding with the development of the laboratory virtual store, it is necessary to develop a visual representation of the navigation or browsing in a real store, employing each of the alternative layouts. To that end, "graph" as a well-documented instrument for representation and modeling was employed. This instrument is a result of a scientific discipline of discrete mathematics, called "graph theory." A graph is introduced here as an abstract mathematical system. Graph theory is applied in such diverse areas as communication engineering, social sciences, physical sciences, information organization and retrieval, artificial intelligence, switching theory, formal languages, operating systems and compiler writing (Wilson 1987).

According to the literature (Chartrand 1985, Gross and Yellen, 1998, West 1996), a graph $G = <V, E, \varphi>$ consists of a nonempty set V that is called the set of nodes (points,

vertices) of the graph, a set E that is the set of *edges* of the graph, and a mapping φ from the set of edges E to a set of ordered or unordered pairs of elements of V. A graph, depending on whether its edges are directed or undirected is called "directed (digraph)" or "undirected" (Figure 30). Any sequence of edges of a digraph such that the terminal node of any edge in the sequence, is the initial node of the edge (if any) appearing next in the sequence defines a path of the graph.

A graph is preferred over other techniques for the representation of the store layouts of this study for the following reasons:

1. It is a standard structure from discrete mathematics that can be used to build models for several situations.
2. It is applied in the area of information organisation and retrieval.
3. Navigation and browsing in a store is accomplished following paths when seeking specific products located in specific shelves.
4. According to Spence (1999), "hypermedia worlds are typically based on node-link representations and permit only discrete movement."

In a graph representation of a customer shopping in a grocery store, the customer follows one or more paths to reach a specific group of products or a specific brand of a product category. The path is represented by a sequence of edges and the desired product or group of products, is represented by a node.

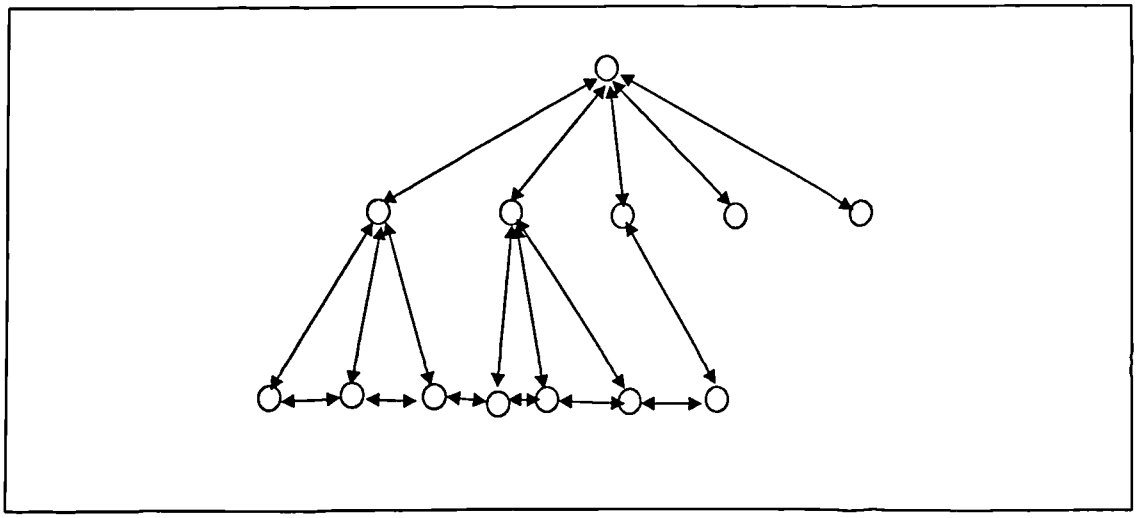


Figure 30: An "Undirected" Graph for Navigation in a Store

For example, one can get into a grocery store, stop and ask an employee for the location of vegetables (e.g., in order to buy tomatoes). The employee shows the customer which way (i.e., path or walk) to follow. Following this path he/she passes through several

other product categories (i.e., nodes). Eventually, he/she, for example, reaches the vegetables' category (i.e., node) and looks there for tomatoes. Finally, she/he locates tomatoes (i.e., final node in his path) and picks one or two pounds of them.

A representation of the relevant customer behaviour for each of the three alternative store layouts is attempted later in the Chapter.

5.1.3. Hypermedia Design Methodology Selection

As Isakowitz et al. (1997) note, hypermedia projects are very different from traditional software development projects. First, hypermedia projects may involve people with very different skill sets: authors, content designers, artists, marketers, as well as programmers. Second, the design of hypermedia applications involves the capturing, understanding and organising of the structure of a complex domain and makes it clear and accessible to users. Third, according to Miles et al. (1999), hypermedia applications that support electronic commerce should take into account the distinct goals and constraints of this activity. The primary goal of an e-commerce Web site is to facilitate economic actions. This goal is supported by information retrieval techniques as well as by consumer behaviour and human factors' analyses.

Web development in general and Web development for e-commerce in particular, is therefore, a very challenging process that demands support from a well-defined methodology adjusted to specific requirements. Such a methodology is necessary to ensure that the hypermedia product meets its objectives, and is completed on time and within budget limitations (Lee et al. 1999).

Research on the development of design methodologies for the support for hypermedia projects has resulted in the development of a number of methodologies, e.g., RMM and Extended RMM (Isakowitz et al. 1995, 1997), ERM (Kiountouzis 1997), OOHDM (Schwabe and Rossi 1995), SOHDM (Lee et al. 1999). This research is currently in progress and a few of the methodologies are being updated.

The Relationship Management Methodology (Isakowitz et al. 1995) is based on the development of an Entity Relationship Model. RMM includes the following steps:

1. E-R design
2. Slices Design

3. Navigational Design
4. Conversion Protocol design
5. User Interface Design
6. Runtime behaviour design
7. Construction and Testing

RMM has been updated recently, resulting to the development of the Extended RMM which is based on the following prototyping and iterative process (Isakowitz et al. 1997):

1. Define the information domain
2. Define what the application will do
3. Define who will use it
4. Define how the users will use the application
5. Design the E-R diagram
6. Design the initial application (navigation) diagram (top-down)
7. Decompose the application diagram into the *m-slices*
8. Regenerate the application diagram from the *m-slices* in a bottom-up fashion
9. Repeat steps 6-9
10. Design the user interface
11. Implement the system

Entity relationship modeling (ERM) is used for presenting the entities in a system and identifying the relationships between them. It is used mainly for the creation of models for data. ERM could be used for identification of relationships between products or product categories. The relationships that can be used are expected to be of the "belongs to," or "contains," or "located to" types. This technique is proven very effective for the representation of semantics' relationships between entities but it does not contain sufficient information for the representation of the navigation (e.g., between aisles, product categories or products).

The Object Oriented Hypermedia Design Model (OOHDM) is an object-oriented method (model). It is continuously updated and revised. It consists of the following steps:

1. Domain analysis
2. Navigational Design
3. Abstract Interface Design

4. Implementation

OOHDM has been complemented recently with the techniques of *use cases* and *scenarios* for the determination of the requirements accomplished in domain analysis. It contains a very important tool, the navigational context schema that is used for the development of navigational models which include a sense of context for the user. A navigational context is a set of nodes, links, context classes and other navigational contexts. This model assists the author of a hypermedia application to consider the way in which the user explores the hypermedia, avoiding redundant information and getting "lost in the hyperspace."

More recently, a Scenario-based Object-oriented Hypermedia Design Methodology (SOHDM) was developed (Lee et al. 1999). SOHDM is based on experience collected from the application of the RMM, OOHDM, and other methodologies. It consists of the following phases:

1. Domain Analysis
2. Object modeling
3. View design
4. Navigation design
5. Implementation design
6. Construction (physical database schema)

It should be clarified that the objective of this dissertation is not the development of a virtual store as such, but rather the use of it as a research instrument towards measuring its effects on consumer buying behaviour. However, a specific methodology (Figure 31) was developed in order to meet the requirements of this study. This methodology is basically based on the OOHDM presented above, using however, various elements of the aforementioned methodologies. Finally, it employs graph theory as a modeling instrument, and consists of the following phases:

1. **Domain Analysis** (use of graph theory along with conventional retailing theory for consumer navigation representation within each layout pattern).
2. Identification of **Entities** and **Procedures** within the virtual store for each layout pattern.
3. Development of **Entity-Relationship diagrams** for each layout pattern.
4. **Abstract Interface Design** for each layout pattern.

5. **Implementation** of each type of layout (use of Human Computer Interaction principles and guidelines for effective Web site design toward providing user friendly interfaces).

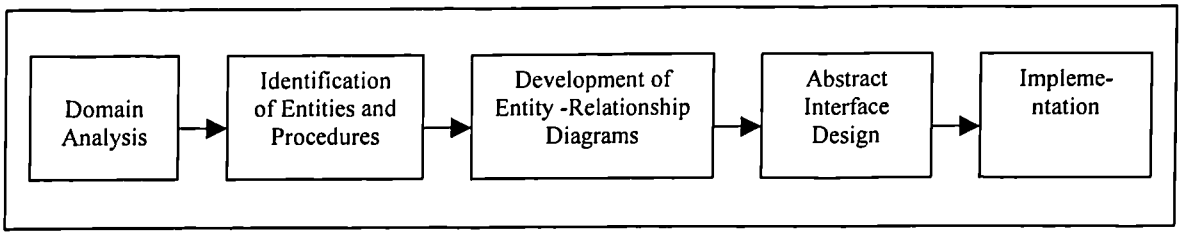


Figure 31: The Suggested Methodology for Developing the Virtual Layout Types

The first four stages of the adopted methodology are first followed for each layout pattern. Then, the implementation follows along with the definition of several pending issues (e.g., product selection, product assortment, etc). However, the third and the fourth phase of this methodology are thoroughly discussed in Appendix C1.

5.2. Virtual Store Layout Analysis and Design

5.2.1. Grid Layout

5.2.1.1. Domain analysis

Graph theory can be used for the representation of the navigation in a grid store layout. A store that is laid in this way, divides its space using gondolas of merchandise and aisles. When the customer enters the store, he/she makes sense of its geometric organization and is directed to the aisle(s) where the product(s) that he/she needs are located. Figure 32 presents an initial step to the representation of the grid layout.

It must be clarified that this representation is actually a two-dimensional projection of the three-dimensional space of a store. Several levels of nodes should be imagined, since there are many shelves of products in a gondola (Figure 34). Consequently, the second step of this representation (Figure 33) depicts only the bottom shelves of the gondolas.

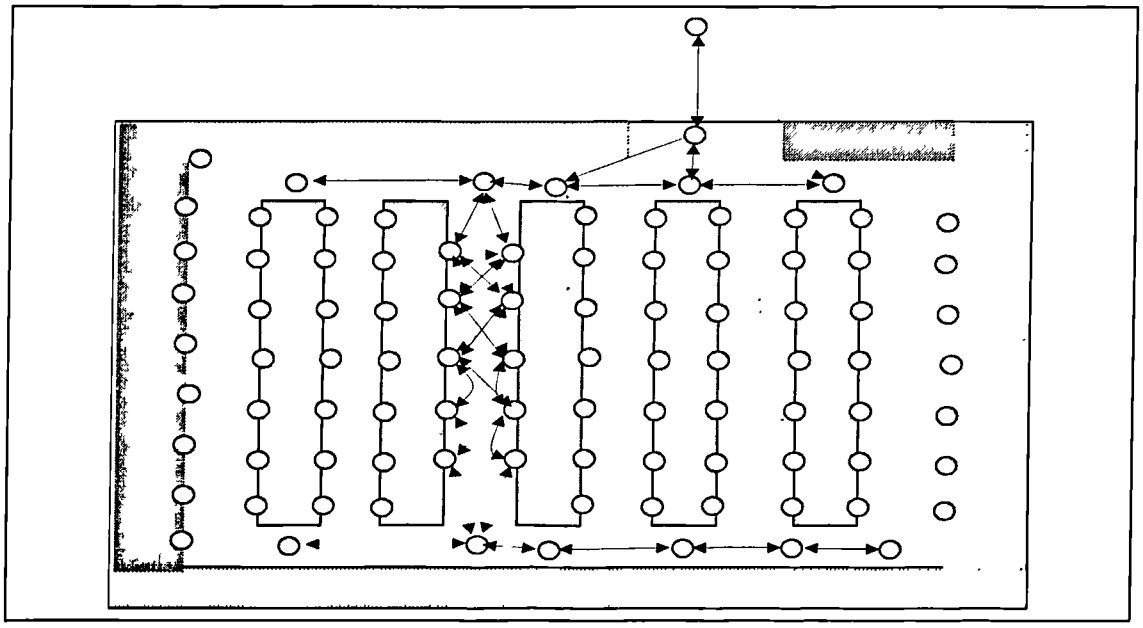


Figure 32: Grid Layout Representation - Step 1

For this representation an undirected graph is used. Its structure stems from the geometric organization of the grid store layout. The central feature of this representation is that a customer may move backward and forward between nodes (i.e., end-products, sub-categories or product categories), but only according to specific aisles that are separated from gondolas. A customer located at a node in aisle 1, for example, can not move directly to a node in aisle 2 without passing from the main or the internal corridor nodes, as depicted in Figure 33.

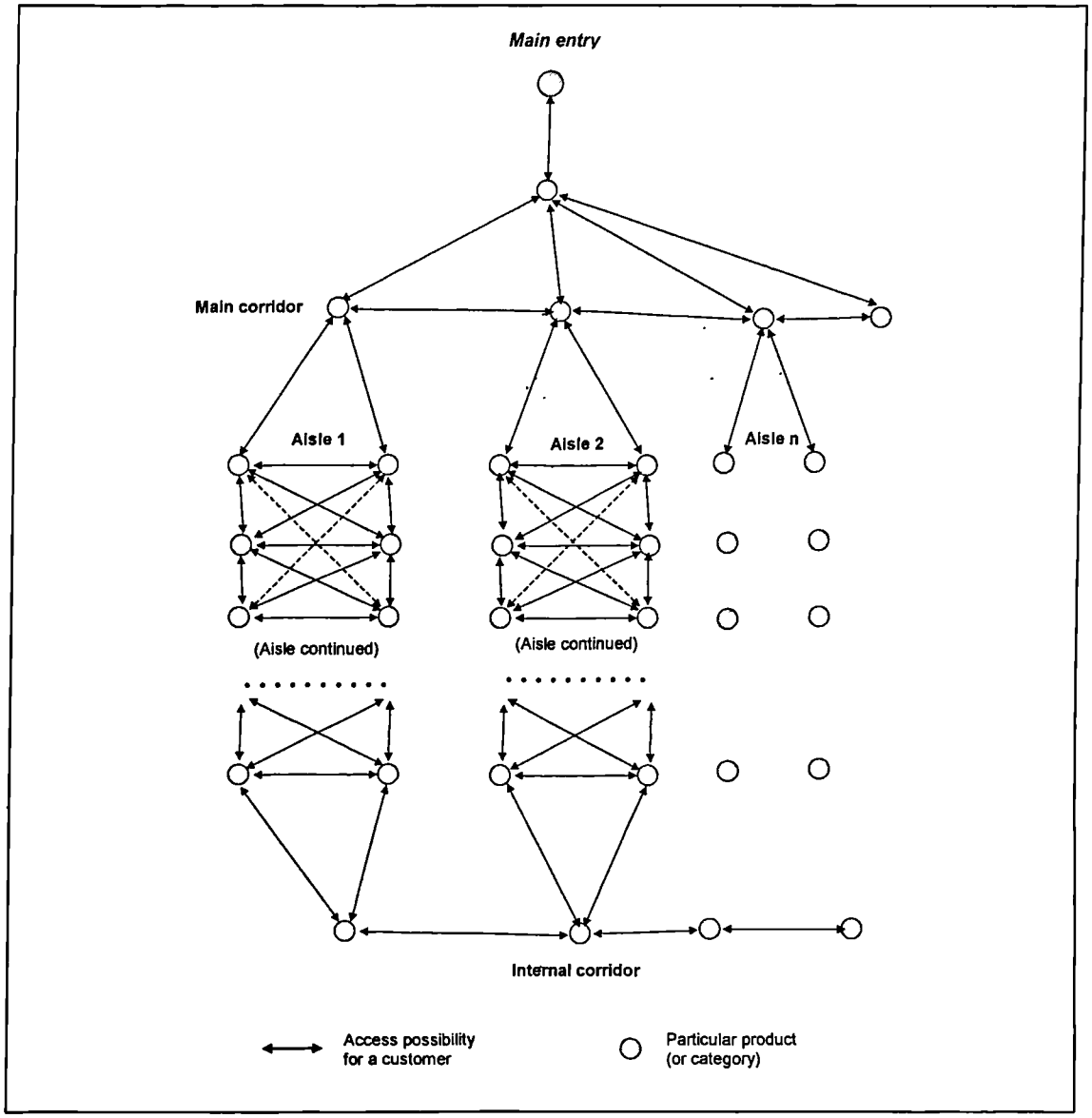


Figure 33: Grid Layout Representation - Step 2

Figure 34 presents an example of a real 3-dimension situation. In this Figure, the third dimension represents the gondolas that consist of multiple shelves. When a customer gets into an aisle, he/she turns to the left or to the right to see the merchandise that is arranged in the shelves of the gondolas. He/she picks the product that he/she wishes from the particular shelf of the gondola.

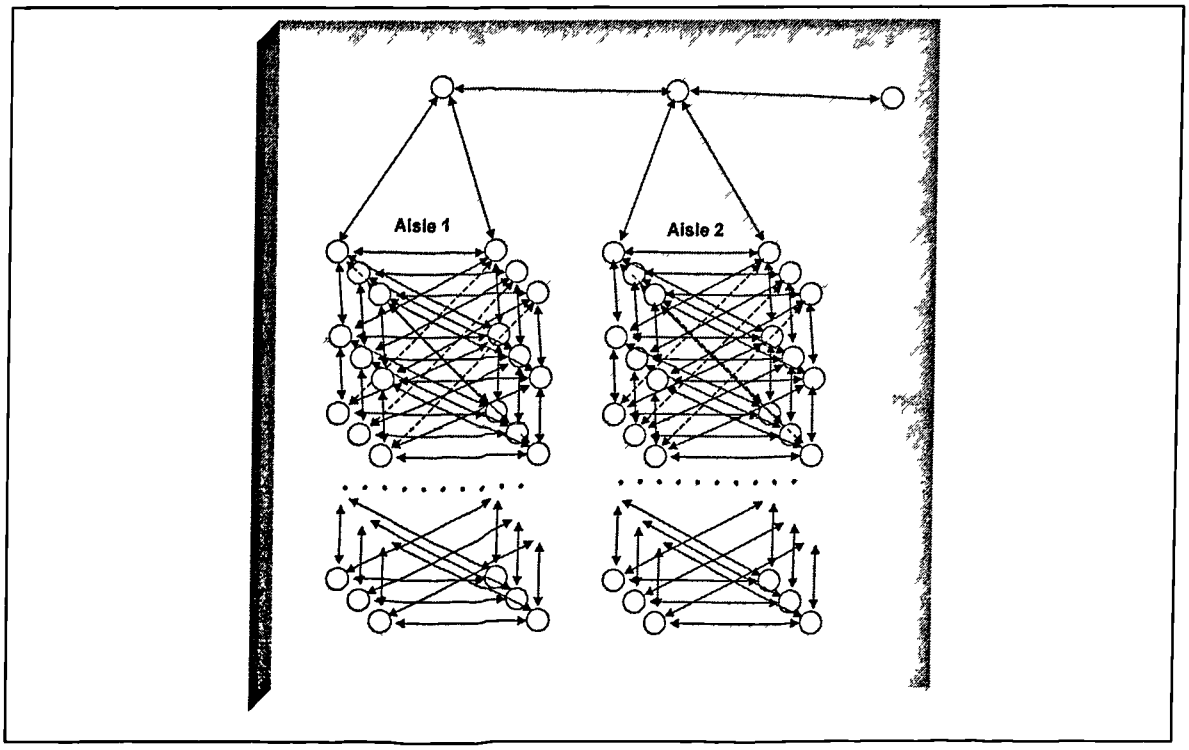


Figure 34: 3-dimensional View of the Shelves

5.2.1.2. Identification of entities and procedures for the grid layout

A virtual store over the Internet can be designed according to the concepts and rules of the conventional retail store grid layout. The basic characteristic of the grid layout, therefore, is that the user is permitted to browse the store through a number of aisles. Each aisle has two opposite sides. After the entrance in an aisle, the user is guided to a number of subcategories that have been selected to be displayed in the specific side of that aisle. In a physical grid layout design, the customer is not permitted to exit from an aisle before walking to its ends. Moreover, the customer can go "directly" to the position of a specific product after the assistance of an employee. These concepts can be translated and followed during the design of the virtual store as follows:

The main entities of the virtual store employing the grid layout are:

1. Category
2. Subcategory
3. Product
4. Aisle
5. Shelf
6. User

7. Purchase
8. Navigation

The products placed within the virtual store are structured according to a three level format. More specifically, the first level refers to the product categories. Each product category contains some product subcategories and, finally, each subcategory contains single products (i.e., brands). Each aisle contains one or more product categories. The shelves, which are located within each aisle, contain subcategories and single products. A user (6^{th} entity) is the subject who logins into the store. Each time a user logins into the store he/she is provided with a basket. Therefore, the "purchase" entity refers to information related to purchases (i.e., product codes, quantities, total price, etc.) that each subject conducts. Finally, the navigation entity refers to the collection of data related to time spent within the store and other navigation related issues.

Detailed procedures that take place within the grid layout pattern are presented below:

- Entrance to the store.
- Selection of an aisle.
- As discussed above, an aisle in conventional retailing has two sides. However, within a Web-based virtual store such a categorization seems to be useless. However, the "side concept" was initially followed in the development of the virtual store in the sense that whenever the customer selects an aisle, the product subcategories of this aisle are presented to him/her in a similar to conventional aisle way (i.e. in two sides). In addition, each side is divided into subcategories of products.
- Before a user enters a specific aisle, there is a node that permits access or selection of different aisles.
- After the entrance of a user into an aisle, there is a number of nodes that he/she is permitted to access or pass. The number of nodes equals the number of subcategories of each side.
- A set of permanent buttons or links is required for user assistance in each Web page:
  - View basket
  - Home page
  - Quit
  - Banners (advertisements)

At this point, it should be noted that based on the initial research findings (Chapter 4) and more specifically on the classification of Internet retail stores, the attributes used for classifying the existing retail stores were also used in the same way in the development of the virtual laboratory store for each layout type. For example, the "home page" button is the attribute, which was used for the grid layout, as the other two (i.e., menu bars and product catalogues) are sufficiently represented by the structure of the virtual laboratory store (i.e., aisles, shelves, view basket and quit buttons).

- Whenever the user selects a page/node that corresponds to a specific subcategory he/she can have direct access to the products of this subcategory. Moreover, the user may have access to a number of products of neighbouring subcategories by using the back button. The concept of neighbouring is defined as the distance of two nodes.

Summarizing, the main procedures that the customer implements into the store are:

1. Entrance to the store
2. Selection of an aisle
3. Selection of a subcategory or a shelf
4. Selection of a product
5. Addition of a product into the basket
6. Update basket
7. Check out

Moreover, there are three different stages during the navigation in a grid type store:

1. Entrance in the store
2. Navigation in an aisle
3. Concentration to a specific product

The entrance in the store involves the selection between the available aisles to follow. The navigation in a specific aisle involves the selection or concentration to its left or right side (Figure 35). As discussed above, each side contains subcategories of products.

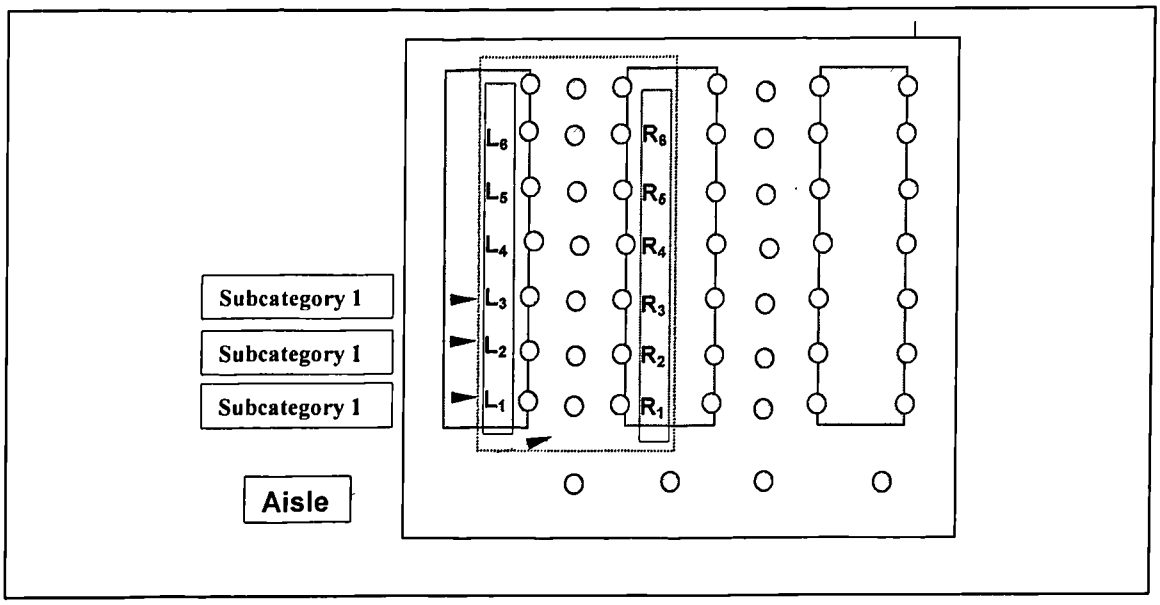


Figure 35: Aisle Structure

The concentration to a specific product involves the following issues:

1. Concentrate on the product
2. Reach neighbouring products or subcategories
3. Return to the aisle

Finally, it should be clarified that the issue of neighbouring is implemented within the grid layout among products belonging to the same subcategory (e.g., the customer can select Nescafe Classic or Maxwell House at once, in case he/she is in the coffee subcategory). In addition, the same also stands for subcategories that belong to the same product category (e.g., Marmalade and Cornflakes belong to the same category named "Breakfast"). Finally, in case an aisle contains more than one product categories (e.g., Confectionary – Breakfast), the neighboring issue is implemented in the same way among all subcategories included in these product categories but not among the end products.

5.2.2. Free-Form Layout

5.2.2.1. Domain analysis

When the customer gets into a store employing a free-form layout, he/she can have a direct perception of the entire store along with the placements of products (or product categories) in it. For example, he/she can at once see where the store beverages are located. This situation is graphically represented in Figure 36. The customer from any

particular node in the graph can have access to every other node, at a minimum cost compared to the grid layout.

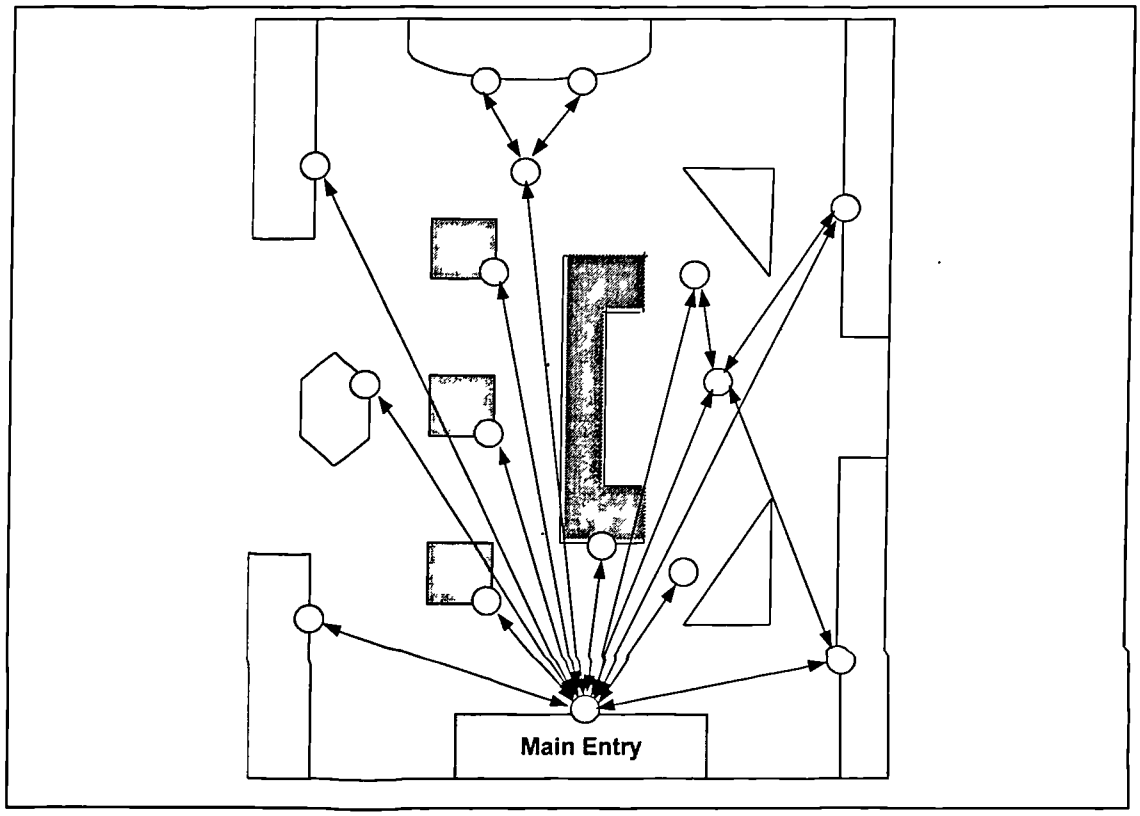


Figure 36: Free-form Layout Representation - Step 1

In other words, when the customer enters the store, he/she can have an integrated view of its contents. This situation can be represented as an undirected graph, with a link from every node to every other node (Figure 37).

However, this is a simplified representation of the situation. In a detailed representation of the searching or browsing process, a customer may follow more than one steps. In particular, a customer wishing to buy a product, e.g., milk, gets into the store, locates the related category, approaches the particular display area and selects the desired product.

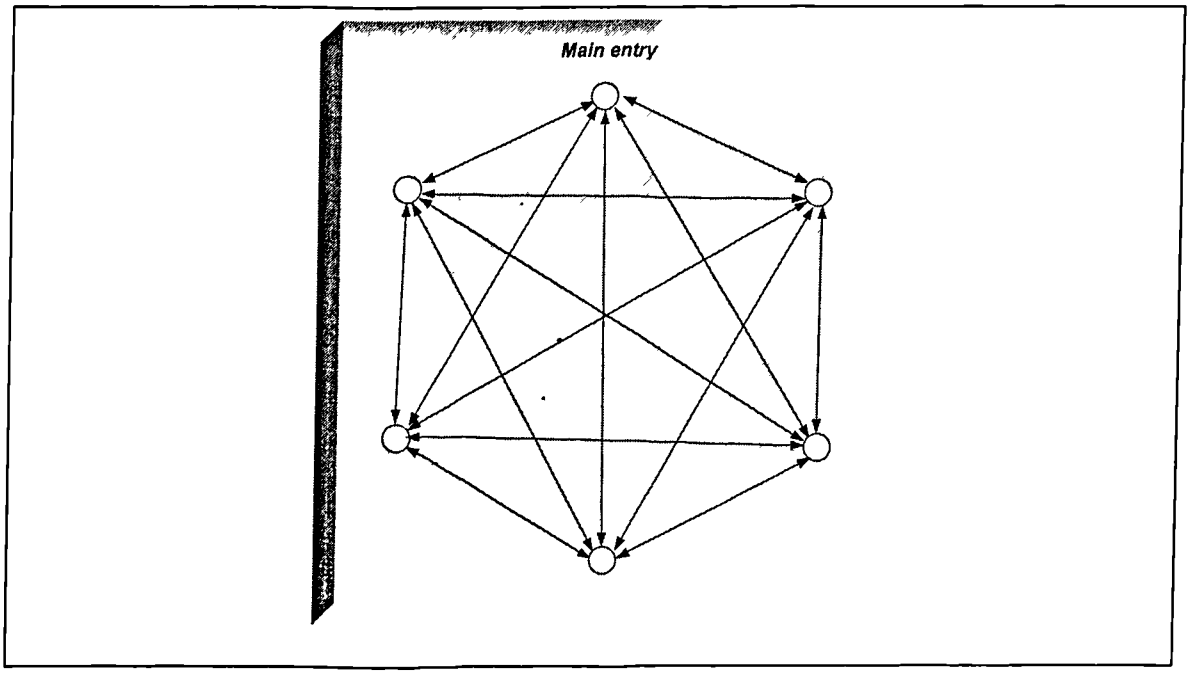


Figure 37: Free-form Layout Representation - Step 2

In Figure 38, the yellow node represents the location of a category. The green node represents the location of a particular product. The customer searching process consists of two steps: a) the selection of a category, and b) the selection of a particular product in the store.

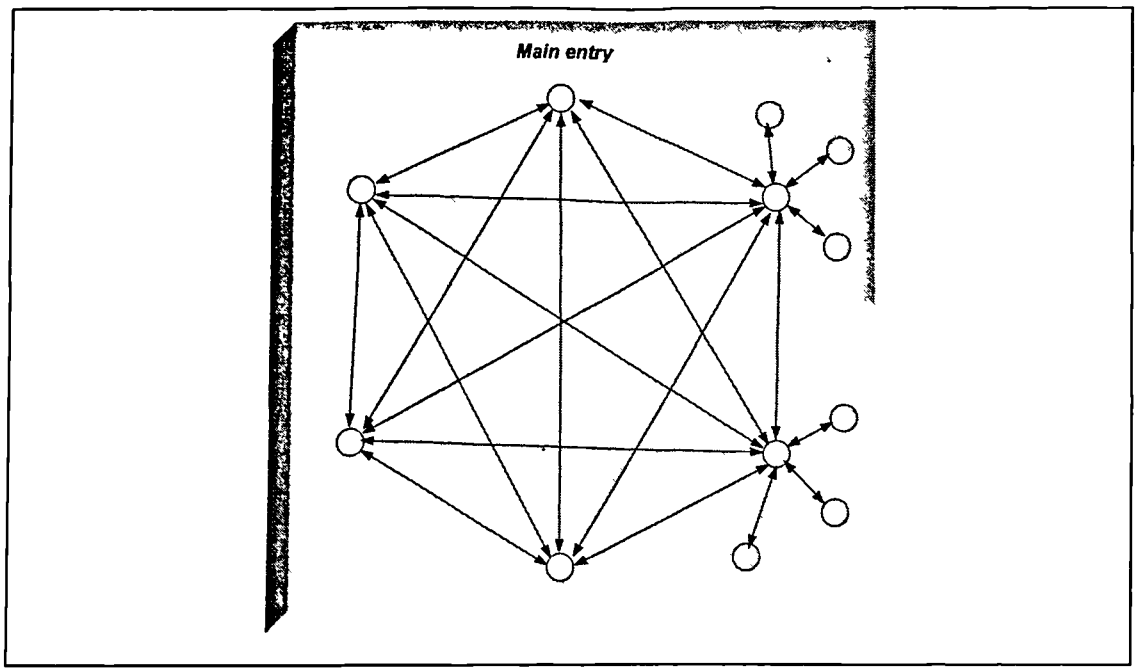


Figure 38: Free-form Layout Representation - Step 3

The main characteristic of the free-form layout design is the option of having direct access to every product category or subcategory from any place in the store. The

customer, depending on the size of the store, can have visual access to the products or subcategories that are near his/her current position in the store and those categories that are located further away.

In the free-form design layout, the store is divided into displays (see Figure 36). A display does not have an internal structure. Every display has a set of subcategories of products. Therefore, a question that arises here is how these subcategories could be defined. In other words, questioning was generated regarding the subcategories assortment within each display. To that end, and in order to proceed with the development of the virtual store, it was assumed that every display corresponds to the set of subcategories that constitute a category of products. In other words, it was assumed that every display refers to a single product category, which in turn contains several subcategories. It should be noted that this decision was based on conventional retailing theory insights which suggest that each display within a free-form layout usually refers to one product category.

One of the most critical points was to define the levels of visual access from every customer position in the store, as well as the neighbouring displays, subcategories, and products. Of course, some concessions/assumptions should take place in order to proceed with the development of the virtual store, as the relevant literature cannot support every single step taken. Therefore, it was assumed that for every location within the virtual store, there are three levels of visual access for the customer, something which in fact seems to effectively simulate the conventional store navigation experience (Figure 39):

Level 1 - More visible area: In this case, customers have visual access to product categories (i.e., displays), sub-categories and even single products as all the above are very close to their current location.

Level 2 - Less visible area: In this case, customers have visual access to product categories (i.e., displays) and sub-categories. The fact that customers do not have access to single products is due to the fact that the specific displays are located away from customers' current location.

Level 3 - No visible area: In this case, customers have access only to product categories (i.e., displays). This happens because the displays are placed far away from the customers' current location.

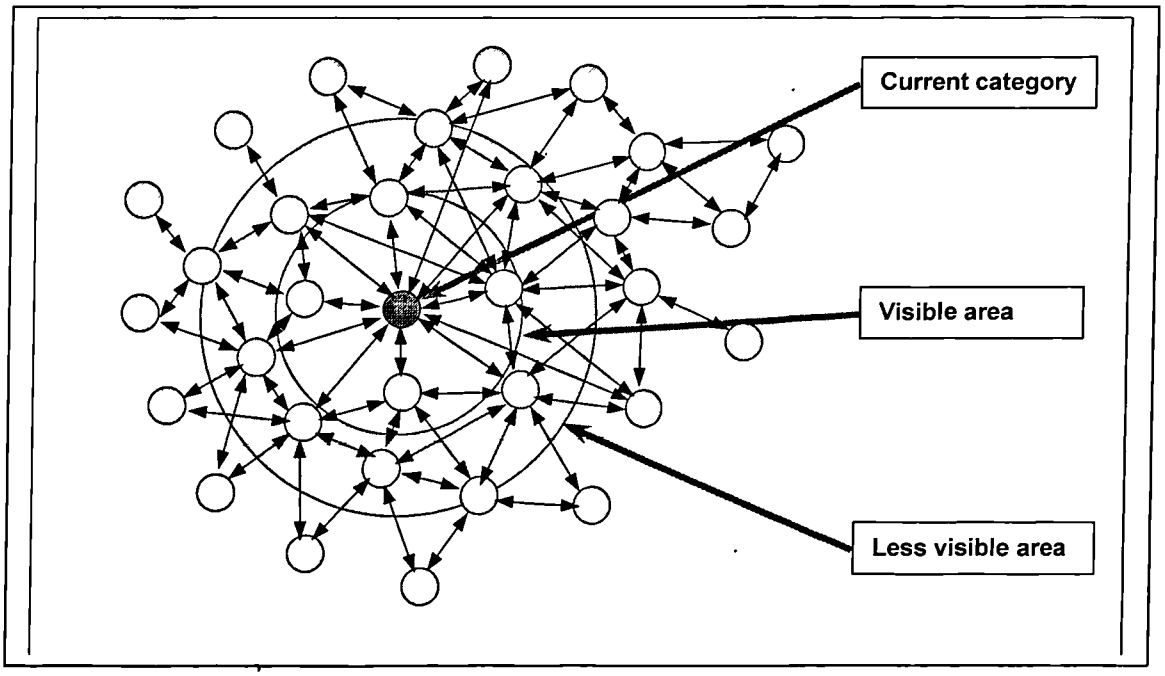


Figure 39: Network of (sub-) Categories in a Freeform Type Store and its Visibility

It should be also clarified that the aforementioned levels of visual access in conventional free-form stores, are highly dependent on the store size. For example, in a big free-form store, a customer may not even have visual access to some displays, as several obstacles (e.g., stairs, large displays, etc.) may hide them. In this situation, the customer may request the assistance of an employee.

5.2.2.2. Identification of the entities and procedures for the free-form layout

Based on the discussion above, the following main entities for the freeform design layout are identified:

1. Category
2. Subcategory
3. Product
4. Display
5. User
6. Purchase
7. Navigation

Every display has a one-to-one relationship to a category of products. Each category have many subcategories while each subcategory belongs to only one category. Each subcategory has many products, while every product belongs to one subcategory.

Furthermore, as discussed above, each display has one product category. Finally, as far as users, purchase and navigation entities are concerned, they follow the same concept as in the grid layout.

The concept of the neighbourhood must be defined for product categories (i.e., displays), subcategories and products. The following approach was used. Every display, subcategory and product has a rank number. The displays, subcategories and products that are near the center of the store will have rank number = 1. Drawing away from the center, the rank number will increment by 1. So, if a customer is in front of a display with rank number "x" then the first level of visual access will be all the displays, subcategories and products with the same rank number. The second level of visual access will be all the displays, subcategories, products and nodes whose rank number is "x+1" or "x-1". All other (the rest) displays, subcategories and products are in the third level of visual access of the customer.

Therefore, the main procedures that take place within the virtual store employing the free-form layout, are:

- Entrance to the store.
- Search for a product (this can be implemented through the use of the "search" button offered within the free-form layout). As discussed above, initial research and, more specifically, the Internet layout classification framework, provided input to this phase of the research as far as the classification attributes is concerned. Therefore, the "search" attribute was offered only to the free-form version of the laboratory store.
- Selection of a display
- Selection of a subcategory
- Selection of a product
- Addition of a product into the basket
- Update basket
- Check out
- Purchase

Moreover, there are three different stages during the navigation in a freeform type store:

1. Entrance to the store
2. Navigation
3. Concentration to a specific product

At this point, it should be noted that as free-form and racetrack layouts are not employed by conventional grocery stores, there is not a scientific theoretical background which could be used towards the effective assortment of products in the virtual store employing the two layouts. This means that, inevitably, some concessions should be made in order to proceed with the product assortment within these layout types. Considering that the product assortment within the three different versions of the online grocery store will follow the same placement concept it was concluded that the lack of relevant theory in that point does not weaken the reliability of the analysis and design concept.

5.2.3. Racetrack Layout

5.2.3.1. Domain analysis

Racetrack layout design is mainly used by department stores, i.e., large stores that have different sections, which promote and sell completely different categories of products (e.g., handbags, cosmetics, electronics, etc.). These sections require a large area in order for the products to be effectively arranged and adequately promoted. In this design, the customer gets into the store and follows one of the alternative paths that are available to him/her. At crossing points/nodes, he/she makes his/her decision according to the merchandise that is displayed in the alternative routes or according to a predetermined plan for seeking a particular category of products, in case he/she knows the specific store's layout (Figure 40).

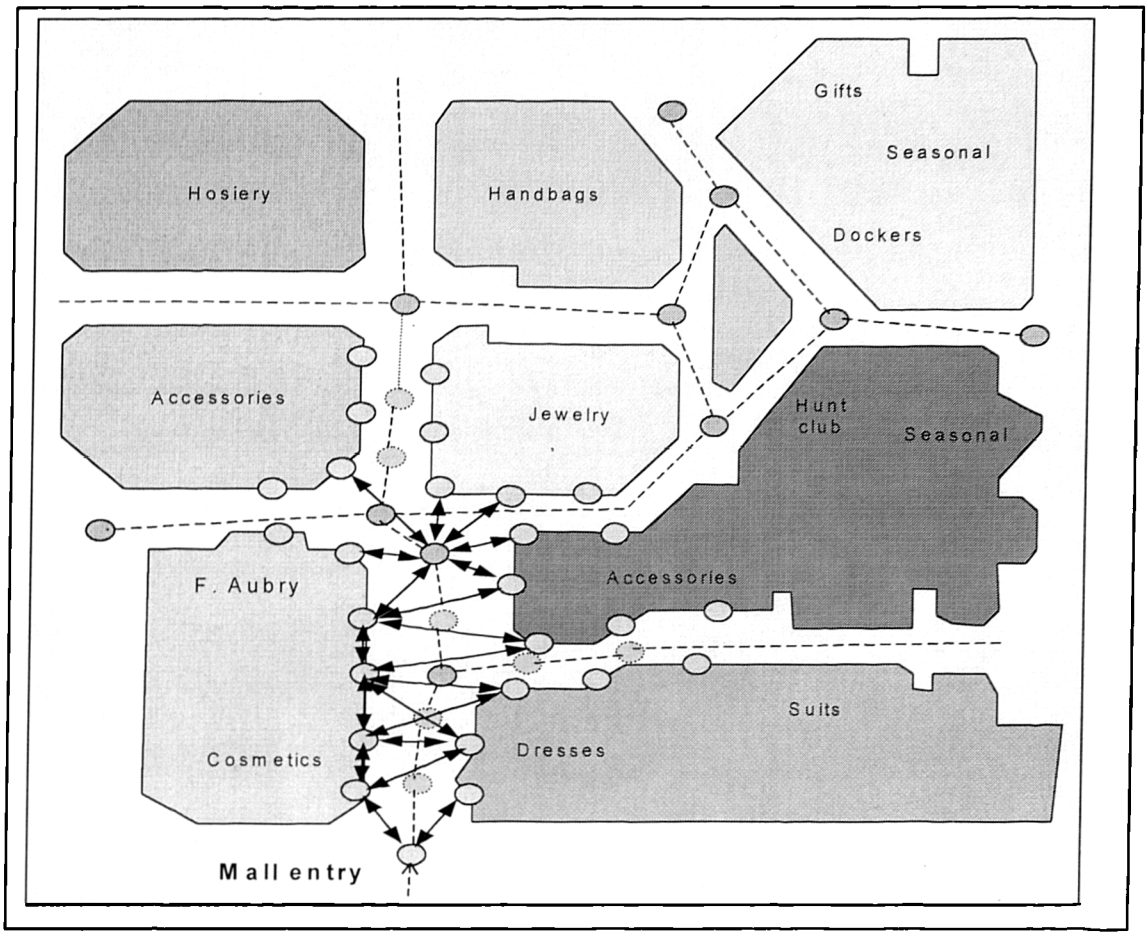


Figure 40: Racetrack Representation

The crossing points are represented with a coloured node in Figures 40 and 41. At a crossing point, the customer can see various product categories (e.g., accessories, jewelry, etc.) and may select to follow one of the alternative routes provided.

As in the free-form layout, a decision was taken to place a single product category in each of the racetrack layout displays. In addition, this is also usually the case in conventional retailing. Moreover, each department has multiple shelves which, in the case of the virtual store, refer to product subcategories and single products, always included in the same product category (Figure 41).

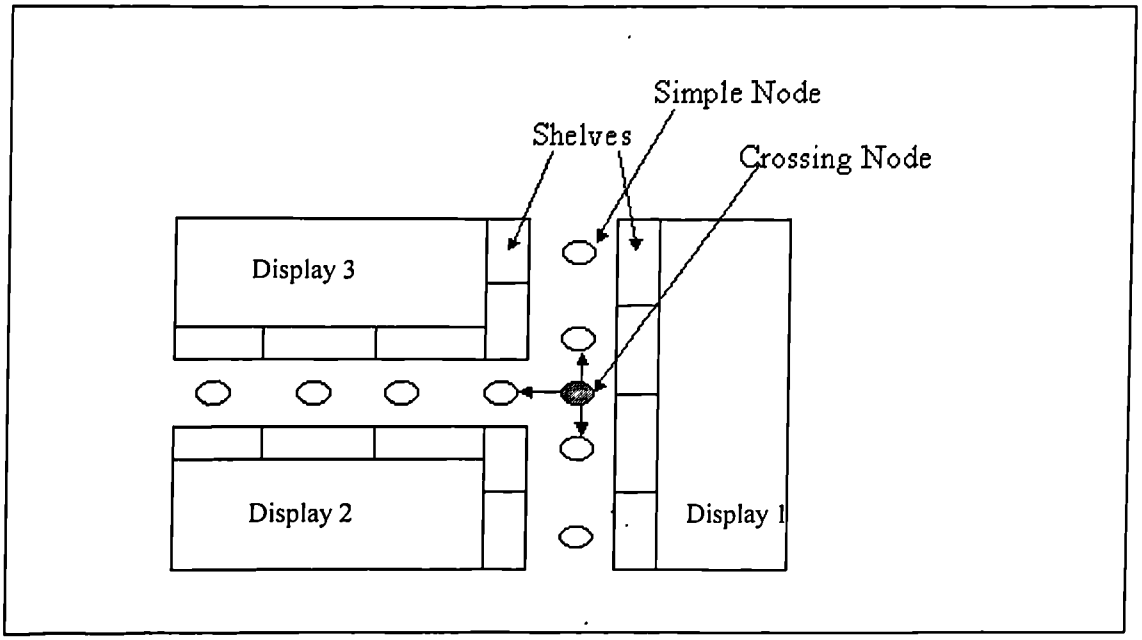


Figure 41: Graphical Presentation of the Racetrack Layout

In the racetrack layout, customers do not have an immediate access to every point of the store but have to follow specific paths in order to reach their desired products. Racetrack resembles the grid layout in that the navigation is restricted in a number of specific paths/corridors (aisles in the grid layout). However, in some cases (i.e., at the crossing nodes), it resembles the free-form layout as customers have access to quite a big number of products. Nevertheless, customers visiting racetrack-layout stores cannot have direct visual or physical access to every direction around their current position. Therefore, customers are restricted to have access only to the displayed products located near their current position or within the current corridor.

5.2.3.2. Identification of the entities and procedures for the racetrack layout

The virtual racetrack layout entities are the following:

- Racetrack entities – characteristics
  1) Display
  2) Category
  3) Subcategory
  4) Product
  5) Corridor node
  6) Corridor
  7) Corridor shelve
  8) Navigation

9) User
10) Purchase

Except for the crossing node, the node, the corridor and the corridor shelf, the rest of the entities retain the same structure as in the grid or the free-form layouts. The racetrack related entities are described below:

- **Node:** This entity refers to the case where the customer has selected a specific corridor and navigates within it.
- **Corridor:** This entity contains basic identification information about each corridor (e.g., corridor id number).
- **Corridor node:** Used to meet the many-to-many relationship between corridors and nodes.
- **Corridor Shelf:** This entity contains detailed information about each corridor's contents.

The basic procedures that take place within a virtual store's racetrack layout are described below:

- Entrance to the store by keying in the corresponding user name and password
- Selection of a specific corridor to navigate through among a list of alternatives (at least two alternatives/corridors are provided)
- Navigation into a corridor
- Selection of a specific subcategory
- Selection of a specific product

5.3. The Implementation of the Virtual Grocery Store

5.3.1. General Requirements

The following information is gathered whenever a customer is visiting the virtual store and conduct purchases:

- Layout that he/she used
- List of purchased products

- Total time spent in the store
- Purchases of promoted products

The following permanent buttons and banners are offered for user assistance in every page of each layout.

- **View basket:** By using this button, customers can view their shopping basket any time they wish during their navigation within the store and be provided with information regarding their selected products (brands and number of selected items per product) and price (of each product and in total).

- **Quit:** This button provides the alternative to leave the store at once. However, also in this case, the information related to the shopping activity (i.e., purchases, time spent within the store, etc.) is recorded.

- **Add/Remove one product:** By using this button, customers can select their desired quantity of the selected product.

- **Add to basket:** By using this button, customers can insert the selected product into their shopping basket.

- **Update basket:** By using this button, customers can confirm any change they conduct in their shopping basket. These changes refer either to the quantity (i.e., increase or decrease the quantity of the selected products) or to the removal of a specific product from the shopping basket.

- **Pay now:** This button enables customers to pay for their shopping basket products and leave the store. In this case, their shopping activity ends and all related information is recorded in the store's database.

- **Promotional banners:** These banners link to the end page of the specific product promoted, therefore enabling customers to buy this product at once, at a lower price.

However, except for the different structure employed by each of the alternative layouts, there are also some differences regarding specific buttons used by each layout. More specifically:

- **Grid layout:** Provides the home page button
- **Free-form layout:** Provides the home page and the search button
- **Racetrack layout:** Does not provide any of the aforementioned buttons. This means that it forces customers to reach at once only neighbouring product categories (i.e., related product pages as described in Chapter 4).

As far as the menu bars and the product catalogue are concerned, racetrack layout is the one that does not offer such kind of customer support. This is the case because customers are provided with the least necessary features regarding menu bars (i.e., only the "quit" and the "view basket" buttons are provided) and product catalogue (i.e., customers visiting this layout are provided with a quite limited product catalogue which contains only specific corridors' product categories each time). On the contrary, customers visiting grid or free-form layouts are both provided with the whole product category catalogue at the entrance of these stores. The only assumption made herein is that the "quit" and the "view basket" buttons are not characterised as a "menu bar" store feature, while on the contrary, these buttons in combination with the "home page" and the "search" buttons (only for the free-form layout) constitute the menu bar for this specific application.

The presentation format of all aforementioned buttons and banners is the same among the alternative layouts in order to eliminate any effects on consumer buying behaviour caused by these store features. For example, the concept followed regarding the promotional activities within the virtual lab-store is the following: one scrolling promotional banner would promote one pre-selected product of each product category (13 promotions in total). Each product promotion is displayed for 10 seconds within the same banner in order for the customer to have enough time to click on this button and take the offer. Price off (25%) is the type of promotion used for all the products in order to provide a strong motive to customers. This banner is displayed continuously during the navigation within all versions of the store (i.e., types of store layout) at the center of the bottom of each page. Through such a promotional strategy, any undesirable effects on consumer's buying behaviour among different layouts are eliminated, as the

promotional banner is exactly the same for all three versions of the store and runs in exactly the same way. In addition, the fact that the promoted products are also placed within the store in a regular price, contributes towards testing the promotional communication effectiveness among the alternative layouts (i.e., test whether customers understand that they can buy the specific product at a lower price from the promotion and not from the regular virtual shelf).

As far as the selection of the promoted products from each category is concerned, it was done randomly so that there would be no influences on consumer buying behaviour. The only criterion used was that of product price. For example, products of low price were not selected, as the 25% discount would not provide a strong motive to customers for purchasing them using the promotion.

5.3.2. Product Selection and Assortment Methodology

The selection of products that are offered by a virtual lab-store along with their corresponding assortment technique, constitute a critical issue both for conventional and virtual retailing (ECR 1996). However, researching category management (i.e., efficient product introduction, promotion and assortment) under the ECR (Efficient Consumer Response) initiative, is out of the scope of this study. Nevertheless, in order to eliminate effects of the potential differences among the product assortment techniques employed by the three alternative layouts on consumer buying behaviour, emphasis was also placed on developing a methodology towards applying similar product selection and assortment techniques for each layout pattern.

Since there is no available scientific research to support the optimum product assortment in a virtual store employing each of the three specific layout patterns, a new conceptual and methodological framework should be produced. For example, questions are raised regarding the optimum product assortment in a grocery store (conventional or virtual) employing the free-form layout since this layout is not commonly used by conventional grocery stores. Moreover, "Category Management" and "Efficient Product Assortment" techniques for conventional retailing are not yet fully developed by researchers (e.g., the "Efficient Consumer Response" approach initiative is developed by consultants and practitioners and it is at its initial steps). Based on that, a conceptual/methodological framework for efficient product selection and assortment for the virtual lab-store along with its documentation was introduced (Figure 42):

Step 1 - Product selection: Although this step seems to be irrelevant to the whole methodology of layout transformation, it is nevertheless fundamental for the present research purpose. The virtual grocery store must provide a sufficient variety of products towards offering participating subjects a real shopping experience (i.e., simulating a real grocery store) and quality results. However, it is evident that the laboratory store cannot offer thousands of products as the case is with real grocery stores. Therefore, a selection of products that will be offered by the laboratory store was necessary. These products should be organised in categories and subcategories based on existing practices applied in conventional grocery stores. To that end, Carrefour hypermarket located in Athens (Carrefour is a well-known multinational brand) was used as a benchmark and its product selection (step 1) and assortment techniques (step 2, 3 and 4) were adopted in the present study. The initial step was to apply Carrefour's product selection (step 1) and assortment techniques (step 2, 3 and 4) in the development of the grid layout (firstly) employed by the laboratory store, as also Carrefour's conventional stores employ this layout pattern. In parallel, a comparative study concerning the product selection was conducted among Carrefour and UK's virtual grocery stores in order to select products that are both available in Greece and United Kingdom, eliminating, therefore, potential customer confusion (i.e., customers may be confused in case the virtual lab-store offers "unknown" brands).

Step 2 - Product assortment for the virtual grocery store's grid layout: In this step, the selected products (input provided by step 1 above) were assorted into the "physical" grid layout employed by the Carrefour hypermarket. Based on that, this layout was transformed into a format suitable for the implementation phase of the study (e.g., the basement and the first floor of the Carrefour's hypermarket were incorporated in one floor employing several aisles). This way, the virtual grid layout is based on the corresponding "physical" grid layout provided through this step of the methodology.

Step 3 - Product assortment for the virtual grocery store's racetrack layout: In this step, the selected products were assorted in the racetrack layout based both on the theoretical guidelines from conventional retailing and on product assortment techniques applied in the grid layout of the virtual grocery store.

Step 4 - Product assortment for the virtual grocery store's free-form layout: In this step, the racetrack's product assortment pattern along with corresponding conventional

retailing theory were used in order to assort the selected products in the free-form layout of the virtual grocery store.

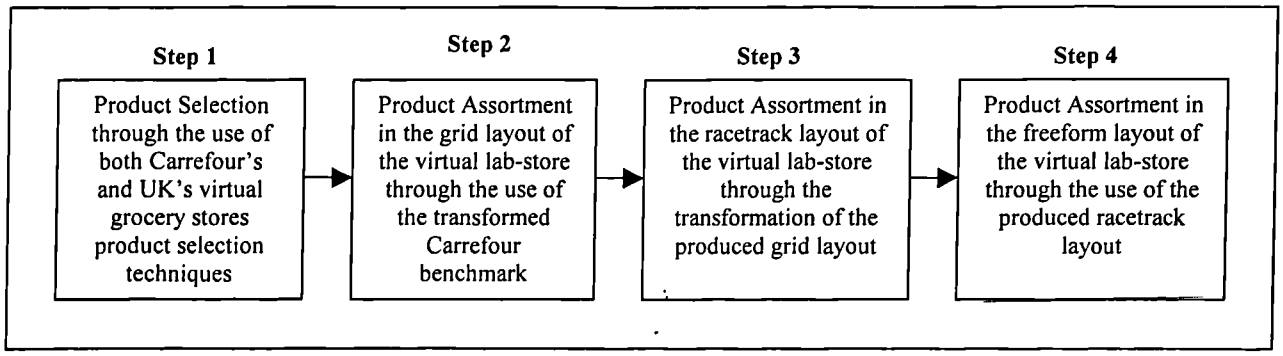


Figure 42: Product Selection and Assortment Methodological Steps

However, the fact that conventional grocery theory does not refer to product assortment techniques for stores employing racetrack or free-form layouts, the aforementioned methodology faced a few problems. However, in such cases, the basic concept followed was to place the selected products in a similar way among these layouts whenever this action was facilitated by their specific structure. This means that both the free-form and the racetrack layout employed displays. In addition, both these layouts have some displays at the entrance, at the end, at each side (left and right) and at the center.

The aforementioned methodological steps are thoroughly discussed below.

5.3.2.1. Product Selection

In order to define which products should be available in the virtual grocery store, it was decided to visit grocery stores instead of using relative theory. The fact that the same experiment was to run both in Greece and the United Kingdom, supported the decision to run a field survey in both countries in order to select products that were offered in both of them (i.e., eurobrands).

Therefore, the conventional grocery store visited was a Carrefour hypermarket located in Athens. Carrefour is one of the largest food retail companies in Europe. It was founded in 1960 in France and, since 1970, has tried to export the hypermarket formula overseas. Now, Carrefour operates many hypermarkets outside France (Spain, Brazil, Argentina, Taiwan, Greece, U.S., etc). Its major achievement outside France was in Spain, where

Carrefour is a leading retailer (McGoldrick 1998). Finally, it is important to point out that Carrefour uses the grid layout at most of its grocery stores.

According to the findings of this survey, Carrefour sells products belonging to the following categories (in alphabetical order):

- Apparel
- Automotive & Tools
- Baby Products
- Beverages
- Books & Magazines
- Computers & Peripherals
- Cosmetics
- Detergents
- Foods
- Garden Corner
- Health & Beauty / Drugstore Products
- Home Appliances
- Home Electronics
- Home Improvements
- Household Goods, Cleaning Supplies
- Houseware
- Jewelry / gifts
- Movies / Music / Video Games
- Paper products
- Pets
- Photo & Cameras
- Toys
- Travel & Holidays
- Wine & Spirits

However, as the present research focuses on the grocery sector, products that refer to this sector should be identified (e.g., travel and holidays do not refer to the traditional grocery sector). So, focus was placed on traditional grocery products, as categorised by Carrefour and offered in the basement of its particular store in Athens. These product categories were:

- Bakery
- Breakfast
- Canned Foods
- Cheese
- Condiments
- Confectionary
- Dairy products
- Ethnic food
- Fish Market
- Frozen Products
- Fruits
- Meat
- Oils & Vinegars
- Pasta – Rice – Beans
- Roasted meat market
- Salted products, eggs, meals
- Sauces
- Sausage Shop, Pork Butchery

Despite the fact that Carrefour mostly offers "eurobrands," a separate survey focusing on UK's Internet grocery shops was also conducted. To that end, based on Ernst & Young's (2000) Internet Retailing Report detailed list, the following UK's food/beverage Web sites were surveyed:

1. www.netgrocer.com
2. www.peapod.com
3. www.sainsburys.co.uk
4. www.tesco.co.uk

Based on a preliminary survey, it was found that more or less the majority of the offered brands among these stores was the same. Therefore, a decision was taken to conduct a detailed survey to only one of them. Sainsbury's was selected because it offers the largest product variety as well as it permits navigation without requesting personal information (e.g., Tesco requests post code number in order to allow customers to navigate within its Web-store). The following product categories are offered by Sainsbury's virtual grocery store:

- Baby Shop
- Bakery
- Beers, Wines, Spirits
- Beverages, Hot Drinks
- Breakfast Cereals
- Clothing
- Confectionery, Biscuits, Cakes
- Cooking/Baking Ingredients
- Crisps, Nuts, Snacks
- Dairy
- Delicatessen
- Electrical
- Fish
- Flowers and Plants
- Frozen Foods
- Fruit
- Household Goods
- Meat, Alternatives and Poultry
- Newsagent
- Pet Foods, Pet Accessories
- Pharmacy
- Photo, Video, CDs
- Pickles, Preserves, Oils, Spreads
- Ready Meals, Pizzas, Quiches, Fresh Soup
- Rice, Pasta, Dried Foods
- Sauces, Gravies, Stocks
- Seasonal Products
- Soft Drinks, Fruit Juice
- Special Selection
- Spices and Condiments
- Tinned and Canned Foods
- Toiletries
- Vegetables and Salad

Therefore, based on Carrefour's and Sainsbury's product-related information (i.e., category and subcategory labels, offered products and brands per subcategory) the

procedure of determining which categories, subcategories and brands to include in the virtual lab-store, was taken. Several criteria were used, while some concessions were also done:

- The resulted product categories and subcategories are similar both to those of Carrefour and Sainsbury's.

- The products and brands chosen are available both at Carrefour and at Sainsbury's. However, in cases where not common products were found, "own label" products were offered. This was also communicated to the subjects through the instructional leaflet.

- The main products offered were grocery products, but some basic products of other categories were also included (e.g., electronics).

- Products that cannot be standardised (such as bakery products, fish products, fruit products, meat products, apparel etc.) were not included in the virtual store. The respective product categories were not included either.

- Three products per subcategory were placed at the virtual lab-store.

- Product prices were the averages of the prices offered by Carrefour and Sainsbury's.

- The prices were displayed in greek drachmae for the Greek experiment and in english pounds for the United Kingdom's experiment.

- Expensive products (such as Computers, TV sets, etc.) were not to be included due to budget limitations.

Therefore, the following product categories and subcategories (listed in alphabetical order) were determined to be offered by the virtual laboratory store (detailed product and brand lists are available at Appendix C4):

1. Baby products
   - Baby Bath
   - Baby Change

- Baby Foods

2. Beverages
   - Fizzy Drinks
   - Fruit Juice
   - Water
   - Coffee & Tea
3. Breakfast Products
   - Cornflakes/ Corn Pops
   - Jam
   - Honey
4. Condiments
   - Sauces & Ketchup
   - Oils & Vinegars
   - Salad Cream, dressing & mayonnaise
5. Confectionary, Biscuits, Snack Food
   - Biscuits
   - Chocolates
   - Sweets & Candy
   - Chips
   - Snack Food
6. Cosmetics
   - Make-up and Make-Up Accessories
   - Deodorant
   - Eau De Toilette
   - Body Sprays
   - Aftershave
7. Dairy Products
   - Butter & Fats
   - Cream
   - Juice & Milkshakes
   - Milk
   - Yogurt
   - Cheese
8. Electronics
   - Diskettes
   - Batteries
   - "Playstation" accessories

9. Health & Beauty
    - Dental, Oral Care
    - Shaving Products
    - Soaps
    - Bath and Shower Products
    - Shampoo
    - Hair Products
    - Body Products
    - Face Products
10. Household Goods
    - Cleaning Products
    - Paper Products
    - Laundry products
    - Detergents
11. Pasta, Rice
    - Pasta
    - Rice
12. Pet Products
    - Cat Food
    - Dog Food
13. Wine & Spirits
    - Beers
    - Wines
    - Whisky
    - Vodka
    - Gin
    - Other Spirits

This list of categories and subcategories of products above was not intended to be an all-exclusive list of all the products someone can find in a typical grocery shop. However, the fact that the same product variety is offered in the same format (e.g., product display techniques, number of products, prices, etc.) in all three alternative layouts of the lab virtual store, eliminates potential product-variery-presentation-price, etc. related effects on consumer buying behaviour. Moreover, the concept is to keep all variables (colour, labels, advertisements, etc.) the same within the three different layouts and measure only the effects of the different layout types (independent variable) on consumer's buying behaviour.

5.3.2.2. Product Assortment in the grid layout: the Carrefour's Hypermarket Benchmark

The store layout of the specific hypermarket in Athens is presented in Figures 43 and 44. There are two floors (1st floor and basement). At the basement, the customer may find mainly food products and beverages, and on the 1st floor he/she can find all other products (e.g., home appliances, jewelry, etc.). Carrefour's category management techniques, applied in a grid layout, were followed by the present study for the product assortment in the corresponding virtual gird layout. However, the procedure of placing categories, subcategories and products on a Web-based grocery store employing a grid-concept layout cannot be supported by the corresponding category management theory applied in conventional retailing. In addition, category management strategies are very recent even in the conventional retailing area and, at the moment, consulting companies produce best practice guides for retailers. However, as also discussed above, the issue of category management and efficient product assortment is something that offers many research perspectives but is beyond the scope of this research. Nevertheless, the methodology of placing the products in the virtual lab store's alternative layouts should follow a similar pattern in order to eliminate any potential product assortment effects on consumer buying behaviour.

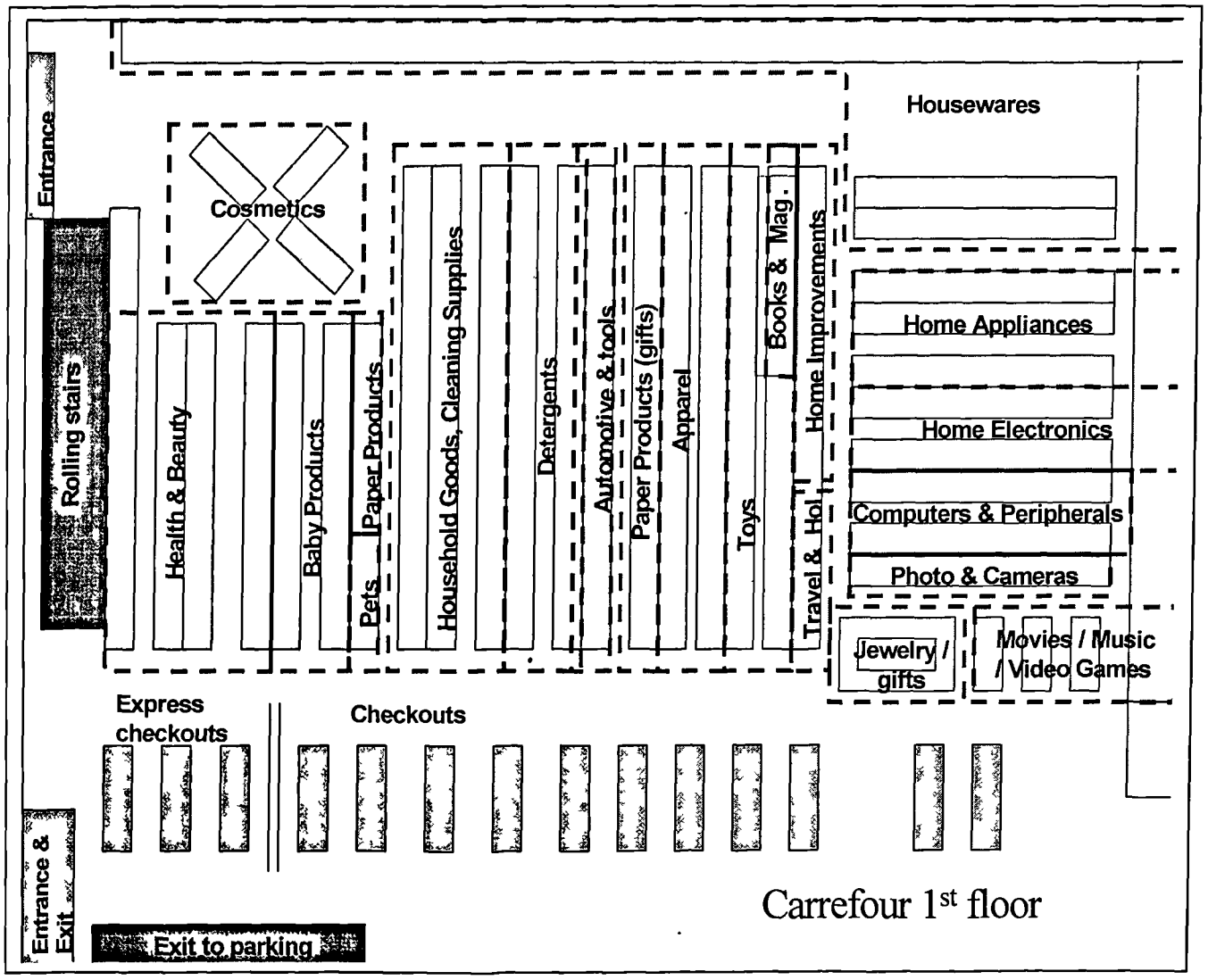


Figure 43: Carrefour Store Layout (1st floor)

Therefore, based on the selected product categories and assortment techniques employed by Carrefour, a transformed type of grid layout was produced (Figure 45). This pattern served as a guide to the product assortment in the virtual grid layout. As shown in Figure 45, the transformed grid layout includes 9 aisles. The selected products (input from step 1) were assorted in the corresponding shelves based on the input provided by Figures 43 and 44. This means that the same sequence was also followed for the virtual grocery grid store (i.e., each virtual aisle contains the product categories presented in Figure 45 in the same pattern). However, since not all Carrefour's product categories were selected, and some of them are placed in different floors within Carrefour's, it was not feasible to exactly follow the specific product assortment.

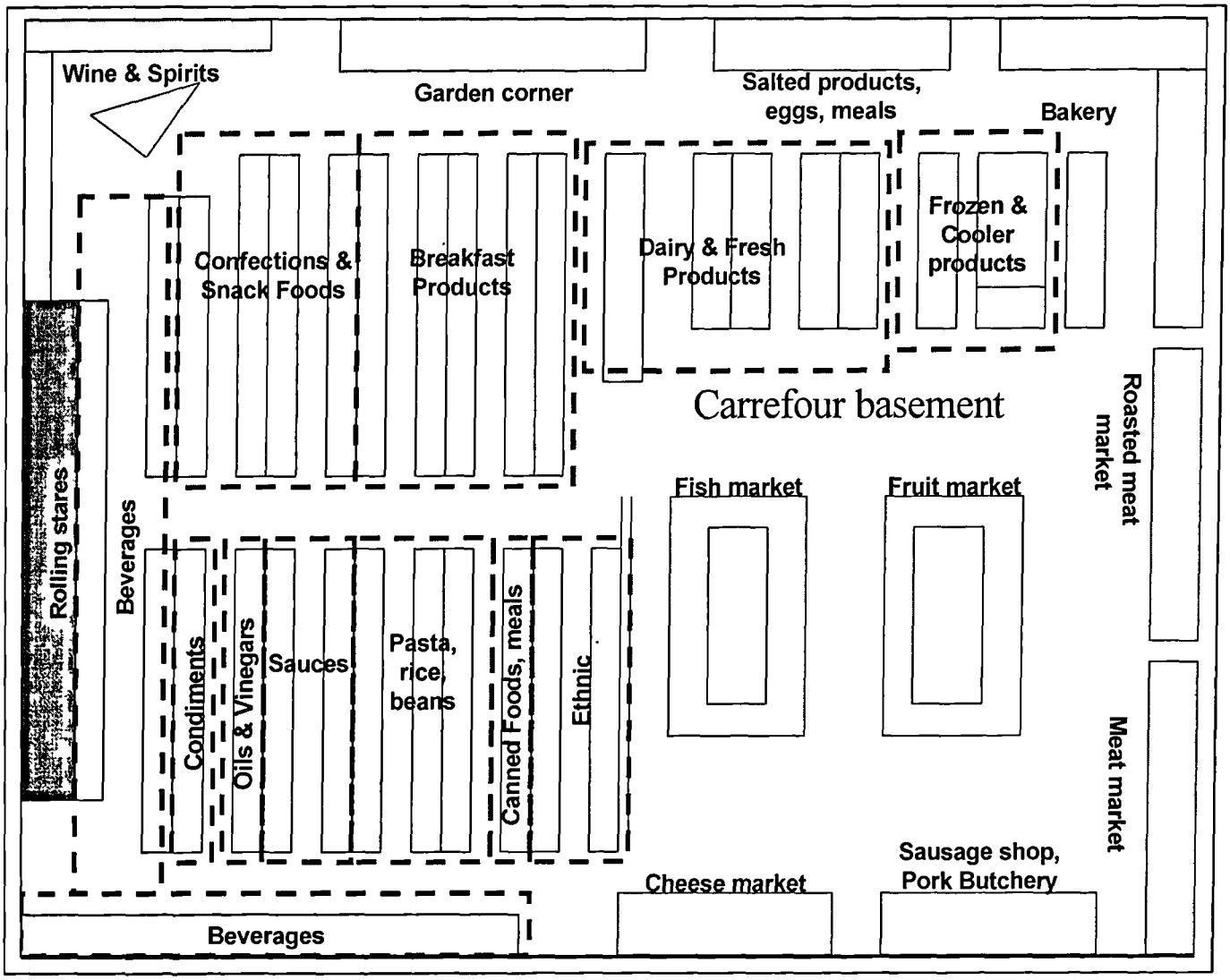


Figure 44: Carrefour Store Layout (Basement)

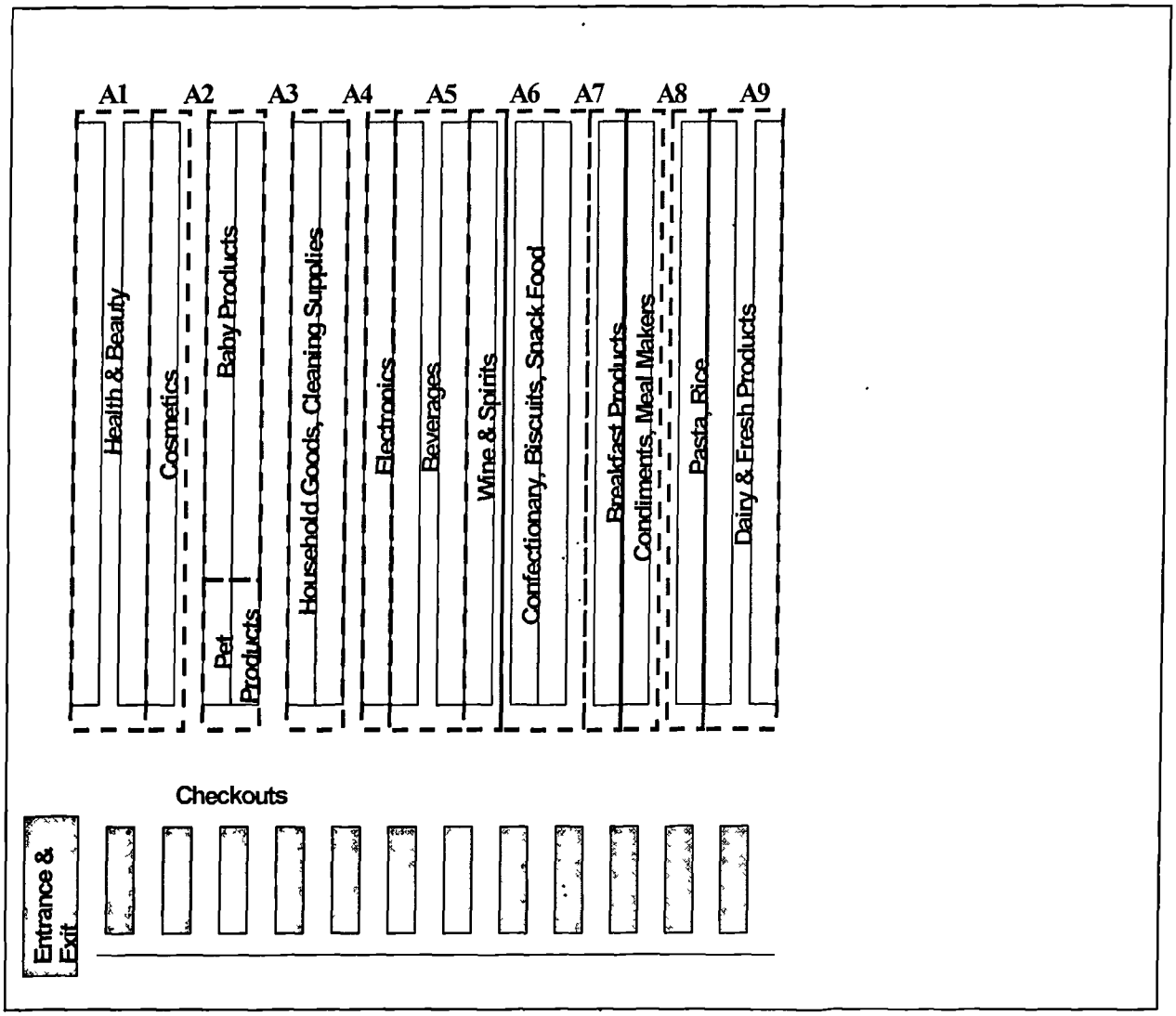


Figure 45: Product Assortment in the Grid Layout for the Virtual Lab-Store

Therefore, Figure 45 served as a product assortment guide/tool for the virtual lab-store, where these 9 aisles were depicted in a hierarchical format. This means that when customers enter this store version, they face these aisles and they can select which aisle they want to navigate through.

5.3.2.3. Product assortment in the racetrack layout through transforming the grid layout

There is no previous research in conventional retailing on how to transform a store layout from one of the three available patterns to another, following at the same time similar product assortment techniques. Besides, each store layout is optimum for a specific type of store. However, within a virtual retailing environment, such a transformation can be easily done at a minimum cost by just providing a different view of the products' database through the use of the appropriate software tools. Moreover,

such a capability allows to conduct similar experiments to this study at a minimum cost, which is not applicable in conventional retailing due to the high cost involved in changing a "physical" store structure.

Theoretically, the grid store layout is closer to the racetrack layout as they both have aisles/corridors (i.e., free-form does not use aisles) and, therefore, a decision was made to first transform the grid to the racetrack than to the free-form layout. However, the main differences between these two store layouts, are the following:

i) In the grid design, the aisles are distributed in a geometrical structure fashion, while in racetrack the customer is more naturally drawn into the store where the aisles are shaped in a labyrinth format.

ii) In the racetrack layout, there are some critical points (i.e., crossing nodes) where the customer is forced to take different viewing angles, rather than look down one aisle as in the grid design.

Transforming the grid to the racetrack layout design, some basic principles and assumptions were also followed:

a) In a racetrack design, the most important departments (e.g., breakfast products) are usually placed toward the rear of the store and the newest items are placed along the main aisle (Levy & Weitz 1998).
b) The sections or departments are arranged in the form of individual specialty shops.
c) Every main category of products is considered as a different department.
d) The racetrack layout provides a major aisle/corridor to facilitate customer traffic.
e) Minor loops (corridors) must also be used and must be accessed through the main loop.

The racetrack layout that arises from the grid layout is presented in Figure 46. The circled departments and their corresponding numbers, refer to the virtual corridors through which the customers can access the products placed within each circled department/display. Figure 46 served as a product assortment guide/tool for the virtual lab-store. For example, at the entrance of the virtual store, customers were provided with the alternative to select either corridor 1 or corridor 2 and access the corresponding

products categories. Furthermore, if a customer wanted to reach corridor 11, he/she should first navigate through corridor 5 or 10.

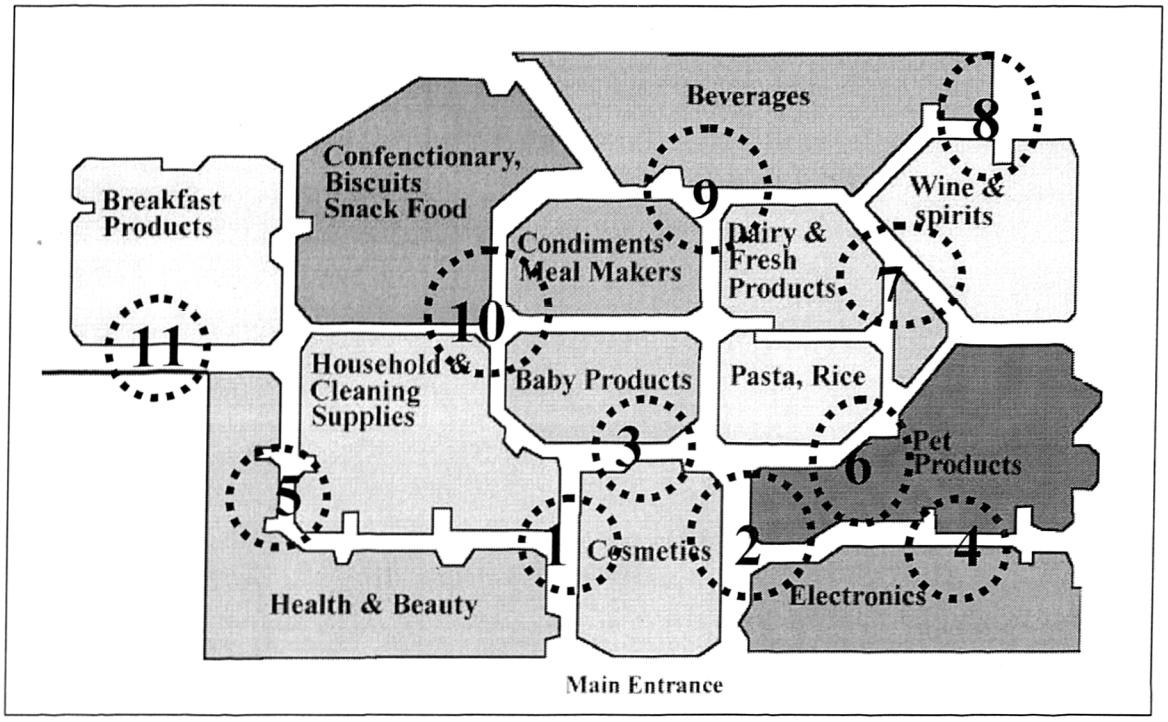


Figure 46: Product Assortment in the Racetrack Layout for the Virtual Lab-store

5.3.2.4. Product assortment in the free-form layout through transforming the racetrack layout

In the free-form layout design the customer is allowed to move in any direction within the store with a considerable freedom. Once the customer enters the store, he/she has visual access to almost every part of the store. However, there are three levels of visual access provided.

Transforming the racetrack to the freeform layout, the following principles were followed:

- The product assortment technique used for the racetrack layout was also followed here and the most important departments were placed at the rear of the store.

- Regarding the remaining product categories, the product assortment demonstrated in the visual representation of the racetrack layout (Figure 46), was also used. For example, cosmetics were placed in front of the store's

entrance as in the racetrack layout, the health and beauty category was placed at the left side of the entrance, and so on. However, it is obvious, that as the free-form differs from the racetrack layout, there are some minor differences and concessions made regarding product assortment issues.

The freeform layout that arises is presented in Figure 47.

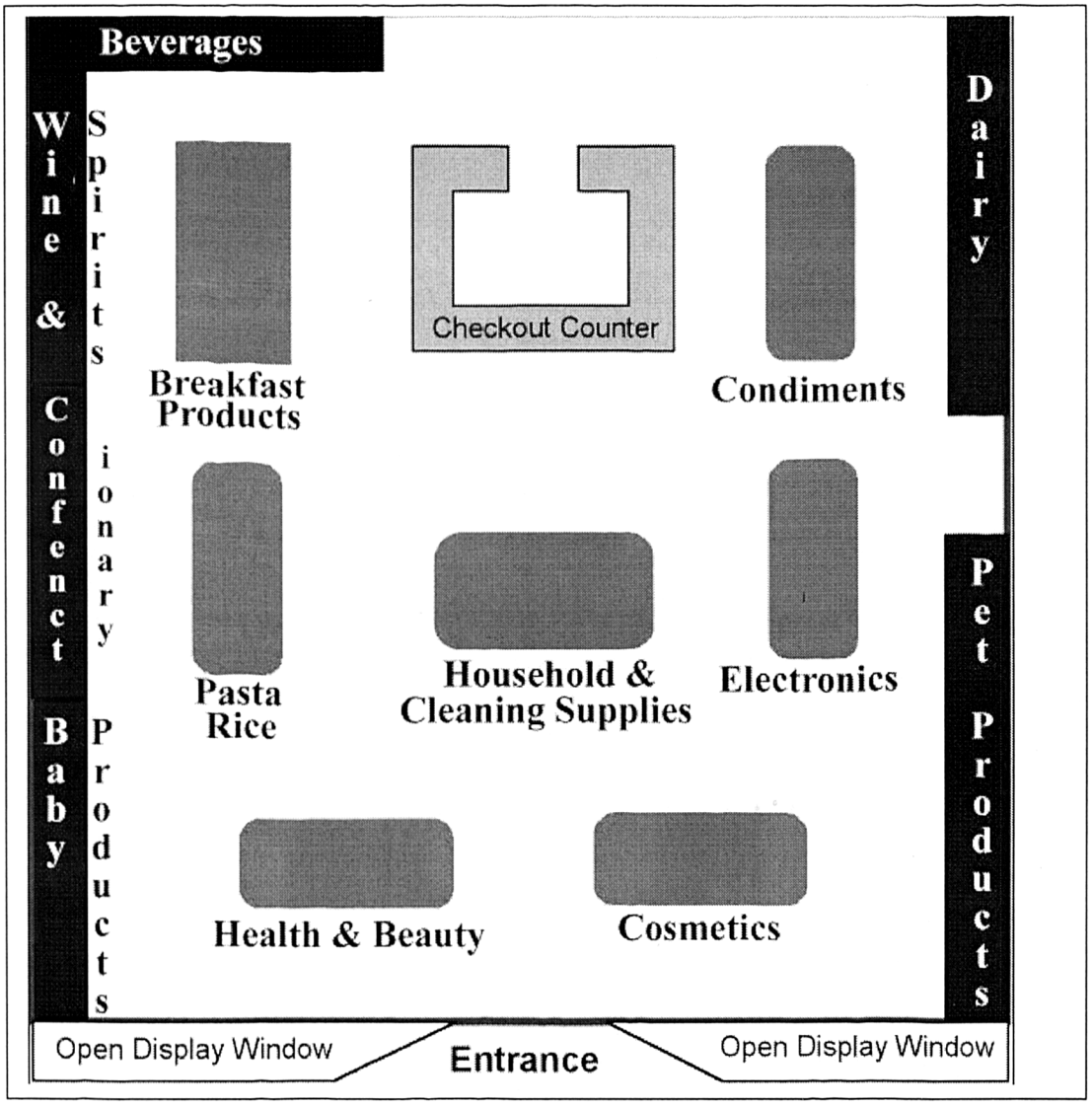


Figure 47: Product Assortment in the Free-form Layout for the Virtual Lab-store

5.3.3. HCI's Mediating Role towards Virtual Laboratory Store Revision

Based on the aforementioned discussion, the final version of the virtual lab-store was developed (the technical description is included in Appendix C3). However, based on feedback provided by experienced Internet users after the abstract interface design phase of the methodology within a workshop conducted in Brunel Univeristy, it was decided to

adopt a more user friendly and simplified shopping interface structure for all the alternative virtual layouts, in order to enhance the usability of the store. To that end, Human Computer Interaction principles and guidelines for effective Web site design provided through corresponding Web usability studies, were followed. More specifically, the following changes took place:

- **Buttons' appearance:** more user friendly and simple buttons were used.

- **Colours:** instead of the white colour commonly used in the abstract interface design phase of the methodology, warmer colours (i.e., red, yellow, etc.) were used.

- **Supporting text:** more user friendly and simple text was used. For example, it was decided to remove buttons like "middle path," "opposite side," "exit up," "exit to crossing node," etc. and replace them with more user friendly buttons like "back", "exit to: breakfast products," etc.

- **Structure:** similarly, the structure presented in the abstract interface design phase of the methodology, was re-examined in order to offer subjects a more simple and effective shopping environment; in other words, avoid confusing them. For example, the concept of placing shelves on each side of the virtual grid-layout aisle, was abandoned. Instead, all product categories that were placed, for example, within a certain aisle, could be immediately accessed whenever customers selected that specific aisle, without having to reach the opposite site of the aisle first (Appendix C1). However, in the case of the grid layout, direct access to end-products through selecting a specific aisle was not provided. In general, each virtual layout structure was improved towards facilitating subjects' shopping and getting reliable results.

In addition, emphasis was placed on developing a more user friendly revised version of the virtual store, taking also into account the experience obtained by visiting other online grocery stores and investigating their shopping interface features. This contributed a lot in the experiment's efficiency, as subjects were experienced Internet users and, therefore, familiar with online grocery stores' interface related issues.

The new revised Web pages are presented in Appendix C2.

5.4. Summary

This Chapter describes in detail the methodologies used towards developing a virtual laboratory store to meet the objectives of the present study. Despite the fact that Web development does not constitute the research area of the present study, the development of this virtual store was a prerequisite in order to effectively and rigorously test the respective hypotheses. To that end, several methodological steps were taken towards developing alternative virtual store layouts that retain distinct differences among each other, while simulating their corresponding concepts and rules from conventional retailing. However, several assumptions and concessions were made, since relevant theory could not support some of the methodological steps taken.

Graph theory was used as a consumer navigation representation tool within the domain analysis phase of the adopted methodology. Based on the results provided through the abstract interface design phase of each of the alternative virtual store layouts, Human Computer Interaction research insights and usability principles and guidelines for effective Web site design, operated as the transformation mechanisms towards providing a more user friendly and simplified shopping environment. However, the basic conditions for applying each conventional layout's concept on the Web, keeping distinct differences between the three layouts, and keeping all other potential consumer behaviour influencing factors the same, were not affected by the HCI interference.

CHAPTER 6. ANALYSIS OF THE LABORATORY EXPERIMENT RESULTS

This Chapter presents and discusses the analysis of the present study's results. First, the analysis of the pilot results and the corresponding changes based on the pilot findings are presented. In addition, some preliminary results provided through the pilot phase are also discussed. The second part of the Chapter presents the analysis of the main experimnent results. The *t*-test statistical analysis used to compare the samples in the respective experiments run in the United Kingdom and in Greece, is thoroughly discussed. Then, the Chapter proceeds with presenting the results provided by the ANOVA and Kruskal-Wallis parametric and non-paramteric tests used for testing the specific research hypotheses. After that, the Chapter deals with the factor and multiple regression analyses conducted in order to relate the independent to the dependent variables of the research design. Some interesting cross-tabulations are also presented, while the Chapter proceeds with the presentation of the qualitative analysis findings based on the personal interviews. The Chapter ends by relating the present study's findings back to HCI, investigating whether these findings, could have been predicted based on the usability and human factors literature.

6.1. Presentation of the Pilot Experiment

6.1.1. Introduction

The pilot phase of the experiment was conducted in Athens at the beginning of May 2001 and lasted four days. The sampling frame from which the pilot sample was drawn was the Technology and Management department of the Athens University of Economics and Business. Convenience sampling was used for the pilot, as according to Malhotra and Birks (2000) this sampling technique is usually used for pre-testing questionnaires, or pilot studies. Fifteen subjects participated in the pilot. They were kindly requested to provide reliable information and behave like they would have behaved within a real shopping situation in a virtual retail store over the Web. Subjects were provided with all the experiment's supporting material (i.e., questionnaires, shopping lists, etc.) and visited the online grocery store, following the experiment's sequence of steps described in Chapter 3. The pilot took place at a pleasant environment within ELTRUN (Hellenic Electronic Trading Research Unit) laboratory, which is

located at the Athens University of Economics and Business. Subjects were asked to participate only in case they had more than an hour of available time to spend, in order for them to be relaxed and devote as much time as they would like so that they adequately fulfil the experiment's requirements. The virtual laboratory grocery store was set up on a single laptop, which implied that subjects participated in the pilot in different time slots (i.e., one subject per time slot). Finally, the criteria met by the subjects participating in the pilot are summarised below:

- experienced Internet users,
- use the Web daily,
- spend money for grocery shopping,
- be fluent in English.

The experiment's administrator was supporting each subject during the execution phase of the pilot in order to both answer questions and record any problems encountered. In addition, at the beginning of each experiment, experiment administrator requested from all the subjects to report any problem (i.e., mistakes in the questionnaires, misleading or difficult to understand questions, bugs in the virtual store, usability problems, etc.) they might face during the execution of the experiment. All experiment's supporting material (i.e., questionnaires, shopping list, etc.) were developed in the Greek language with the exception of the use of English in the virtual store. However, as the participating subjects were fluent in English, they did not face any particular problems in getting used to the environment of the virtual store. In addition, prices were converted in Greek drachmae.

6.1.2. Questionnaire Testing

6.1.2.1. Constructs

The reliability of the constructs used in Parts A and Part B of the questionnaire was tested in the research context of this study through the employment of Cronbach Alpha reliability measurement statistical tool using the SPSS statistical software. The Cronbach Alpha results are summarised in Table 17, while presented in a more detail in Appendix D1. It is evident, therefore, that "Hobby," "Perceived Usefulness," "Ease of Use" and "Entertainment" constructs provided high Cronbach Alpha scores (i.e., greater than 0.7). Therefore, they were reliable in the context of this research, while the "Social Communication," "E-Commerce" and "Information Search" constructs were made

reliable by removing one item from each of them as described in Table 17. The first items of the "Social Communication" and "E-Commerce" and the fourth of the "Information Search" factors were removed from them (see Appendix D1).

Construct	Factor	Items	Cronbach Alpha	Alpha if Item Deleted	Comments
Purpose of Internet Use	Social Communication	SC1	0.6572	0.7245	This can be explained by the fact that students who participated in the pilot, use the Internet not as a means to meet new people, but rather as a means to work/search for information through visiting chat rooms or influencing /joining groups. This is documented by the high scores they gave to the IS construct below
		SC2		0.6120	
		SC3		0.3639	
		SC4		0.5162	
	E-Commerce	EC1	0.5209	0.7919	This can be explained by the fact that the majority of the students participated in the pilot have never used the Internet to make money, advertise or sell something. However, they have used it to buy something (60%).
		EC2		0.2713	
		EC3		0.2806	
		EC4		0.1908	
	Information Search	IS1	0.4548	-0.0568	
		IS2		0.3037	
		IS3		0.1520	
		IS4		0.8210	A possible explanation of this is that 40% of the students participating in the pilot do not use the Internet to buy products and, therefore, they do not use it to get product information. However, the majority of them use it daily to get educational/employment information or work for a job.
	Hobby	H1	0.8150		
		H2			
		H3			
		H4			
		H5			
TAM	Perceived Usefulness	PU1	0.9776		
		PU2			
		PU3			
		PU4			
		PU5			
		PU6			
	Ease of Use	EOU1	0.9488		
		EOU2			
		EOU3			
		EOU4			
		EOU5			
		EOU6			
Entertainment		ENT1	0.9380		
		ENT2			
		ENT3			
		ENT4			

Table 17: Reliability Analysis Results through the Use of Cronbach' Alpha Test

6.1.2.2. Questions

Question #A.2 in Part A of the questionnaire (see Appendix B4) had to be changed mainly due to usability reasons. The sequence of the four items used in this specific question in the pilot confused some subjects. For example, subjects that have purchased both digital and non-digital products through the Internet in the past, were ticking the first item (i.e., digital products), then the second item (i.e. non-digital products) and then the third item, which refers to both digital and non-digital. At this point, some of them were realising this problem, while some others were not (i.e., some questionnaires had been ticked three times in this specific question) despite the fact that it was clearly indicated that one tick was requested. Therefore, the third item was placed first in order for the subjects that had purchased both digital and non-digital products through the Internet to tick only the first item and ignore the rest. In addition, as demonstrated in Figure 48, some rephrasing was done. For example, a specific subject was confused regarding the category in which "hardware" belongs to (i.e., digital or non-digital?). Therefore, the categorisation was based on "Intangible" (i.e., software, music, tickets, etc.) vs. "Tangible" (i.e., clothes, hardware, groceries, etc.) products, instead of "Intangible/Digital" vs. "Tangible/Non-Digital," as in the latter the hardware could not be included anywhere else in the alternative categories.

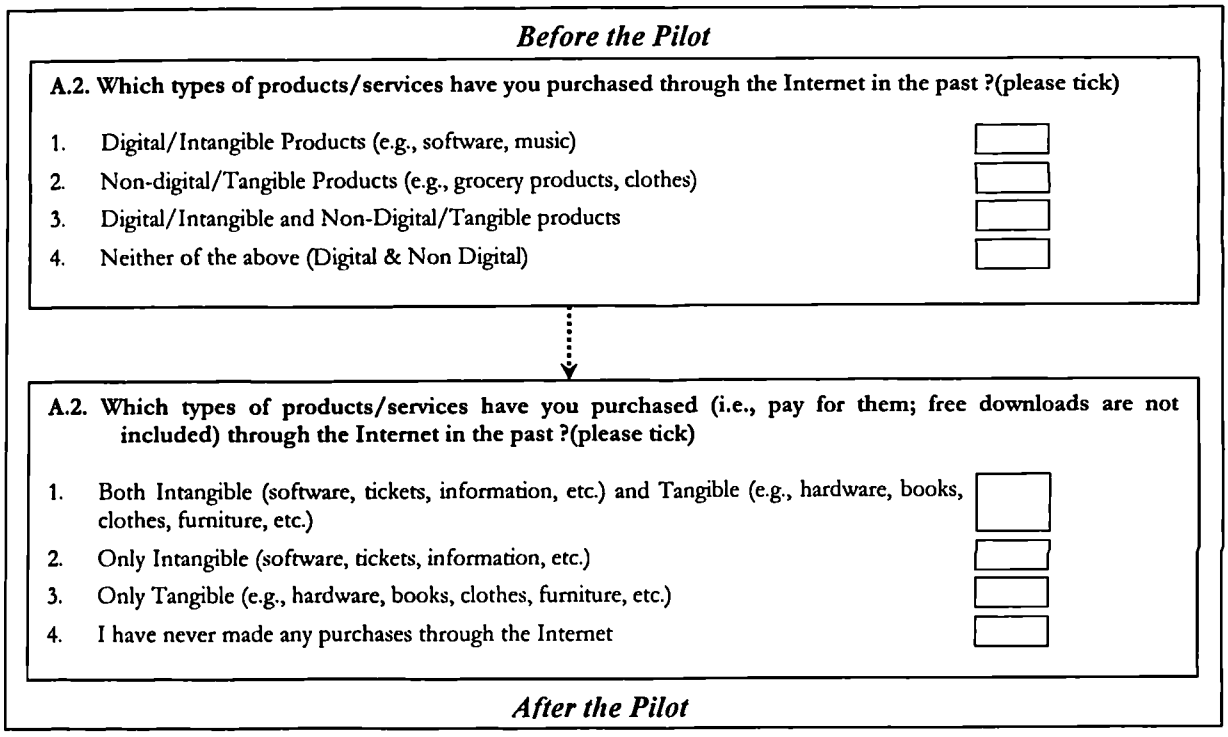


Figure 48: Question A.2 Before and After the Pilot

Furthermore, in the question (Part C) referring to the subjects' age, the available scales were changed for the final experiment. More specifically, it was decided to split the ">35 years" category in two separate categories as follows: "36-50" and ">50." This change was based on the decision to use stratified sampling for the formal experiments, which implied that the particular segment which constituted of subjects over 35 years old was expected to be large enough (i.e., academic staff, department staff, business executives). Therefore, the specific scale should be adapted to this condition.

Finally, the rest of the questions in questionnaire Parts A, B and C remained unchanged as there were no problems recorded about them.

6.1.3. Some Indicative Pilot Results

The pilot's objective was to pre-test the whole experiment's procedure in order to avoid unanticipated situations in the execution of the formal experiment. However, despite its small sample size, the pilot provided some preliminary but indicative results. These results are summarised in the following sections.

6.1.3.1. Independent Variables

a) Purpose of Internet Use

It is clear (Table 19) that subjects that participated in the pilot phase of the experiment use the Internet mostly to search for information (scored an average of 4.55) and for hobby purposes (scored an average of 3.25), while they use it rarely for social communication (an average of 1.97) and E-Commerce (an average of 1.90). In addition, it should be noted that almost half of the subjects asked the experiment's administrator the same question about the meaning of the "Influence a group" item included in the Social Communication construct.

b) Virtual Retail Store Selection Attributes

Table 18 presents the scores given by the subjects to the "Virtual Retail Store Selection Attributes/Characteristics." It is evident that "security" is their primary concern when visiting a virtual retail store over the Web, while "customer service" and "after sales support" comprise the second most important set of attributes. Furthermore, standard deviation of the aforementioned attributes was relatively low compared to the other attributes. Despite the small sample size, this finding strengthens the reliability of the aforementioned evaluations, while it constitutes a primary indicator of the importance of

these attributes to customers' virtual retail store selection procedure. On the contrary, "quality of advertising" was found to be the least important attribute for subjects when selecting a virtual retail store on the Web, with relatively medium standard deviation. Prices, quality and variety of the merchandise provided relatively high scores, constituting the third set of attributes in terms of importance. Finally, the fact that the scores given to these attributes were almost the same, could probably be an indicator for the proceeding factor analysis. The average scores of the "prices of the merchandise" and "sales and specials" attributes had the highset standard deviations which undoubtedly reflects the main classification of customers into those that are "price sensitive" and to those that are not.

	Subjects' Evaluation																
Attributes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average	St. Deviation
Prices of the Merchandise	1	4	4	5	5	5	5	5	2	5	5	4	3	4	5	4.13	1.25
Quality of Merchandise	2	4	4	4	5	5	4	5	3	5	4	5	4	5	4	4.20	0.86
Variety / Assortment of the Merchandise	5	3	4	3	5	5	4	4	4	4	4	5	4	4	4	4.13	0.64
Store Atmosphere	4	4	3	2	4	3	3	3	3	5	4	3	4	3	2	3.33	0.82
Customer Service	4	4	5	5	4	4	4	3	4	5	5	5	5	5	4	4.40	0.63
Quality of Advertising	1	2	2	1	3	3	3	4	1	1	3	3	3	2	2	2.27	0.96
Sales and Specials	1	3	4	4	4	3	5	5	2	2	4	4	5	4	5	3.67	1.23
After Sales Support	5	5	4	5	4	5	5	5	3	4	3	5	4	3	5	4.33	0.82
Store Reputation	5	5	3	4	5	4	3	5	3	4	4	3	3	4	4	3.93	0.80
Quick access to the store's Web site / Web site's speed	5	4	5	3	4	2	4	4	3	3	4	4	5	5	3	3.87	0.92
Availability of the displayed merchandise	3	4	4	4	4	4	3	2	4	4	3	4	5	4	3	3.67	0.72
Security in transactions	5	4	5	5	5	5	5	4	3	5	4	5	4	5	4	4.53	0.64

Table 18: Virtual Retail Store Selection Attributes: Some Preliminary Findings

6.1.3.2. Dependent Variables

a) Variables measured through the questionnaire

One of the most interesting results provided through the pilot was that subjects that visited the free-form layout evaluated it as the most effective regarding "perceived usefulness" it offers towards locating their pre-selected products (i.e., those that they had planned to buy in their shopping lists) and the "ease of use" during navigation within it. In addition, the standard deviation of "perceived usefulness" and "ease of use" was relatively low (0.72 and 1.23, respectively), contributing therefore, to the reliability of this finding despite the small sample size.

		LAYOUT						
		Grid		Free-form		Racetrack		*Total Average*
		Average	Std. Deviation	Average	Std. Deviation	Average	Std. Deviation	
Purpose of Internet Use	Social Communication							*1.97*
	E-Commerce							*1.90*
	Information Search							*4.55*
	Hobby							*3.25*
TAM Constructs	Perceived Usefulness	3.96	2.12	4.86	0.72	3.80	2.41	
	Ease of Use	4.10	2.34	5.10	1.23	4.76	1.36	
Entertainment		3.50	2.06	3.60	0.89	4.25	2.05	

Table 19: Some Preliminary Pilot Findings

On the other hand, the racetrack layout provided the highest score regarding the "entertainment" that it offered to the subjects. However, standard deviation in this case was quite high (i.e. 2.05), which, along with the small sample size, undoubtedly indicates that this particular result may not be as reliable as the results referred to the free-form layout above. Furthermore, grid layout was the second most preferred layout in terms of the "perceived usefulness" it offers towards locating subjects' pre-selected products, while in the other two cases ("ease of use" and "entertainment"), it was the last one. This finding could probably be explained by the fact that this particular layout is commonly used in conventional grocery stores basically due to the convenience it offers to customers. In addition, this preliminary finding could also be combined with the Internet survey findings presented in Chapter 4, where it was found that Internet grocery stores employ the grid layout more than other online retail stores do (i.e., clothes, cosmetics, etc.).

b) Variables measured through the system

b1) Promotional Sales

Subjects spent the smallest amount of their shopping budget for purchasing products under promotion in the free-from layout (i.e., average: 838 Greek drachmae; 6.9% of their shopping budget), while in the grid and racetrack layouts they spent an average of 1280 and 1245 Greek drachmae, respectively. However, the average amount of the budget spent for promotional items was proved to be quite small in all alternative layouts (9.2% of the total shopping budget), despite the 25% discount offered for the promoted products (Table 20).

	Drachmae	Pounds	% of shopping budget spend for promotion
Grid	1,280	2.13	10.6%
Free-form	838	1.39	6.9%
Racetrack	1,245	2.07	10.3%
Total Average	**1,121**	**1.86**	**9.2%**

Table 20: Shopping Budget Spent for Promotional Items per Layout

As discussed above, the subjects that visited the free-form layout evaluated it with the highest scores regarding "perceived usefulness" and "ease of use" towards locating their pre-selected products and navigating within the store. Therefore, the fact that subjects can easily locate and buy their desired products and easily navigate within this type of layout may probably make them not pay any special attention to the promotions existing in the store.

b2) Impulse Purchases

It was recorded that many subjects planned to buy products (i.e., in their shopping lists) that did not exist in the store. Therefore, it was decided to clarify that the online store looks more like a small grocery store employing a narrow but representative product variety, rather than like a hypermarket. These clarifications were included in the Instructional Leaflet that was used in the formal experiment. In addition, it was clarified that it did not include a wide variety of fresh produce (i.e., fruits, vegetables, eggs, etc.) and other fresh products (i.e., meat, bread, fresh butter) or special products (e.g., cigars, newspapers, books, shoes, electronics) due to delivery constraints. However, it was clarified that some fresh products like yoghurt, milk, cheese and juices were offered.

Through that clarification, cases of subjects not being able to find some products that they planned to buy before entering the virtual store are minimized as they will understand that the virtual store that they will visit does not include an exhaustive product variety. Therefore, impulse purchases will be recorded in a more reliable way, as any non-shopping list product purchased will count as "impulse purchase". In addition, the experiment administrator will check the shopping list right after subjects fill it out (i.e., before entering the virtual store) in order to inform them of any products not existing in the virtual store. Such an action will also contribute to the reliable measurement of impulse purchases.

Due to the aforementioned reasons, pilot's impulse purchases were not investigated in-depth, since such an analysis would probably not provide any reliable results.

b3) Time Spent within the Store

Based on the results included in Table 21, it is clear that subjects spent more time within the racetrack layout, as it was probably difficult for them to easily locate their pre-selected products. This can be documented by the fact that subjects evaluated this particular layout with the lowest score regarding the "perceived usefulness" it offered to them towards identifying their pre-selected products. However, in the personal interviews, they stated that the racetrack layout was a quite interesting and unusual layout. This observation could be combined with the highest average score given to the "entertainment" it offered to subjects.

Layout	Time spent within the virtual store (in minutes)
Grid	8.4
Free-form	8.8
Racetrack	10.6
Total Average	9.2

Table 21: Time Spent within each Type of Store Layout

More specifically, subjects spent 8.4 minutes in the grid layout, 8.8 in the free-form layout and 10.6 in the racetrack layout. A preliminary finding is that customers spent less time in the grid layout towards identifying their shopping list products than in the

other two layouts, which is documented by the fact that grid layout is the one most commonly employed by conventional grocery stores because it facilitates planned/routine shopping behaviour. However, the paradox is that, as discussed above, subjects evaluated the free-form layout with the highest score regarding the "perceived usefulness" towards identifying their pre-selected products. However, the difference between the grid and the free-form layout regarding the time that subjects spend within them is quite small.

Finally, it should be noted that as the shopping budget given to subjects was not a real one, the time spent within each layout was expected to be greater in the formal experiments where subjects would conduct real purchases spending a real shopping budget.

6.1.3.3. General and Qualitative Pilot Insights

Except for some system-bugs recorded during the pilot, the virtual laboratory store did not encounter any serious software/coding problems. The pilot experiment administrator was observing subjects' activity during the entire experimental procedure in order to:

- provide subjects with the experiment's supporting material (i.e., questionnaires, shopping list, user name and password form, etc.),
- provide immediate help to subjects whenever they asked for it (i.e., answer specific questions regarding either the supporting material or the virtual store interface), and
- record any problems or questions referred either to the experiment's supporting material or to the online store itself.

However, it should be clarified that subjects were not provided with any help regarding navigational issues, in order for them to provide reliable evaluations at the end. Besides, all subjects were experienced Internet users and did not face any particular navigation problems. They were simply informed that they are free to navigate within the store for as much time as they like, and buy whatever they like, having only the shopping budget limitation, which in the case of the pilot, however, was not a real one.

Finally, at the end of each experiment, a personal interview took place and some pre-defined qualitative questions were asked and tape-recorded. Therefore, exactly the same questions were asked to each subject in order to effectively process and compare the results, while each subject was encouraged to add anything he/she would like regarding the shopping experience he/she just had. The main findings of the qualitative part of the pilot, are summarized below:

- Most of the subjects that did not visit the free-form layout stated that they would like a search engine to be provided to them by the online grocery store in all its pages.

- All subjects that visited the racetrack layout stated that it was a quite unusual and interesting layout. However, it was difficult for them to identify the (shopping list) products that they had planned to buy. To that end, some subjects stated that it would be very helpful in case a "layout map" of the whole store had been provided to them at the home page.

- Most subjects that visited the free-form layout stated that they did not have any serious problems towards searching for and buying their shopping list products.

- Most subjects that visited the grid layout stated that it was not so easy for them to locate their shopping list products.

- Some subjects that visited the free-form layout stated that they would also prefer a free-text search engine.

However, it should be clarified that the pilot served more as an instrument to detect any problems regarding the questionnaire and the virtual laboratory store, rather than as a tool to provide reliable findings.

6.2. Analysis of the Final Experiment's Results

6.2.1. Introduction

The final experiment run in the United Kingdom and Greece in June and July, 2001 at Brunel University and the Athens University of Economics and Business, respectively. Subjects were informed one week before running the experiment in order to be prepared for it. Each subject was placed on a specific time slot. It was also orally communicated to them (in addition to the instructional leaflet) that they will be given a 20 pounds/12.000 drachmae shopping budget to conduct real purchases from an online grocery store. This operated as a strong motive for participation, while it simulated a "real shopping experience" providing therefore more reliable results than a usual laboratory experiment.

6.2.2. Samples' Comparison through the Use of *t*-Tests

In order to determine whether the two sets of scores (i.e., UK and Greece) are from the same or different populations, ***t*-Tests** were used. According to Webster (1998), Kinnear and Taylor (1996), Hair et al. (2000) and Coakes and Steed (1999), a *t*-test is used to determine whether a set or sets of scores are from the same or different populations. In case the t-value is not significant, this means that there is not any significant difference between the two sample means (i.e., cannot reject Ho: $\mu 1=\mu 2$) and therefore, the two sets of scores are from the same population. This finding will advise whether "subjects' location" should be used as a "moderating factor" in the research design or not. More specifically, in case the sets of scores are from the same population, "subjects' location" should not be used as a "moderating factor" (i.e., manipulated variable), while in case a statistically significant difference between the means exists, "subjects' location" should constitute one of the "moderating factors" of the research design along with the "layout."

Thus, the following two scenarios were considered:

(a) The first one refers to the comparison between the means of the two groups (i.e., UK and Greece) that participated in the same layout, per dependent variable. In this case the sample size is 20 (i.e., 20 subjects per layout).

(b) The second scenario refers to the comparison between the means of the two groups (i.e., UK and Greece) per dependent variable (not per layout). In this case the sample size is 60.

Scenarios	Dependent Variables	Layout	Kolmogorov-Smirnof Significance Level	Shapiro-Wilks Significance Level
1st (sample size = 20)	1) Perceived Usefulness	Grid		UK: .055; GR: .154
		Free-form		UK: .090; GR: .662
		Racetrack		UK: .405; GR: .049
	2) Ease of Use	Grid		UK: .684; GR: .264
		Free-form		UK: .061; GR: ,402
		Racetrack		UK: .651; GR: ,385
	3) Entertainment	Grid		UK: .251; GR: ,492
		Free-form		UK: .053; GR: ,681
		Racetrack		UK: .092; GR: ,218
	4) Time	Grid		UK: .184; GR: .664
		Free-form		UK: .339; GR: .553
		Racetrack		UK: .051; GR: .906
	5a) Promotional items purchased	Grid		UK: .010; GR: .010
		Free-form		UK: .010; GR: .010
		Racetrack		UK: .010; GR: .010
	5b) Budget spent on promotional items	Grid		UK: .010; GR: .010
		Free-form		UK: .010; GR: .010
		Racetrack		UK: .010; GR: .010
	6a) Impulse purchased items	Grid		UK: .010; GR: .010
		Free-form		UK: .299; GR: .210
		Racetrack		UK: .020; GR: .010
	6b) Budget spent on impulse purchases	Grid		UK: .014; GR: .010
		Free-form		UK: .597; GR: .134
		Racetrack		UK: .303; GR: .010
2nd (sample size = 60)	1) Perceived Usefulness	All	UK: .200; GR: .061	
	2) Ease of Use	All	UK: .052; GR: .091	
	3) Entertainment	All	UK: .084; GR: .200	
	4) Time	All	UK: .090; GR: .200	

Table 22: Normality Test Results as an Assumption for Running *t*-Tests

In both the aforementioned scenarios, before running the t-tests, normality tests were run for both samples' observed values. Kolmogorov-Smirnov (for sample sizes over 50) and Shapiro-Wilks (for samples sizes less than 50) statistics were used. Finally, the other two assumptions that must be met prior to the *t*-test analysis are:

- the scale of measurement; data should be at the interval or ratio level of measurement, and
- random sampling; the scores should be normally distributed in the population.

These assumptions were also met and therefore the accuracy of the *t*-test interpretation is enhanced. According to Coakes and Steed (1999), all these assumptions need to be evaluated, because the accuracy of test interpretation depends on whether assumptions are violated. However, Kerlinger et al. (1986) support that violation of the assumption that the population scores are normally distributed is not so serious because tests like *F* and *t* tests are robust. They also state (p.267) that "the evidence to date is that the importance of normality and homogeneity of variance is overrated." Despite that, as discussed above, the Kolmogorov-Smirnov (for sample sizes over 50) and Shapiro-Wilks (for sample sizes less than 50) statistics with a Lilliefors significance level for testing normality were used in order to enhance the quality and reliability of the results. If the significance level is greater than .05, then normality is assumed.

The *t*-tests results for both the aforementioned scenarios along with their corresponding normality tests are summarized in Tables 22 and Table 23, while Appendices D2, D3 and D4 presents them in greater detail.

It is evident that in both scenarios, the samples regarding dependent variables 1-4 (i.e., "perceived usefulness," "ease of use," "entertainment" and "time") are from normal distributions. However, the samples regarding dependent variables 5 and 6 (i.e., "promotion effectiveness" and "impulse purchases") were found not to be from normal distributions, in the first scenario and, therefore, there were not any separate normality tests conducted for these variables using the second scenario. It should be clarified at this point, that the first scenario is the most reliable one (compared to the second) as it uses two samples of 20 observations each (i.e., participated in the same layout) per dependent variable which, depending on the *t*-tests results, will constitute one sample of 40 observations per dependent variable and per layout for the ANOVA tests. Therefore, the second scenario was used just to support the findings of the first one. Furthermore, it should be also noted that the observed values of dependent variables 5 and 6 were recorded based on: (a) the budget spent for promoted products and impulse purchases,

and (b) the number of different promoted or impulse products purchased. Therefore, based on the normality test results, *t*-tests cannot run for these dependent variables as the assumption of normality is violated.

Scenarios	Dependent Variables	Layout	*t*	Sig. (2-tailed)	Significance Level
1st (sample size = 20)	Perceived Usefulness	Grid	.215	.832	p>.05
		Free-form	1.792	.078	p>.05
		Racetrack	.527	.604	p>.05
	Ease of Use	Grid	.586	.565	p>.05
		Free-form	.505	.620	p>.05
		Racetrack	1.948	.066	p>.05
	Entertainment	Grid	-.223	.826	p>.05
		Free-form	1.926	.064	p>.05
		Racetrack	.144	.887	p>.05
	Time	Grid	.552	.588	p>.05
		Free-form	-.406	.690	p>.05
		Racetrack	.488	.631	p>.05
2nd (sample size = 60)	Perceived Usefulness	All	1.902	.062	p>.05
	Ease of Use	All	1.834	.072	p>.05
	Entertainment	All	1.564	.123	p>.05
	Time	All	0.406	.686	p>.05

Table 23: t-Tests Results for Dependent Variables 1 to 4

Regarding dependent variables 1-4, Kolmogorov-Smirnof and Shapiro Wilks statistics' significance levels are greater than .05 in all cases under both scenarios. Thus normality is assumed and, therefore, *t*-tests can run only for dependent variables 1-4.

Based on the results presented in Table 23, it is evident that in both scenarios, the samples are from the same population as there is not any statistically significant difference between their observed means. All *t* values are less than the critical values included in a two-tailed (i.e., Ho: $\mu 1=\mu 2$, HA: $\mu 1\neq\mu 2$) test at $\alpha=,05$. Therefore, as Ho cannot be rejected, "subjects' location" should not be used as a "moderating factor" in the research design. This means that 40, instead of 20, observations per dependent variable and layout will be used for the ANOVA tests (i.e., a total of 120 for the three layouts), something which undoubtedly provides greater statistical power.

Finally, it should be clarified that since the population from which the samples were drawn is the same, the research design is not a factorial one of the type "3 layouts x 2 countries". The only treatment" is the layout.

6.2.3. Normality Tests as an Assumption for Running ANOVA Tests

Before proceeding with the hypotheses testing, normality tests were run for each sample per dependent variable (i.e., 3 samples of 40 subjects per dependent variable) in order to decide whether parametric or non-parametric tests should be used. In cases where serious violations of the distribution assumptions of parametric tests exist, then non-parametric tests can be used (Webster 1998). The results are summarized in Table 24 below, while presented in a more detailed format in Appendix D5.

Dependent Variables	Layout	Shapiro-Wilks significance level
1) Perceived Usefulness	Grid	.050
	Free-form	.594
	Racetrack	.051
2) Ease of Use	Grid	.061
	Free-form	.057
	Racetrack	.744
3) Entertainment	Grid	.064
	Free-form	.077
	Racetrack	.049
4) Time	Grid	.171
	Free-form	.255
	Racetrack	.088
5a) Promotional items purchased	Grid	.010
	Free-form	.010
	Racetrack	.010
5b) Budget spent on promotional items	Grid	.010
	Free-form	.010
	Racetrack	.010
6a) Impulse purchased items	Grid	.010
	Free-form	.068
	Racetrack	.010
6b) Budget spent on impulse purchases	Grid	.010
	Free-form	.144
	Racetrack	.010

Table 24: Normality Test Results as an Assumption for Running the ANOVA Tests

Based on the results of Table 24, it is evident that the observed values regarding dependent variables 1-4 (i.e., "perceived usefulness", "ease of use," "entertainment" and "time") are from normal distributions as Shapiro Wilks statistic significance levels are greater than .05 in all cases. Thus, normality is assumed. In the case of dependent variables 1-4, parametric tests like ANOVA can be used for analysing the samples' observed values.

As far as dependent variables 5 and 6 (i.e., "promotion effectiveness" and "impulse purchases") are concerned, it is evident that samples are not from normal populations and, therefore, non-parametric tests should be used for analysing their observed values.

6.2.4. Hypotheses Testing through the use of ANOVA Parametric Test

One-way between groups ANOVA tests (i.e., *F* statistic) were run for dependent variables 1-4 per layout, in order to test whether there were significant differences between the group means. However, according to Hair et al. (2000) and Coakes and Steed (1999), ANOVA is only able to tell that differences exist between the group means, considered together. It cannot identify which pairs of means are significantly different from each other. Thus, in case the null hypothesis is rejected, if any pair of means is unequal, there is a need to locate where the significant differences lie. This requires post-hoc analysis/comparisons or follow-up tests. To that end, Tukey's honestly significant difference test was used. The ANOVA results are summarised in Table 25, while presented in a more detailed format in Appendix D6.

Interpreting results in Table 25, it is apparent that the layout significantly affects each of the corresponding dependent variables. More specifically, the calculated *F*-value is greater than the corresponding critical value in all cases, which means that there is a statistically significant difference between the group means. Therefore, Ho is rejected. Alternatively, since $p<.05$, Ho is rejected in all cases, implying that the layout significantly affects "perceived usefulness," "ease of use," "entertainment" and time."

Alternative Hypotheses	*F*	Sig. (2-tailed)	Finding	Means - scale for H1-H3: 1 (low) to 7 (high), - seconds for H4	Tukey HSD Post-Hoc Comparisons (i.e., order of effects) >>: significant >: not significant
H1 (perceived usefulness)	8.91	.000	Reject Ho at α=.005	Grid: 4,0 Free-form: 4,8 Racetrack: 3,5	Free-form >> Grid Grid > Racetrack Free-form >> Racetrack
H2 (ease of use)	17.782	.000	Reject Ho at α=.005	Grid: 5,7 Free-form: 5,0 Racetrack: 4,2	Grid >> Free-form Free-form >> Racetrack Grid >> Racetrack
H3 (entertainment)	5.139	.007	Reject Ho at α=.01	Grid: 3,6 Free-form: 4,3 Racetrack: 3,4	Free-form >> Grid Grid > Racetrack Free-form >> Racetrack
H4 (time)	5.118	.007	Reject Ho at α=.01	Grid: 747,5 Free-form: 817,8 Racetrack: 971,3	Racetrack > Free-form Racetrack >> Grid Free-form > Grid

Table 25: ANOVA Test Results for Research Hypotheses1 to 4

More specifically, one-way between groups ANOVA with Post-Hoc comparisons per dependent variable results (Table 25) are discussed below.

1) **Perceived Usefulness:** It was found that consumers perceive the free-form layout as significantly more useful than the grid and racetrack layouts, as it facilitates their shopping activity towards searching for and buying the products on their shopping list (α=.005). The alternative hypothesis, however, states that consumers perceive the grid layout as more useful than the free-form and racetrack layouts. Having obtained a significant result, it can then be determined where the significance lies through the use of the Tukey HSD test. The test showed that there are significant differences between the free-form and the other two layouts (i.e., grid and racetrack), while there is not any significant difference between the grid and the racetrack layout. Finally, the racetrack was perceived as the least useful layout. These findings indicate that the free-form layout facilitated the subjects to easily locate their shopping list products. The fact is that the information-rich environment (i.e., detailed product catalogues, including even end-products, are provided at the home page) and supportive mechanisms (i.e., search engine) which only exist in the free-form layout, helped customers to easily locate their shopping list/desired

products. Finally, it is reminded that pilot results also indicated that the free-form was perceived as the most useful layout.

2) **Ease of Use:** It was found that customers perceive the grid layout stores as significantly easier to use, than other stores employing the free-form or racetrack layouts (α=.005). The alternative hypothesis, however, states that consumers perceive the free-form layout stores as easier to use, than other stores employing the grid or the racetrack layouts. Having obtained a significant result, it can then be determined where the significance lies through the use of the Tukey HSD test. The test showed that there are significant differences between all the layouts; the grid was perceived as the easiest to use, while racetrack as the least easy to use. This finding, combined with the previous one, implies that the hierarchical/tree structure employed by the grid layout is the most effective in making a store easy to use. Therefore, despite the fact that the grid was found to not be the most effective layout regarding the "perceived usefulness," it seemed to enable customers to use its aisles, significantly more easily than the other two layouts.

3) **Entertainment:** It was found that the free-form layout, in comparison to the grid and racetrack layouts, offers to customers significantly more entertainment during shopping activity (α=.01). The alternative hypothesis, however, states that racetrack layout, in comparison to the grid and free-form layouts, offers more entertainment during shopping activity. Having obtained a significant result, it can be determined where the significance lies through the use of the Tukey HSD test. The test showed that there are significant differences between the free-form and the other two layouts. Additionally, there is not any significant difference between the grid and the racetrack layouts. The racetrack layout was perceived as the layout that offers to customers the least entertainment during their shopping activity. This finding could be probably explained by the fact that the free-form layout enables customers to easily locate their desired products (i.e., perceived usefulness) within an information-rich and supportive shopping interface. This is especially true for grocery products, where planned shopping is a usual case. Furthermore, the dynamically changing product assortment within a three-level visible area (as described in Chapter 5) implemented in the free-form layout, probably contributed to the increase of customers' perceived "entertainment" during their shopping activity.

4) **Time:** The layout significantly affects the time that customers spend for shopping (α=.01). The Tukey HSD test showed that significance lies only between the racetrack and the grid layouts, while consumers spend the least shopping time within the grid layout. However, there was not any significant difference encountered between the racetrack and the free-form layouts, which were found to be the first and second layout, respectively, in terms of amount of time that customers spend within them. However, the alternative hypothesis states that consumers spend more shopping time within a store using the free-form layout than the other two layout patterns. Moreover, it should be reminded, that the racetrack layout was found to be the most difficult to use and the least useful towards locating shopping lists products. Therefore, customers spent more time within it in order to both learn how to use it and how to locate their shopping list products within it. This finding is also supported by the interviews' results (discussed at the end of this Chapter) and also by the pilot results (discussed at section 6.1.3.2 of this Chapter).

6.2.5. Hypotheses Testing through the Use of Kruskal-Wallis Non-Parametric Test

As discussed above, non-parametric tests were used for "Promotion Effectiveness" and "Impulse Purchases".

According to Webster (1998) and Coakes and Steed (1999), the Kruskal-Wallis test is equivalent to the one-way between groups ANOVA (which was used for the other 4 dependent variables) and thus, allows to examine possible differences between three or more groups. Kruskal-Wallis is used when the data violate the assumptions of a one-way ANOVA and it is the analogue to the F test used in ANOVA tests.

Therefore, 4 Kruskal-Wallis tests run for: (a) the number of different promoted products purchased, (b) the budget spend for promoted products, (c) the number of non-shopping list products purchased (impulse purchases) and (d) the budget spend for non-shopping list products (impulse purchases). The Kruskal-Wallis results are summarised in Table 26, while they are presented in a more detailed format in Appendix D7.

Alternative Hypotheses		Chi-Square	Asymp. Sig.	Mean Rank	Findings
H5 Promotion Effectiveness	Number of different promoted products purchased	3.476	.176	Grid: 60,40 Free-form: 56,05 Racetrack: 65,05	**Cannot Reject Ho** The number of different promoted products purchased does not significantly differ across the 3 layouts
	Budget spent for promoted products	3.528	.171	Grid: 60,58 Free-form: 55,92 Racetrack: 65,00	**Cannot Reject Ho** The budget spent for promoted products does not significantly differ across the 3 layouts
H6 Impulse Purchases	Number of non-shopping list products purchased (impulse purchases)	3.314	.191	Grid: 55,29 Free-form: 68,40 Racetrack: 57,81	**Cannot Reject Ho** The number of non-shopping list products purchased (impulse purchases) does not significantly differ across the 3 layouts
	Budget spent for non-shopping list products (impulse purchases)	0.976	.614	Grid: 57,13 Free-form: 64,66 Racetrack: 59,71	**Cannot Reject Ho** The budget spent for non-shopping list products (impulse purchases) does not significantly differ across the 3 layouts

Table 26: Kruskal Wallis Test Results for Research Hypotheses 5 and 6

All values included in Table 26 indicate that promotion effectiveness and impulse purchases do not significantly differ across the three layouts. In other words, the null hypothesis (i.e., Ho: $\mu1=\mu2=\mu3$) cannot be rejected, implying that the layout of an Internet retail store does not affect promotion effectiveness and impulse purchases.

6.2.6. Independent and Dependent Variables Relationship

6.2.6.1. Factor Analysis for the "Virtual Retail Store Selection Criteria"

According to Coakes and Steed (1999, p.155), "factor analysis is a data reduction technique used to reduce a large number of variables to a smaller set of underlying

factors that summarise the essential information contained in the variables." In the case of the present study, factor analysis was used as an exploratory technique for summarising the structure of the set of variables included in the "virtual retail store selection criteria" independent variable. To that end, the Principal Axis Factoring (PAF) method of factor extraction was used. Finally, the assumption of an appropriate sample size (i.e., a minimum of five subjects per variable) for running a factor analysis was met (i.e., sample size = 120).

Virtual Retail Store Selection Attributes	Virtual Retail Store Selection Factors				
	1	2	3	4	5
After Sales Support (i.e., information about new products and special offers through e-mail, etc.)	.679				
Quality of Advertising	.475				
Customer Service and Support (i.e., personalised support during shopping, delivery/pick up service, alternative payment methods, etc.)	.460				
Sales and Specials (i.e., in-store promotions, etc.)	.422	.348			
Prices of the merchandise		.771			
Variety/Assortment of the merchandise		.497			
Quality of the merchandise		.373			
Security in transactions		.343			
Quick access to the store's Web site/Web site's speed			.911		
Availability of the displayed merchandise (i.e., minimal stock-outs)			.451		
Store Atmosphere (i.e., product display techniques, store décor, background music, store layout, etc.)				.778	
Store Reputation					.563

Table 27: Rotated Factor Matrix Loadings for "Virtual Retail Store Selection Attributes"

An examination of the correlation matrix included in the factor analysis results (Appendix D8), indicates that a considerable number of correlations exceed .3 and thus the matrix was suitable for factoring. The Barlett test of sphericity was significant and the KaiserMeyer-Olkin measure of sampling adequacy was greater than .6. Furthermore, inspection of the Anti-Image correlation matrix revealed that all MSA (Measures of Sampling Adequacy) were well above the acceptable level of .5. The table labeled "Total Variance Explained" displays the total variance explained at three stages. At the initial stage, it shows the factors and their associated eigenvalues, percentage of variance explained and the cumulative percentages. In reference to the eigenvalues, it was

expected that five factors would be extracted because they had eigenvalues greater than 1. If five factors were extracted, 64,5% of the variance would be explained. The final statistics table displays the communalities and factor statistics after the desired number of factors had been extracted. It is clear that the eigenvalues for factors 2 to 5 have dropped below 1 and that the percentage of variance explained by the five factors had also decreased. Finally, the third part of the table shows eigenvalues of the rotated factors and their respective percentage of explained variance.

Inspecting the Factor Matrix, it became evident that rotation was necessary as there were many complex variables (i.e., those that had loadings of .3 or greater, on more than one factor) and, therefore, interpretation of the output was difficult. Varimax rotation was used and the output clearly indicates that the number of complex variables was reduced and five factors were extracted (Table 27). However, factors referring to the "store atmosphere" and "store reputation" consisted of only one item as they were not grouped in any one of the other 3 factors. Finally, the factor transformation matrix indicated that there was not any high correlation between the extracted factors. Factors that emerged are shown in Table 27.

The final step in this analysis involved determining how many factors to interpret and assigning an appropriate label to each of them (Table 28). According to Hair et al. (1992) and Coakes and Steed (1999), the number of factors to be interpreted largely depends on the underlying purpose of the analysis. In the case of the present analysis, the objective is to produce a set of factors that summarise the structure of the set of "virtual retail store selection criteria/variables." Therefore, the first factor was interpreted as "Customer Care" since the quality of customer service and advertising, along with the existence of sales and after sales support service, significantly contribute to the "care" offered to customers. This means that besides the direct service offered to customers either during or after shopping activity, the quality of advertising and the existence of sales and specials show that the store cares and respects its customers, communicating with them with quality advertising, while offering challenging shopping opportunities (i.e., sales) to those customers that are "price sensitive." Factor 2 was defined "Merchandise and Security," as it included items that directly refer to the merchandise (i.e., price, quality and variety/assortment of the merchandise) and the security in transactions, which is critical for Internet retailing. Factor 3 was labeled "Effective Shopping" as it includes items that refer to the speed of entering the Web site and the availability of the displayed merchandise. This means that customers can directly access the store's Web site, while they are confident that they will not waste

time in case they buy a product that is out-of-stock but the store does not inform them about it. Finally, factors 4 and 5 were named "virtual store atmosphere" and "virtual store reputation," respectively. The above discussion results are summarized in Table 28.

Construct	Factors	Variable Name	Question Number	Cronbach Alpha
Virtual Store Selection Criteria	Customer Care	Customer Service	A.3.5	.6437
		Quality of Advertising	A.3.6	
		Sales and Specials	A.3.7	
		After Sales Support	A.3.8.	
	Merchandise and Security	Prices of the merchandise	A.3.1	.6049
		Quality of the merchandise	A.3.2.	
		Variety/Assortment of the merchandise	A.3.3.	
		Security in transactions	A.3.12	
	Effective Shopping	Quick access to the store's Web site/Web site's speed	A.3.10	.6118
		Availability of the displayed merchandise (i.e., minimal stock-outs)	A.3.11	
	Virtual Store Atmosphere	Store Atmosphere (i.e., product display techniques, store décor, background music, store layout, etc.)	A.3.4	-
	Virtual Store	Store reputation	A.3.9	-

Table 28: Factor Interpretation Reliability Analysis for Scale Construction and Definition

The final step was to determine Cronbach's alpha coefficient of internal consistency to ensure that the items comprising the aforementioned factors produce reliable scales. Cronbach's alpha values were not so high because scores fluctuated between 6.049 and 6.437 (Table 28). However, according to Malhotra and Birks (2000) and Hair et al. (2000) Cronbach's alpha value of 0.6 or less generally indicates marginal to low internal consistency reliability. Therefore, since there was not any case of a Cronbach's alpha score equal to or less than 0.6, it can be assumed that the internal consistency reliability of the resulted factors was at least marginal and not unsatisfactory at all. In addition, as presented in the Reliability outputs (Appendix D.8.2), and more specifically in the

"Alpha if item deleted" column, reliability would decrease in case any of the items would be removed from the corresponding scales.

6.2.6.2. Regression Analysis

6.2.6.2.1. Regression Analysis for the "Purpose of Internet Use"

Separate multiple regression analyses were performed per layout, one for each dependent variable. Table 29 includes only the cases in which the regression as a whole was significant (based on the ANOVA test and the *F* statistic). It also provides information about the *beta (β)* values and the *t*-tests' significance levels, for these cases only. Finally, the analytical multiple regression results are included in Appendix D.9.1.

Independent Variables	Dependent Variables			
	Perceived Usefulness	Ease of Use	Entertainment	Time
GRID				
Social Communication				
Electronic Commerce				
Information Search				
Hobby				
FREE-FORM				
Social Communication				
Electronic Commerce	$p = .023$ $\beta = -.367$			
Information Search				
Hobby	$p = .033$ $\beta = 2.219$			
RACETRACK				
Social Communication				
Electronic Commerce				
Information Search				
Hobby				

Table 29: Significant Regression Relationships for the Three Layouts ($p<.05$)

Table 29 shows that there were very few significant regression relationships between the "Purpose of Internet Use" independent variables and the corresponding dependent variables. The significant equations are discussed below:

- An increase in the use of the Internet for "Electronic Commerce" purposes is expected to decrease the "Perceived Usefulness" for those customers visiting the free-form layout. This finding can be supported by the Internet retailing survey (see Chapter 4) which found that the majority of the retail Web sites use a "free-form" type of layout. More specifically, combining this finding with the ANOVA results which showed that that the grid was significantly the easiest layout to use, it is clear that an emerging layout for the future will not be the free-form on its present form, but rather a "grid--free-form mixed" type of layout incorporating the grid's most effective characteristics. In other words, as "Internet users" become "experienced Internet shoppers," the perceived usefulness in the free-form layout on its present form would decrease, because customers will be able to compare this particular layout with many other layouts that probably will be perceived as more useful. Further support to the regressions' findings is provided by the Internet consumer survey's results (also presented in Chapter 4) regarding future Internet shoppers evaluation of store atmosphere of a virtual retail store as an important store selection criterion for them.

- An increase in the use of the Internet for "Hobby" purposes would increase the "Perceived Usefulness" for those customers visiting the free-form layout. This finding is also supported by the ANOVA results discussed above, which showed that the free-form layout was perceived as the most useful towards locating shopping list products, while offering significantly more entertainment to customers. Therefore, regression results indicate that in case customers increase their use of the Internet for hobby purposes (hobby, undoubtedly, includes entertainment), the perceived usefulness in the free-form layout might also increase. The fact is that most of such "hobby" Web sites are mainly characterised by information-rich environments, dynamically changing interfaces, and, in general, their basic objectives are to surprise, enjoy and entertain customers. On the other hand, the free-form layout, compared to the other two layouts, is the only one that has so many similarities with the Web sites that refer to hobbies and it is the most entertaining layout of all. Thus, customers getting used to navigate through Web sites that refer

to hobbies will undoubtedly evaluate the free-form as the most useful layout towards searching for and buying shopping list products.

However, the amount of the expected decrease/increase would differ for each of the aforementioned variables according to the regression coefficients, as presented in Table 29.

Finally, it is evident that the multiple regression results (Table 29), represent different behaviour patterns among the three layouts under study, something which was also supported by the ANOVA results discussed previously.

6.2.6.2.2. Regression Analysis for "Virtual Retail Store Selection Criteria"

Having generated new independent variables based upon the factor analysis, separate multiple regression analyses, one for each dependent variable per layout, were performed. Table 30 includes only the cases in which the regression as a whole was significant. It also provides information about the *beta (β)* values and the *t-tests'* significance levels.

Table 30 shows that there were very few significant regression relationships among the "Virtual Retail Store Selection Attributes" independent variables and the corresponding dependent variables. The significant equations are discussed below:

- An increase in the importance that customers pay for the "effective shopping" attribute (i.e., quick access of the Web site and availability of the displayed merchandise), is expected to decrease their perceived entertainment when visiting the grid layout. This means that there is a "trade-off" between the entertainment and the effective shopping experience offered to customers by the grid layout. ANOVA results indicate that customers spend the least amount of time when visiting the grid layout. Combining this with ANOVA findings that the grid layout is significantly the easiest layout to use, it seems that entertainment is being "sacrificed in the shrine" of the quick and effective shopping.

Independent Variables	Dependent Variables			
	Perceived Usefulness	Ease of Use	Entertainment	Time
GRID				
Customer Care				
Merchandise and Security				
Effective Shopping			p = .014 β = -.379	
Virtual Store Atmosphere				
Virtual Store Reputation				
FREE-FORM				
Customer Care	p = .001 β = .672			
Merchandise and Security				
Effective Shopping				
Virtual Store Atmosphere				
Virtual Store Reputation				
RACETRACK				
Customer Care				
Merchandise and Security				
Effective Shopping				
Virtual Store Atmosphere				
Virtual Store Reputation				

Table 30: Significant Regression Relationships for the Three Layouts ($p<.05$)

- An increase in the importance that customers pay for "Care," when visiting a free-form layout Internet retail store, is expected to increase their "Perceived Usefulness" towards locating their shopping list products in this particular type of store layout. As ANOVA results indicated, free-form is perceived as the most useful layout. Based on that, it becomes clear that customer service, after sales support, quality of advertising and existence of sales within the store (all these attributes are included in the "customer care" factor), enable customers to locate their shopping list products

effectively. On the other hand, the free-form layout, in comparison to the other two layouts, offers a richer information (e.g., full product details per display are provided at once) and supportive environment (e.g., it is the only layout that offers the "search" mechanism). Therefore, an increase in the importance that customers pay for "customer care" would undoubtedly increase the perceived usefulness for the free-form layout, as this particular layout is the one which can more effectively than the other two layouts, satisfy those customers that place great importance on this specific attribute.

The amount of decrease/increase expected would differ for each of the aforementioned variables according to the regression coefficients (Table 30). Again, multiple regression results represent different behaviour patterns among the three layouts under study.

6.2.6.3. Cross-tabulation Analysis

Trying to identify further relationships between the independent and the dependent variables, several cross-tabulation analyses were conducted. However, it should be noted that the "monthly budget spent for grocery shopping" attribute variable, was not further analysed for the following reasons: (a) based on the *t*-test results, "subjects' location" was not considered a moderating factor in the research design, and (b) the grocery products' prices are higher in the United Kingdom than they are in Greece. This question was, however, included in the questionnaire, because at the time before running the experiment it was unknown whether "subjects' location" would be a moderating factor of the research design.

Finally, it should be clarified that there was not any separate statistical analysis conducted to test the differences between the means included in Tables 31-37. This implies that the differences between these means are only tentative. The corresponding discussion, therefore, aims to reveal some ternds by inspecting the resulted means, rather to provide robust statistical results. Besides, the number of observations from which the corresponding results have been drawn (i.e., results included in Tables 31-37) is quite small and, therefore, the corresponding findings should be interpreted with caution.

6.2.6.3.1. Layout Preferences by Gender

Table 31, summarises the scores given to each of the dependent variables by males and females, separately.

LAYOUT	PU (1-7)		EOU (1-7)		ENT (1-7)		TIME (in sec.)		PROMOTION ITEMS (# of items)		PROMOTION BUDGET (in pounds)		IMPULSE ITEMS (# of items)		IMPULSE BUDGET (in pounds)	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
GRID (21 Male 19 Female)	3.83	4.39	5.75	5.71	3.43	3.83	713.76	784.84	0.43	0.05	1.67	0.77	2.14	2.00	5.56	8.49
FREE-FORM (19: Male; 21 Female)	4.59	5.05	5.00	5.17	4.32	4.38	879.00	762.57	0 26	0.00	0.64	0.00	2.47	2.76	7.29	7.96
RACETRACK (26 Male, 14 Female)	3 44	3 82	4 05	4.61	3 11	4.04	933 58	1,041.57	0.73	0.00	2 83	0.00	2.23	1.93	8.14	5.04

Table 31: Layout Preferences by Gender

The scores given to "Perceived Usefulness" and "Ease of Use" for each layout by males and females do not have any noticeable differences if compared with the total scores. However, regarding "Entertainment," it was found that females evaluated the racetrack as the second more entertaining layout instead of the grid. This probably could be explained by the fact that this type of layout is commonly used by conventional department stores where females constitute the majority of the customers. Along the same lines, it was found that females spend the second higher amount of time in the grid layout. This may be due to the fact that it was more difficult for them to locate their shopping list products within the grid than within the free-form layout. Regarding "promotion effectiveness," it was found that males buy more products under promotion and spend more of their shopping budget for buying promoted products than females, especially in the racetrack layout. A possible explanation of this is that females spend more shopping time in the racetrack layout than males trying to locate their shopping list/desired products. On the other hand, males buy more promoted products in the racetrack layout because it is difficult for them to locate their shopping list products in this layout. Finally, regarding the number of impulse products purchased, the results indicate that both males and females follow the general trend, i.e., buying more "impulse products" in the free-form layout. In terms of the budget spent for these products, females were found to spend the highest amount in the grid layout, while males in the racetrack. This finding implies that females locate other, than their shopping list products in the grid layout and, therefore, spend a large amount of their budget to buy them. On the contrary, males probably spend their highest amount for impulse purchases in the racetrack layout, because they find this particular layout very difficult to use and

they do not want to spend much of their time to locate and buy their shopping list products. Therefore, they buy other than their shopping list products, spending, compared to the other two layouts, their highest amount of their budget for "impulse purchases."

6.2.6.3.2. Layout Preferences by Age

It was investigated whether customer age affects the evaluation of the three different layouts. Table 32 summarises the scores given to each of the dependent variables per layout by each age group.

It is evident that for most cases, the results support the ANOVA and Kruskal-Wallis tests discussed previously. The cases where the results are different from the parametric and non-parametric tests are further discussed below:

a) Subjects between 26-30 years old evaluated the grid layout as the one that facilitated their effort to locate and buy their shopping list products (perceived usefulness) the most. However, the difference between the means was quite small. In addition, the sample size was also small and, therefore, these results should be interpreted with caution.

b) Subjects between 31-35 years old evaluated the racetrack layout as the second most useful layout towards locating and buying their shopping list products. However, as ANOVA revealed, there is not any significant difference between the second (grid) and the third (racetrack) layouts regarding perceived usefulness.

c) Subjects between 36-50 years old evaluated the grid layout as the one that facilitated their effort to locate and buy their shopping lists products most. However, in this case the sample size was also quite small and, therefore, these results should be interpreted with caution.

d) Subjects between 36-50 years old evaluated the free-form layout as the easiest to use. However, the difference between the means was quite small, the sample size was small and, therefore, this result should also be interpreted with caution.

e) Subjects between 31-35 years old evaluated the racetrack layout as the second most entertaining layout. However, as ANOVA results revealed, there was not any

significant difference between the second (grid) and the third (racetrack) layouts regarding the perceived entertainment.

Layout	Age Scales									
	18-25	26-30	31-35	36-50	>50	18-25	26-30	31-35	36-50	>50
	Perceived Usefulness (Scale: 1-7)					Ease of Use (Scale: 1-7)				
GRID	3.66	4.77	3.57	4.93	3.72	5.88	5.83	5,05	5,74	6,28
FREE-FORM	5.18	4.55	4.67	4.00	-	4.90	5.35	4,88	5,83	-
RACETRACK	3.63	3.67	4.58	2.33	4.83	4.54	3.96	4,46	3,33	5,50
	Entertainment (Scale: 1-7)					Time (in seconds)				
GRID	3.82	3.34	3.29	4.29	2.58	757.6	803	768.4	705.2	598.6
FREE-FORM	4.42	4.55	4.36	3.17	-	742.6	790.4	961.5	1059.3	-
RACETRACK	3.53	2.89	4.81	2.88	4.25	1051.6	952.8	881	846	646
	Number of promoted items purchased					Budget spent for promoted products (in pounds)				
GRID	0.13	0.38	0.43	0.29	0	0.36	0.90	2.83	2.46	0
FREE-FORM	0	0.27	0.29	0	-	0	0.64	0.74	0	-
RACETRACK	0.05	0.33	1.50	1.50	0	0.13	0.61	6.06	6.84	0
	Number of impulse purchased items					Budget spent for impulse purchases (in pounds)				
GRID	2,47	1,88	1,29	2,57	1.33	7.69	6.34	3.60	10.89	3.75
FREE-FORM	2,53	2,36	3,29	2,67	-	7.57	6.09	8.84	10.98	-
RACETRACK	2,30	2,22	1,75	1,83	1	6.62	9.11	6.13	6.99	1.33
Number of subjects per age group that participated in each layout										
GRID: 18-25= 15; 26-30= 8; 31-35= 7; 36-50= 7; >50= 3										
FREE-FORM: 18-25= 19; 26-30= 11; 31-35= 7; 36-50= 3; >50= 0										
RACETRACK: 18-25= 20; 26-30= 9; 31-35= 4; 36-50= 6; >50= 1										

Table 32: Layout Preferences by Age

f) Subjects between 36-50 years old evaluated the grid as the most entertaining layout. Despite the fact that the difference between grid's and free-form's means was quite large, this finding should be interpreted with caution because of the small sample size.

g) Finally, subjects between 31-35 years old spent more shopping time within the free-form layout. However, as ANOVA revealed, there was not any significant difference between the first (racetrack) and the second (free-form) layouts regarding the amount of time spent for shopping within these layouts.

In general, despite the fact that the sample sizes were small in all the above cases, the findings indicate that there is a noticeable difference between the scores given to "perceived usefulness", "ease of use" and "entertainment" by different age groups in the grid and free-form layouts.

6.2.6.3.3. Relationship between Layout Preferences and Educational Level

Relating subjects' educational level with layout preferences may provide some interesting findings with direct managerial implications (i.e., provision of personalised shopping interfaces). The results of this cross-tabulation analysis are presented in Table 33.

Layout	Educational Level							
	High School	Under-graduate	Graduate	Post-Graduate	High School	Under-graduate	Graduate	Post-Graduate
	Perceived Usefulness (Scale: 1-7)				Ease of Use (Scale: 1-7)			
GRID	4.78	4.17	4.89	3.85	6.00	6.28	5.67	5.65
FREE-FORM	4.33	5.60	4.83	4.71	6.33	5.10	5.11	5.04
RACETRACK	4.56	-	4.13	3.39	5.50	-	4.63	4.07
	Entertainment (Scale: 1-7)				Time (in seconds)			
GRID	3.83	2.83	4.25	3.63	666	923.3	667.5	756.6
FREE-FORM	3,50	4.95	4.67	4.21	970	998.8	606.1	825.5
RACETRACK	4.83	-	4.10	3.20	681.3	-	1044.6	987.1
	Number of promoted items purchased				Budget spent for promoted products (in pounds)			
GRID	0	0.33	0.17	0.30	0	1.13	0.45	1.61
FREE-FORM	2	0	0	0.11	5.16	0	0	0.26
RACETRACK	0	-	0	0.59	0	-	0	2.30
	Number of impulse purchased items				Budget spent for impulse purchases (in pounds)			
GRID	2.33	3.67	1.83	1.96	6.69	10.90	5.50	6.99
FREE-FORM	5	2.20	2.00	2.75	14.71	6.59	5.56	8.02
RACETRACK	1.33	-	3.20	2.03	2.96	-	11.75	6.70
Number of subjects per educational level participated in each layout								
GRID: High School: 3; Undergraduate: 3; Graduate: 6; Post-Graduate: 27								
FREE-FORM: High School: 1; Undergraduate: 5; Graduate: 6; Post-Graduate: 28								
RACETRACK: High School: 3; Undergraduate: 0; Graduate: 5; Post-Graduate: 32								

Table 33: Layout Preferences by Educational Level

The discussion on the results presented in Table 33, should take into consideration the fact that the sample sizes of the "post-graduate" group were larger than the sizes of the

other three groups. Therefore, the fact that this group provided results that did not differ at all from the corresponding ANOVA and Kruskal-Wallis test results enhances the quality of the study's results.

Nevertheless, the "high school" group provided very different results, but due to the small sample size of each of the groups participated in each layout, these results should not be taken under serious consideration. The same (i.e., small sample size) also holds for the "graduate" group, which also provided some different results for the "perceived usefulness" and "time" variables.

Finally, it was shown that highly-educated customers (i.e., graduates and post-graduates) scored higher on "promotion and impulse purchases," when compared to less educated customers. This finding could be probably explained by the fact that these customers felt more relaxed and free to buy whatever they liked from this online store; not necessarily their shopping list products.

6.2.6.3.4. Relationship Between Layout Preferences and Occupation

Table 34 includes the layout preferences and occupation relationships provided by the cross-tabulation analysis. There were some small differences between ANOVA and cross-tabulation results regarding the scores given to "perceived usefulness" and "ease of use" variables. More specifically, academics participated in the grid and free-form layouts gave approximately the same score to "perceived usefulness," while employees evaluated the racetrack layout as the most useful in searching for and buying shopping list products. Employees, also evaluated the racetrack layout as the second most easiest to use. Furthermore, researchers and business executives gave almost the same scores to the grid and free-form layouts, as far as "ease of use" is concerned. However, both these groups evaluated the free-form as slightly easier to use.

As far as the "entertainment" variable is concerned, academics evaluated the grid layout as the least entertaining one. However, based on the ANOVA results, which indicated that there was no significant difference between the grid and the racetrack layouts, this finding should not be considered an important one. Along the same lines, employees and business executives considered the racetrack as the second most entertaining layout, although this finding is not considered important either.

Layout	Occupation									
	Academics	Employees	Researchers	M.Sc. Students	Business Executives	Academics	Employees	Researchers	M.Sc. Students	Business Executives
	Perceived Usefulness (Scale: 1-7)					Ease of Use (Scale: 1-7)				
GRID	3.57	4.65	4.13	3.62	4.90	5.30	5.90	5.56	5.88	5.80
FREE-FORM	3.54	4.67	4.87	5.03	5.39	4.21	4.92	5.68	4.87	5.94
RACETRACK	2.71	5.33	3.63	3.52	3.50	3.74	5.63	4.00	4.26	3.75
	Entertainment (Scale: 1-7)					Time (in seconds)				
GRID	2.95	3.94	3.64	3.54	3.95	707.2	734.8	728.4	789.3	738.8
FREE-FORM	4.19	5.44	4.28	4.21	4.25	853.2	638	960.5	750.3	963
RACETRACK	3.29	4.88	3.45	3.15	4.13	723.1	811	1280	1012.8	933
	Number of promoted items purchased					Budget spent for promoted products (in pounds)				
GRID	0.60	0.13	0.44	0.15	0	3.96	0.34	2.42	0.42	0
FREE-FORM	0.25	0	0.20	0	0.67	0.67	0	0.44	0	1.72
RACETRACK	1.29	0	0.40	0.36	0	7.82	0	0.91	0.64	0
	Number of impulse purchased items					Budget spent for impulse purchases (in pounds)				
GRID	2.00	1.75	2.00	2.85	0.80	5.78	5..34	7.94	9.75	1.66
FREE-FORM	3.00	2.75	2.70	2.42	3.00	10.28	8..53	8.36	6.46	7.99
RACETRACK	0.86	2.00	2.00	2.50	3.00	6.44	6..96	5.49	7.59	7.45
Number of subjects per occupation group participated in each layout										
GRID: Academics: 5	Employees: 8		Researchers: 9		M.Sc. students: 13		Business Executives: 5			
FREE-FORM: Academics: 4	Employees: 4		Researchers: 10		M.Sc. students: 19		Business Executives: 3			
RACETRACK: Academics: 7	Employees: 4		Researchers: 5		M.Sc. students: 22		Business Executives: 2			

Table 34: Layout Preferences by Occupation

Furthermore, regarding the time spent for shopping, only researchers' scores did not differ from those provided by the ANOVA tests. Finally, regarding "promotion effectiveness" and "impulse purchases" there were no noteworthy results from the present analysis.

6.2.6.3.5. Relationship Between Layout Preferences and Internet Shopping Activity

Subjects were segmented into four groups based on what they had purchased through the Internet in the past (i.e., both intangible and tangible goods, only intangible, only tangible, nothing). Based on this segmentation, Table 35 provides the corresponding evaluations for the three layouts per dependent variable.

Types of products purchased through the Internet	PU (1-7)			EOU (1-7)			ENT (1-7)			TIME (in sec.)			PROMOTION ITEMS (# of items)			PROMOTION BUDGET (in pounds)			IMPULSE ITEMS (# of items)			IMPULSE BUDGET (in pounds)		
	G	FF	R	G	FF	R	G	FF	R	G	FF	R	G	FF	R	G	FF	R	G	FF	R	G	FF	R
Both Intangible and Tangible (Grid = 19; Free-form=24; Racetrack= 20; TOTAL= 63)	4.03	4.67	3.19	5.74	5.01	3.90	3.57	4.07	3.45	768	837	992	0.32	0.08	0.75	1.39	0.18	2.67	1.68	2.92	1.95	6.25	8.18	6.79
Only Intangible (Grid = 2; Free-form=8; Racetrack= 6; TOTAL= 16)	3.50	4.90	4.28	5.75	5.17	4.58	4.50	5.06	2.79	463	771	1027	0.00	0.25	0.00	0.00	0.65	0.00	1.50	2.38	3.00	4.09	7.36	9.73
Only Tangible (Grid = 9; Free-form=2; Racetrack= 8; TOTAL= 19)	4.39	4.58	3.56	5.81	4.50	4.27	3.86	4.63	3.53	757	560	958	0.11	0.50	0.38	0.38	1.35	2.35	3.00	3.00	2.13	7.27	8.63	6.98
Nothing (Grid = 10; Free-form=6; Racetrack= 6; TOTAL= 22)	4.07	5.44	4.14	5.63	5.50	5.03	3.33	4.42	3.88	757	891	865	0.30	0.00	0.17	1.98	0.00	0.21	2.10	1.67	1.83	8.57	5.52	5.34

Table 35: Layout Effects and Internet Shopping Activity Relationship

It should be noted, however, that the sample size of the resulting segments was small and, therefore, interpretation of the results must be done with caution. Nevertheless, it is clear that the separate evaluations provided by each of these four groups follow the general trend revealed through the ANOVA and Kruskal-Wallis analysis discussed above. The only noteworthy exception was that the customers, who had never used the Internet to buy something, spent the highest amount of their shopping time in the free-form (not in the racetrack layout). In general, the results in Table 35, strengthen the ANOVA and the Kruskal-Wallis results discussed above, indicating that the evaluation of the three layouts for each of the dependent variables was not considerably affected by the type of products that customers had purchased through the Internet in the past.

Combining these findings with the corresponding initial research insights (Chapter 4), one can note that in this case, current and future Internet shoppers do not evaluate Internet retail shopping interfaces in a different way. This finding implies that the need to offer personalised shopping layouts to customers depending on their past shopping experience over the Web, cannot be documented.

6.2.7. Other Findings: Virtual Retail Store Selection Criteria/Attributes Evaluation

Table 36 includes all the attributes used in question A.3. (i.e., virtual retail store selection criteria) of the questionnaire and their corresponding evaluations (i.e., means) provided by the subjects.

No.	Attributes	Average Score (Scale: 1-5)	Standard Deviation
1.	Prices of the merchandise	4.26	0.88
2.	Quality of the merchandise	4.47	0.65
3.	Variety/Assortment of the merchandise	4.07	0.84
4.	Store Atmosphere (i.e., product display techniques, store décor, background music, store layout, etc.)	3.26	1.03
5.	Customer Service and Support (i.e., personalised support during shopping, delivery/pick up service, alternative payment methods, etc.)	4.29	0.84
6.	Quality of Advertising	2.72	1.03
7.	Sales and Specials (i.e., in-store promotions, etc.)	3.58	0.99
8.	After Sales Support (i.e., information about new products and special offers through e-mail, etc.)	3.12	1.16
9.	Store Reputation	3.87	0.95
10.	Quick access to the store's Web site/Web site's speed	4.33	0.79
11.	Availability of the displayed merchandise (i.e., minimal stock-outs)	4.08	0.82
12.	Security in transactions	4.80	0.63

Table 36: Virtual Retail Store Selection Attributes' Evaluation

"Security in transactions" was the most important criterion (i.e., mean= 4.80/5.0) that customers use when selecting a virtual retail store on the Internet. The same result, was also found by the initial Internet retailing consumer survey (Chapter 4). In addition, the corresponding standard deviation is comparatively low (i.e., standard deviation = 0.63). The second most important criterion was found to be the "quality of the merchandise," while the "quick access to the store's Web site/Web site's speed" was the third most important one. "Prices of the merchandise" and "customer service and support" followed, while the least important attribute was found to be "quality of advertising."

An investigation of whether current and future Internet shoppers place (or not) the same importance to the attributes discussed above (Table 37), revealed the following:

No.	Attributes	Types of Products Purchased through the Internet			
		Both Intangible and Tangible (subject number = 63)	**Only Intangible** (subject number = 16)	**Only Tangible** (subject number = 19)	**Nothing** (subject number = 22)
1.	Prices of the merchandise	4.35	4.38	3.84	4.27
2.	Quality of the merchandise	4.57	4.50	4.37	4.23
3.	Variety/Assortment of the merchandise	4.05	4.13	3.89	4.23
4.	Store Atmosphere (i.e., product display techniques, store décor, background music, store layout, etc.)	3.19	3.56	3.11	3.36
5.	Customer Service and Support (i.e., personalised support during shopping, delivery/pick up service, alternative payment methods, etc.)	4.22	4.31	4.26	4.50
6.	Quality of Advertising	2.79	2.88	2.21	2.82
7.	Sales and Specials (i.e., in-store promotions, etc.)	3.49	3.63	3.11	4.23
8.	After Sales Support (i.e., information about new products and special offers through e-mail, etc.)	3.02	3.56	2.37	3.73
9.	Store Reputation	3.94	4.13	3.42	3.86
10.	Quick access to the store's Web site/Web site's speed	4.35	4.56	4.16	4.23
11.	Availability of the displayed merchandise (i.e., minimal stock-outs)	4.08	4.31	3.74	4.18
12.	Security in transactions	4.81	5.00	4.53	4.86

Table 37: Virtual Retail Store Selection Attributes' Evaluation per Internet Shopping Activity

"Security in transactions" was found to be the most important store selection criterion for all the groups under study. For those customers that had purchased both intangible and tangible products, as well as for those that had purchased only tangible products from the Internet, "quality of the merchandise" was found to be the second most important criterion. However, for the customers who had purchased only intangible products from the Internet, "quick access to the store's Web site/Web site's speed" was found to be the second most important criterion. This can be easily explained by the fact that "speed" is crucial for those customers that want to, for example, download intangible products like software, music, etc. In addition, as there is usually is no problem regarding the quality of intangible products (e.g., tickets, music, software, etc.), the "quality of the merchandise" was the third (instead of the second) most important criterion. As far as customers that had never used the Internet to buy something,

"customer service and support" was found to be the second most important store selection criterion. This is probably due to the lack of experience of these customers with buying through the Internet. Finally, it should be noted that "quality of advertising" was found to be the least important store selection criterion for all the groups. These findings, can be directly exploited by virtual retailers in designing and providing effective and tailor-made (to specific customer needs and wants) marketing programmes.

6.2.8. Qualitative Data Analysis

Despite the fact that the present study is undoubtedly characterised as a "quantitative" one, a qualitative research approach in the form of personal interviews was also employed as a supportive, research instrument. At the end of each experiment, subjects were requested to participate in a personal interview and provide answers to a short series of questions that were tape-recorded. First, they were asked to evaluate in general the layout of the store they had just visited. Then, they were asked to indicate what they liked most and what they disliked most in the particular layout. Finally, with the open-ended question: "Would you like to add anything else about the store's layout?", they were free to add anything they might have in their minds regarding the layout of the store they just visited (i.e., ideas for improvement, past experiences, etc.).

6.2.8.1. Data Assembly

The first phase of a qualitative research approach refers to the data assembly (Malhotra and Birks 2000). This phase included data gathering from subjects' answers to the specific set of questions during a personal interview at the end of each experiment. According to Malhotra and Birks (2000, p.195), "memory alone is fallible, unreliable and potentially biased."

6.2.8.2. Data Reduction

After data assembly, the reduction phase follows. During this phase, data were coded, in a structured and organised manner, so that they could be easily interpreted. Data were broken down into discrete chunks and a reference was attached to each of them. Through that reference, the data chunks could be arranged and rearranged in search of meaningful patterns and relationships.

Refer-rences	a. Grid	b. Free-form	c. Racetrack
1	It was very easy for me to learn how to use this layout	The information-rich interface helped me find my shopping list products quite easily. However, sometimes I was tired and confused by the information overflow.	I was totally confused by the layout.
2	I want to be able to reach the end-product directly without having to pass through so many levels	I was confused by the "dynamically" changing and multi-level layout. However, this dynamic character was something innovative that I have never seen before	It took me much time to learn how to use this layout.
3	I would prefer to be able to see all the aisles and all their corresponding product categories on the left frame (i.e , as it is) at the home page without having to scroll down.	I do not like seeing end- products at the home page. Instead, I would prefer to be able seeing all product categories only on the left frame at the home page without having to scroll down.	I would like to see all the main product categories and sub-categories at the home page's left frame.
4	I would like to be provided with a search engine.	I liked the search engine as it facilitated finding my shopping list products, but I would also prefer to be provided with a "free-text" search capability.	I would like to be provided with a search engine.
5	I liked the idea of the left-frame product catalogue Also, I liked the idea of the dynamically changing promotional banner displayed at the bottom of the interface Finally, the shopping buttons placed under each product, really helped me.	I liked the idea of the left-frame product catalogue. Also, I liked the idea of the dynamically changing promotional banner displayed at the bottom of the interface. Finally, the shopping buttons placed under each product, really helped me.	I liked the idea of the left-frame product catalogue but it would be more effective if all product categories were included at the home page. Also, I liked the idea of the dynamically changing promotional banner displayed at the bottom of the interface. Finally, the shopping buttons placed under each product, really helped me
6	I want to be able to reach any place or product I want within the store at once, without having to spend time and effort going "back and forward"	I want to able to reach any place or product I want within the store at once, without having to spend time and effort going "back and forward "	I want to able to reach any place or product I want within the store at once, without having to spend time and effort going "back and forward."
7	I liked the shopping-basket management mechanism	I liked the shopping-basket management mechanism	I liked the shopping-basket management mechanism.
8	The aisle-structure idea makes the navigation very easy, as it is in a conventional grocery store It is a good idea.	I liked the display structure located at the upper left frame but I was confused by the right frame and some other frames located at the centre of the bottom of the page and at the bottom of the left frame	I believe that this layout concept should be used only in conventional *retailing and not* on the Web.
9	I would like to be provided with a store map at the home page	The fact that so many end-products are displayed almost in all pages made me buy some products that I have not planned to buy before entering the store.	It was very difficult for me to search and find my shopping list products within the store.
10	I would like to be able to see only the main product categories on the home page left frame and be able seeing what each category includes by clicking on each, one at a time	I would like to be provided with a store map at the home page.	At the beginning I thought that the store has only two corridors. It took me a few minutes to realize that other corridors also exist.
11	I would like to be able to see my shopping basket's running total on every page of the store	I would like to be able to see only the main product categories on the home page left frame and what each category includes by clicking on each, one at a time	I would like to be provided with a store map at the home page.
12		I would like to be able to see my shopping basket's running total on every page of the store	I would like seeing only the main product categories on the home page left frame and what each category includes by clicking on each, one at a time.
13		When going back, I would like to reach exactly the page where I was before.	I would like to be able to see my shopping basket's running total on every page of the store.
14		The dynamically changing product catalogues' content surprised me many times	I would like to be provided with a "home page" button.
15			When going back, I would like to reach exactly the page where I was before.

Table 38: Data Reduction Phase Results

Table 38 presents the data reduction phase results. The phrases included in this Table, are those expressed by the majority of the subjects (i.e., they were recorded more than once) and are related with each of the store layouts under study. Therefore, any

comments referring to other issues except the layout (i.e., product variety, prices, colours, etc.), are not included in this Table.

6.2.8.3. Data Display

The data display phase involves summarising and presenting the structure that was observed in the collected data by making connections between the different "data chunks," (Table 38).

The grid and the free-form layouts were evaluated as the most effective and supportive layouts. However, they both encountered some disadvantages. On the other hand, the racetrack layout was found to confuse almost all subjects during their shopping trip, as less effective and supportive. More specifically, the grid was in general found to be the easiest layout to use (a1, a5, a8). However, there were some basic layout issues that should be taken into consideration when attempting layout improvement (a2, a3, a4, a6, a9, a10). On the other hand, the free-form layout was found to be the most effective in supporting customers in their search for the products that they planned to buy before entering the store (b1, b4, b5, b8) and the most entertaining one (b2 , b14). Similarly, entertainment was basically interpreted by the phrases: "innovative," "I have never seen before," "it surprised me". In the case of the free-form layout, there were some basic issues that should be taken under consideration for the layout's improvement (b1, b2, b3, b4, b6, b10, b11, b13). Finally, it should be noted that customers visiting the free-form layout, were influenced to buy some products that they did not plan to buy before entering the store, because of the great number of end-products displayed almost in all pages of this particular layout (b9). As far as the racetrack layout is concerned, it was found to confuse almost all subjects during their shopping activity (c1, c2, c8, c9, c10), while there was a quite large number of comments referring to the improvements that should be done in this particular layout (c3, c4, c5, c6, c11, c12, c14, c15).

Based on all the above, it is clear that customers prefer a grid--free-form "mixed type" of layout, incorporating, however, both grid's and free-form's comments for improvement. Thus, an improved layout should keep grid's hierarchical structure, incorporating, however, the following critical success factors:

- Provide a "flexible" search mechanism (i.e., both keyword and free-text searching).

- Enable customers to reach any place in the store they want, at once (i.e., one click).

- Display all main product categories (i.e., not sub-categories or end-products) at the home page's left frame.

- Avoid scrolling up and down (wherever it is applicable).

- Reduce the levels from the home to the end-page.

- Provide a linked store map at the home page.

- Enable customers browsing the sub-categories and end-products by clicking on the corresponding main product categories that are located at the home page left-frame.

- Reduce the information provided to customers. Information should be provided to customers whenever they need it.

- Keep the same structure for the left frame. This means that the order, display technique, contents, etc., should be continuously displayed in the same format in order to avoid confusing customers.

- Provide "dynamic" mechanisms not as the main characteristic of the store layout, but as a special case (e.g., personalised shopping recommendations, etc).

Furthermore, there are also some other special issues/proposals that should be taken into consideration (a7, a11, b7, b12, c7, c13):

- Provide a flexible and intelligent shopping-basket mechanism. Customers should be enabled to select and unselect products at once, increase or decrease quantities, be informed whether a specific product(s) is (are) on discount, etc.; all these without having to go back again to the place from which they had picked the corresponding product(s).

- Continuously inform customers about their shopping basket's running total. This could be effectively implemented by displaying it on a specific place/section on the shopping interface.

6.2.8.4. Data Verification

The data verification phase involves seeking alternative explanations of the interpretations of qualitative data, through other data sources. Therefore, this section includes the direct comparison between the qualitative and the quantitative research findings in order to enhance the quality and reliability of the results.

The qualitative analysis findings undoubtedly explain and support their corresponding quantitative ones. More specifically:

- The grid was found to be the easiest layout to use, based on both ANOVA and qualitative analysis results.

- The free-form was perceived as the most useful layout towards searching for and buying shopping list products (supported by both ANOVA and qualitative analysis).

- The free-form was found (ANOVA and qualitative analysis) to be the most entertaining layout.

- The ANOVA results indicated that racetrack was the layout in which customers spend the highest amount of time compared to the other two layouts. However, it should be noted that according to ANOVA Post-hoc comparisons, it was found that there was no significant difference between the first (racetrack) and the second (free-form) regarding the amount of time spent for shopping. Nevertheless, the fact that the racetrack's mean time spent for shopping was the highest, is also supported/explained by qualitative analysis results. More specifically, subjects reported that they were totally confused when navigating within the racetrack layout and it took them a reasonable amount of time to realise how to use this layout. Furthermore, they reported that it was very difficult for them to search for and buy their shopping list products in this

particular layout. All the above indicate that subjects spent the highest amount of time in the racetrack layout because of the inconvenience they faced within it.

6.2.9. Prediction of Findings based on Corresponding Usability Research Insights

According to O'Keefe et al. (2000, p.613), "..the emergence of the consumer interface is producing review and re-evaluation of previous work in HCI."

After the analysis of the results, this section focuses on relating the present study's findings to HCI by investigating whether some of the present study's findings, could have been predicted based on specific usability and human factors literature research insights discussed in Chapter 2.

6.2.9.1. "Ease of Use" Vs. "Perceived Usefulness" towards Customer Satisfaction and Effectiveness

Nielsen (1999b), Kerne (1998) and Alben (1996), proved that the key usability issues of "customer satisfaction" and "effectiveness" can be achieved by improving the ease towards reaching information relevant to customer desires. In the present study it was proved that reaching the desired information (i.e., "end-products") easily contributes to satisfaction of customers and to the effectiveness of a Web site.

However, it should be reminded that while the free-form was perceived as the "most useful layout towards locating shopping list products," the grid was found to be the "easiest" layout "to use." Combining this specific finding with the aforementioned usability insight, it is concluded that "ease of reaching information relevant to customer desires" does not necessarily imply "ease of using" the store. Therefore, "customer satisfaction" and "effectiveness" are enhanced in cases where "ease of using the store" and "usefulness in reaching the desired information/products" dimensions are provided to customers.

6.2.9.2. Use of Hyperlinks towards Customer Support

Lohse and Spiller (1998) supported that increasing the use of hyperlinks within an Internet retail store over the Web is the primary area of opportunity towards effectively

supporting customers. Based on the quantitative and qualitative analysis findings of the present study, it was found that the "fully hyper-linked" environment implemented in the free-form layout, supported customers during their effort to locate their shopping list products. In other words, the capability to access any place within the store at once (provided only by the free-form layout) was found to be a major contributing factor to the effective customer support. Therefore, Lohse and Spiller (1998) usability insight adequately predicts the corresponding finding provided through the present study.

6.2.9.3. "High-Tech" Vs. "Easy to Use" Web Sites towards Meeting Customers' Expectations

Jarvenpaa and Todd (1997) stated that the fact that consumers are looking for better-designed sites does not necessarily mean that they expect state-of-the-art technology but, rather, they seem to be looking for thorough and "easy to use" sites that support the way they shop. This finding also predicts the present research findings in the sense that the dynamically product assortment technique implemented within the free-form and racetrack layouts (both constituting more "high-tech" software applications) proved to confuse and dissatisfy customers. On the contrary, the simple hierarchical structure implemented in the grid layout was found to satisfy customers in terms of "ease of use."

6.2.9.4. Virtual Store Atmosphere and Shopping Interface Effectiveness

Eroglu et al. (2000) and Eroglu et al. (2001) proved that virtual store atmosphere is crucial for the effectiveness of online shopping interfaces as it influences consumer buying behaviour. More specifically, they stated that the layout constitutes one of the major consumer behaviour influencing factors that virtual retailers should take into consideration when designing the shopping interface towards creating an effective "atmosphere" in their online stores. Therefore, the findings of the present study confirm the aforementioned research insight, i.e., that the layout should be considered as a "critical virtual store atmosphere determinant" since it was proved to affect consumer buying behaviour.

6.2.9.5. Number of Levels Between the Home and End–Page Effects on Sales

Lohse and Spiller (1999) proved that the number of levels between the home and end-product pages has no significant effect on sales. In the case of the present study, the number of levels between home and end-pages was implemented differently in the three

layouts under study. Therefore, it was feasible to measure level-effects on sales and compare this finding with the corresponding usability finding provided by Lohse and Spiller (1998). However, as the case of the present study refers to a laboratory instead of a field experiment, such a comparison refers only to the "sales of promotional items" and "impulse purchases" that were investigated by the present study and not to sales volume in general. Kruskal-Wallis test results proved that the number of levels between the home and end-product pages, implemented differently within each layout, has no significant effect on promotional sales and impulse purchases.

6.2.9.6. Usability Guidelines for Effective Web Site Design

According to Serco Usability Services (1999) guidelines for effective Web site design, HCI professionals should consider, among others, the following issues when designing virtual stores over the Web: (a) ensure that descriptive terms or pictures are used, (b) allow users to find and use search facilities, and (c) allow users to see what items are inside their shopping basket. The present study confirmed the important and critical role that each of the aforementioned usability guidelines can play in the shopping interface design.

6.2.9.7. The Role of "Content" towards Increasing the Ultimate Value on the Web

Nielsen (1999a) states that the content is "king" on the Web and the only way to increase the ultimate value is to enhance the quality of the content. This statement, clearly raises the "crucial role" that content can play over the Web. The findings of the present study also revealed that the content provided through the shopping interface constitutes a "critical success factor" for business effectiveness over the Net, confirming, therefore, Nielsen's (1999a) research insight. More specifically, the qualitative analysis results revealed that customers pay great emphasis on the quality and quantity of the content provided to them during their shopping activity within a Web retail interface.

6.2.9.8. Web Sites' Complexity Effects on Consumer Attitudes towards the Store

Stevenson et al. (2000) and Bruner II and Kumar (2000), predicted one of the present research findings, as far as the Web sites' complexity negative effects on consumer attitudes towards the store are concerned. In the case of the present study, this refers to the "complex" racetrack and free-form layouts, which were found to confuse and dissatisfy customers. However, Bruner II and Kumar (2000) also found that Web sites'

complexity lead to the pages being perceived as more interesting. This research insight also predicts the present study's finding in the sense that the "complex" free-form layout was evaluated as the most entertaining and interesting one.

Furthermore, it should be noted that since the subjects in the present study's experiments were experienced Internet users, they evaluated the three layouts based not only on their preferences but also on their previous experience. For example, the majority of the subjects reported that they would like the idea of a product catalogue placed on a left frame on the interface. This may be explained by the fact that most well-known grocery stores over the Web use such kind of service (e.g., Sainsbury's, Walmart, etc.). Besides, the "left frame" concept is also dictated by HCI.

Based on the previous analysis, it is evident that many of the usability literature research insights discussed in Chapter 2, predicted the findings of the present research. Besides, a quite big number of HCI researchers have stated that business-to-consumer interface constitutes a critical success factor for business effectiveness over the Net, which is also proved by the present study.

6.3. Summary

The analysis of the results discussed in this Chapter revealed that the layout of an Internet retail store significantly affects the perceived usefulness towards searching for and buying the shopping list products, the ease of using the store, the perceived entertainment during shopping activity, and the time spent for shopping. The free-form was found to be perceived as the most useful and entertaining layout, while the grid was found to be the easiest one to use. The racetrack layout was found to be the one in which customers spend the highest amount of their time for shopping. However, the layout does not seem to significantly affect the promotion effectiveness and impulse purchases. On the other hand, through the factor analysis and the corresponding regression analysis, it was found that an increase in the importance that customers assign to the "effective shopping" attribute (i.e., quick access of the Web site and availability of the displayed merchandise) is expected to decrease the perceived entertainment offered to them when visiting the grid layout. An increase in the importance assigned by customers to the "care" given to them when visiting a free-form layout is expected to increase their perceived usefulness towards finding their shopping list products. Furthermore, it was

also found that the use of the Internet for Electronic Commerce purposes is expected to decrease the perceived usefulness, while an increase in the use of the Internet for hobby purposes is expected to increase the perceived usefulness for those customers visiting the free-form layout. Then, the interpretation of the qualitative analysis findings sufficiently supported and explained the corresponding quantitative results. The Chapter ends with relating some of the present research findings to the corresponding usability research insights for effective Web site design, investigating whether some of them could have been predicted based on the HCI literature.

CHAPTER 7. CONCLUSIONS AND RECOMMENDATIONS

The first part of this Chapter presents the achievements and contribution of the present research to Internet retailing theory. Next, several managerial implications are presented and discussed. The limitations in various phases of the research undertaken are then identified. They should be accounted for carefully when interpreting results. Finally, this last Chapter concludes with the identification and discussion of future research directions, in this challenging and fast-evolving research area.

7.1. Contribution to Internet Retailing Theory

An initial and generic contribution of the present research to Internet retailing theory is that it proved that *the layout of an Internet retail store over the Web, affects consumer buying behaviour.* Investigating the layout effects on consumer buying behaviour within a Web-shopping interface, the present research revealed that researchers and virtual retailers should place particular emphasis on this important issue. Based on the research insights provided by the present study, virtual retailers can be supported by the corresponding to conventional retailing Internet retailing store layout theory towards designing effective shopping interfaces.

7.1.1. Conventional Vs. Internet Retailing Store Layout Findings

For the six dimensions corresponding to the major variables examined in the dissertation, Table 39 provides a comparison of research findings under conventional and Internet retailing. Based on this comparison, the following conclusions and theoretical guidelines are provided:

- ***Perceived Usefulness:*** The free-form, compared to the grid and racetrack layouts, was perceived as the most useful layout as it facilitates customers' shopping activity towards searching for, locating and buying their shopping list products within a grocery store over the Web. In contrast to conventional retailing, the free-form layout proved to be the most effective one in facilitating routine and planned shopping behaviour within a virtual grocery store over the Web. Adoption of the

free-form layout by virtual retailers could, therefore, be proposed when the basic objective is to facilitate customers' planned shopping behaviour.

VARIABLES	CONVENTIONAL RETAILING	INTERNET RETAILING
PERCEIVED USEFULNESS	Grid	***Free-Form***
EASE OF USE	Free-Form	***Grid***
ENTERTAINMENT	Racetrack	***Free-Form***
TIME	Free-Form	***Racetrack–Free-form***
PROMOTION EFFECTIVENESS	Racetrack	***Not Affected by Store Layout***
IMPULSE PURCHASES	Racetrack	***Not Affected by Store Layout***

Table 39: Conventional Retail Store Layout Theory vs. Internet Retailing Store Layout Findings

- ***Ease of Use:*** The grid, compared to the free-form and racetrack layouts, was perceived as the easiest to use layout by customers visiting a grocery store over the Web. In contrast to conventional retailing, the interaction with the grid layout proved to be the clearest, most flexible, understandable and easiest to operate. Grid's adoption by virtual retailers could, therefore, be proposed when the basic business is to offer an easy to use shopping interface.

- ***Entertainment:*** The free-form, compared to the grid and the racetrack layouts, was perceived as the most entertaining layout by customers visiting a grocery store over the Web. In contrast to conventional retailing, the free-form layout proved to entertain customers during their shopping activity significantly more compared to the other two layouts. Free-form's adoption by virtual retailers could, therefore, be proposed when the basic objective is to offer an entertaining shopping experience to customers.

- ***Time:*** As it stands for conventional retailing, also in the case of Internet retailing, the store layout proved to affect the amount of time customers spend for shopping. However, it was proved by the present study that there is not any significant difference between the racetrack and the free-form layouts which were found to be the first and the second one, respectively, in terms of the amount of time customers spend for shopping. However, the racetrack adoption by virtual retailers is strongly

discouraged, as it was found to be the least effective one in terms of "perceived usefulness", "ease of use" and "entertainment" it offers to customers during their shopping activity.

- ***Promotion Effectiveness:*** In contrast to conventional retailing, it was concluded that the layout of a grocery store over the Web does not affect promotional sales.

- ***Impulse Purchases:*** In contrast to conventional retailing, it was concluded that the layout of a grocery store over the Web does not affect impulse purchases.

Based on this comparison, it becomes apparent that conventional retailing store layout theory is not applicable on its present form within the context of Internet retailing and, therefore, a relevant adaptation is required. Therefore, the second research question of the dissertation referring to *whether the conventional retailing store layout theory should be applied on its present form in the context of Internet retailing or not* , is adequately answered.

Furthermore, Figure 49 presents all the differences (significant or not) among the layouts, regarding customers' evaluations for the major research variables of the dissertation. These differences, are represented by the distances between the layout boxes. More specifically, in case there is not any significant difference among the layouts, an "overlap" among the corresponding layout boxes appears. On the contrary (i.e., in case a significant difference lies among the layouts), a clear distance (i.e., no overlap) among the corresponding layout boxes exists. For example, there is not any significant difference among the grid and the racetrack layout regarding "perceived usefulness", while there is a significant difference among the grid and the free-form layout regarding the same variable. Moreover, the less the distance is among the layout and the variable box, the higher the evaluation (in "seconds" in the case of the "time" variable) that customers provided for this specific layout was. For example, the free-form was perceived as the most useful layout, while the racetrack as the least useful. More specifically:

- ***Perceived Usefulness:*** The free-form, compared to the grid and the racetrack layouts, is perceived as the most useful layout towards searching for and buying shopping list products. The difference between the free-form and the other two layouts is significant. On the other hand, the grid was perceived as more useful than the racetrack layout, but not any significant difference lies between them.

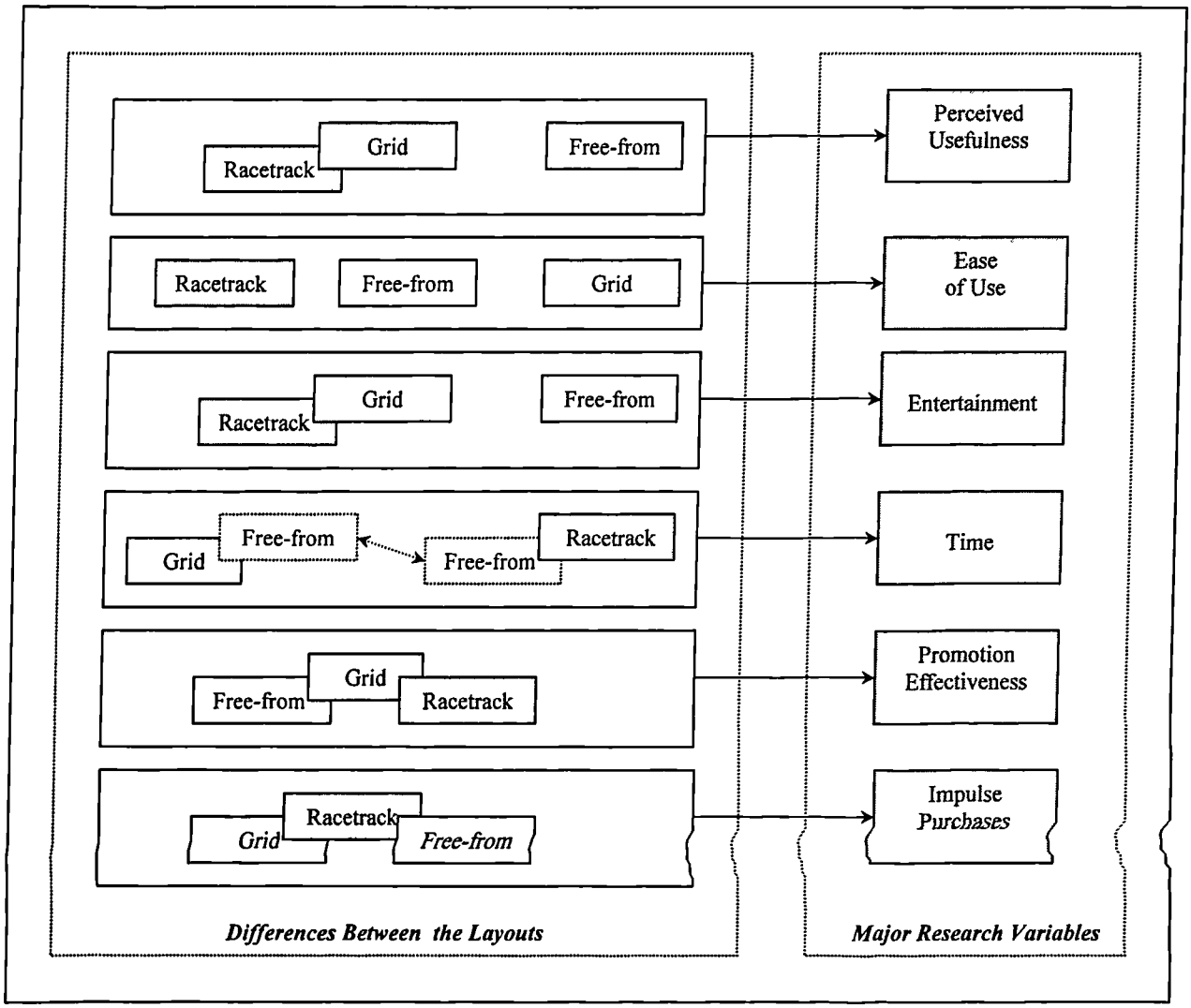


Figure 49: Significant Differences Between the Layouts per Major Research Variable

- ***Ease of Use:*** This is the only case where there are significant differences between all the layouts. The grid is, therefore, the easiest to use layout, while the racetrack is the most difficult one to use.

- ***Entertainment:*** The free-form layout, compared to the grid and the racetrack layouts, is perceived as the most entertaining layout. The difference among the free-form and the other two layouts is significant. On the other hand, the grid was perceived as more entertaining than the racetrack layout, but not any significant difference lies between them.

- ***Time:*** The only significant difference regarding the time spent for shopping lies between the racetrack and the grid layout. Customers spend the highest amount of time in the racetrack layout, while they spend the least shopping time in the grid layout.

- ***Promotion Effectiveness:*** Not any significant difference was observed between the layouts.

- ***Impulse Purchases:*** Not any significant difference was observed between the layouts.

Combining the aforementioned results, the following conclusions and directions are provided:

- Despite the fact that both the grid and the racetrack layouts were found to be the least effective regarding "perceived usefulness," the grid was perceived as the easiest to use while the racetrack as the least easy to use layout. This means, that the grid layout improvement regarding the "perceived usefulness" dimension constitutes a challenging research opportunity.

- Along the same lines, the free-form which was found to be the most effective layout in terms of "perceived usefulness" and "perceived entertainment", should be improved in terms of the "easy to use" dimension in order to be effective. In addition, the free-form layout seems to encourage impulse purchases.

Inspecting the findings presented in Table 39 and Figure 49, questioning is generated regarding which of these layouts is the most effective one for Internet retailing. Apparently, the racetrack layout should be kept out from this kind of comparison. On the other hand, it is obvious that none of the grid and free-form layouts are recommended to be adopted by virtual retailers on their present form, without the appropriate adjustments and modifications. Therefore, further discussion focuses on combining the grid with the free-form layout towards producing an improved layout pattern for Internet retailing.

7.1.2. Introduction of the "Freegrid" Layout for Internet Retailing

It is concluded, that customers visiting an online grocery store over the Web prefer a hierarchical/tree structure. This particular structure is provided only by the grid layout, which, besides, was perceived as the easiest to use layout and the one in which customers spend the least shopping time due to the fact that they learn how to operate it

easily. However, it is not a very supportive layout in facilitating customers to locate their shopping list products. In addition, it seems that it does not entertain customers during their shopping activity. On the other hand, customers want to be able to reach any place in the store at once, either from the home page or from any other place in the store. This capability is provided only by the free-form layout, which, besides, was perceived as the most useful one towards locating shopping list products. However, it is concluded that the dynamically changing product assortment technique implemented within the three-level free-form layout, confuses and dissatisfies customers. Furthermore, the free-form was perceived as the most entertaining layout. "Entertainment" is directly associated with the dynamically changing shopping interface implemented within an information-rich environment. Finally, customers reported that the capability to locate various end-products at once in the free-form layout (i.e., through the use of search engines), along with the fact that many end-products are displayed in almost all pages of this particular layout, makes them buy some products that they did not plan to buy before entering the store.

No.	GRID		FREE-FORM	
	Advantages	***Disadvantages***	**Advantages**	**Disadvantages**
1	Easy to learn how to use its hierarchical/tree structure	Difficult to search, locate and buy shopping list products due to the lack of "search engines" and to the great number of levels that customers should navigate through to reach an end-product	Easy to search, locate and buy shopping list products due to the provision of the "search engine" and the continuous and linked displaying of end-products in all pages	Difficult to learn how to use it due to the "information overload" and the "complex" shopping interface structure
2	Left-framed product catalogue	Does not include entertaining features	Includes entertaining features (i.e., dynamically changing interface elements)	Dynamic changing product assortment implemented within a three-level structure
3	Only the main product categories are placed on the left frame	Many "scroll-ups and downs" needed for browsing	Encourages "impulse purchases"	Many "scroll-ups and downs" needed for browsing
4	Constant product assortment during the whole navigation			Sometimes, customers have to navigate through many levels (i.e., back and forward) to reach an end-product

Table 40: Grid's and Free-form's Advantages and Disadvantages Comparison

Table 40 summarises the basic grid's and free-form's advantages and disadvantages derived through the analysis of the research findings.

A combined "grid--free-form" layout pattern should, therefore, incorporate all grid's and free-form's advantages (presented in Table 40). In addition, particular emphasis should be placed on avoiding grid's and free-form's corresponding disadvantages.

Having in mind the third research question of the dissertation which raises the issue of *whether an optimum layout pattern preferred by the majority of Web customers can be developed for Internet retailing or not*, the following section proceeds to introduce an emerging layout pattern for Internet retailing as the core outcome and contribution of the present research effort.

Specifically, this layout combines the grid's hierarchical structure (the easiest structure to use) with the free-form's alternative and extensive navigation capabilities (i.e, "search" engine, direct access to end-products). In addition, this layout type should incorporate some dynamic elements of the free-form layout that proved to surprise and entertain customers.

Therefore, the "mixed grid--free-form" structure design is based on the grid's and free-form's corresponding designs/concepts used in the laboratory virtual retail store. These are put together in Figure 50.

The grid layout used in the laboratory store employs a hierarchical structure. For example, customers have to navigate through the main product categories and sub-categories in order to reach an end-product. This implies that they cannot directly access an end-product from the home page or from the product category level in general. Correspondingly, in cases that customers are at the end-product level, they cannot reach another end-product which belongs to a different product category or another product sub-category, at once (directly). On the contrary, customers entering the free-form layout can select, for example, an end-product at once through the use of the "product catalogue" mechanism. In general, the free-form layout enables customers to directly access any place in the store, regardless their current position by using either the "search engine" or the product catalogues. However, also in the case of the free-form layout, there are some navigational limitations. These refer to the "three-level" structure employed by the free-form layout which, for example, enables customers to access at

once only these end-products that are placed in the level in which customers are navigating at any given time (see Chapter 5).

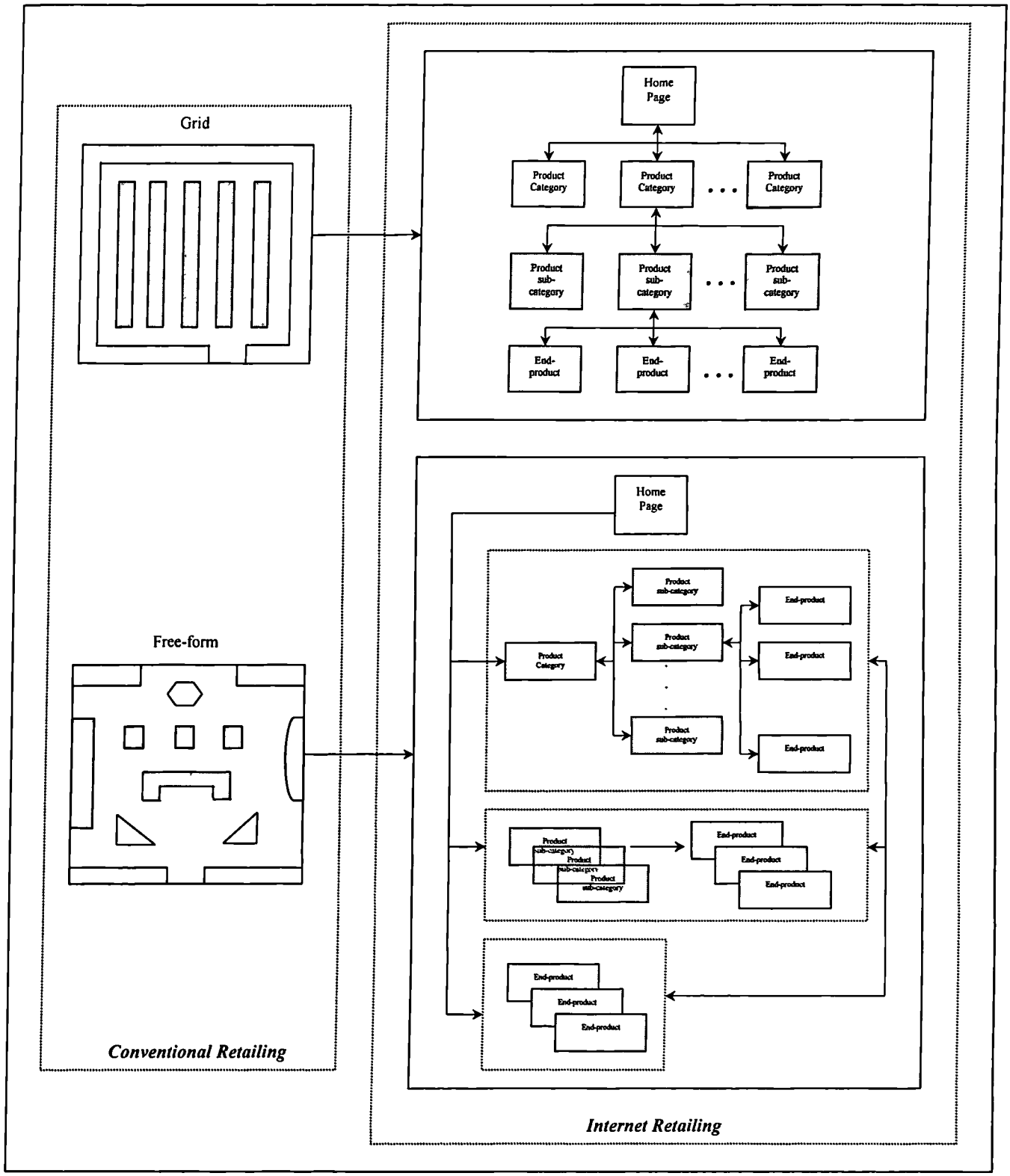


Figure 50: The Transformed Grid and Free-form Layouts' Design used in the Laboratory Store

"Freegrid's" Description

The proposed new layout type is named "freegrid". Its operational concept is diagrammatically presented in Figure 51.

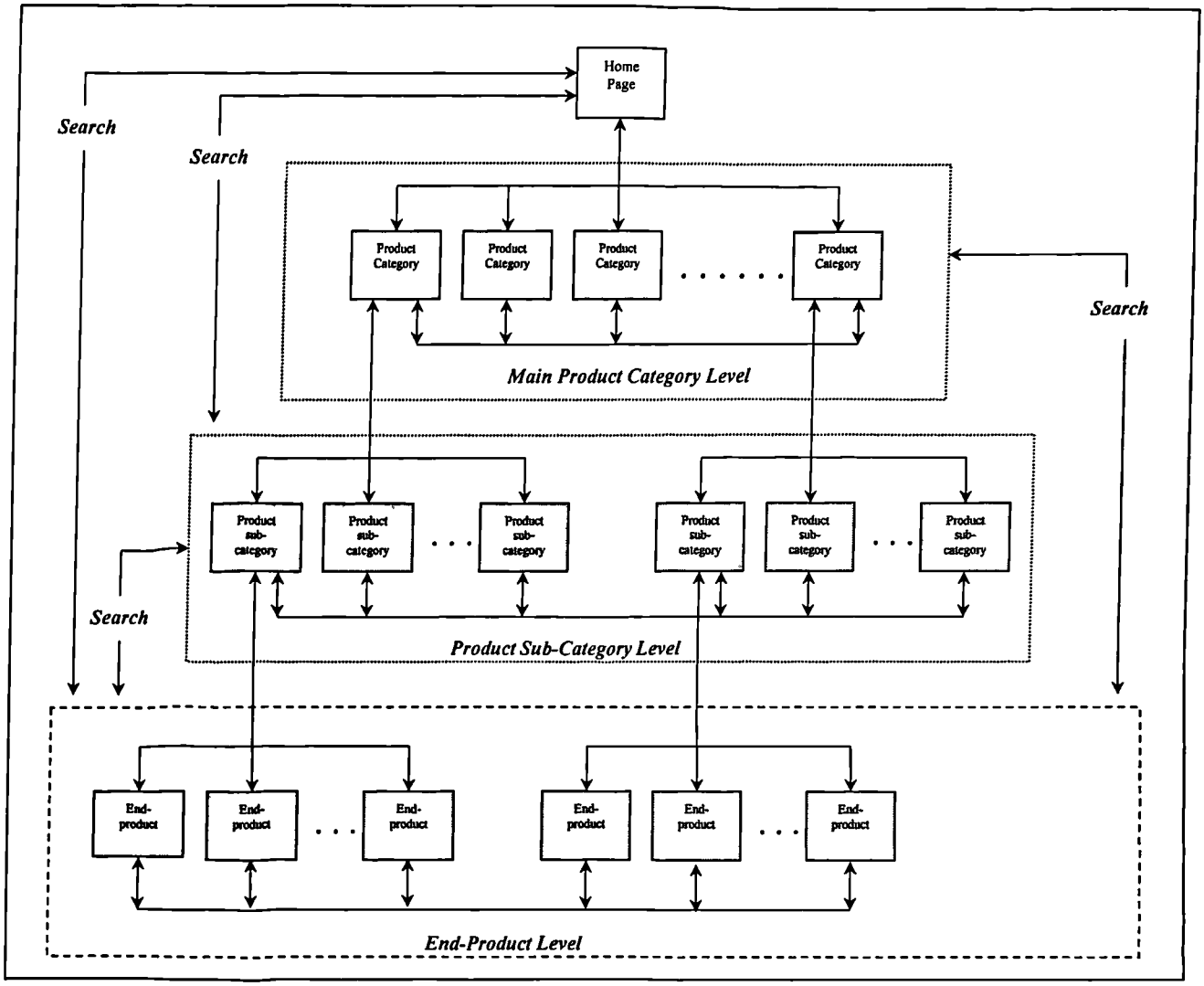


Figure 51: The "Freegrid" Layout Design Version for Internet Retailing

The "freegrid" layout employs a simple hierarchical/tree structure as the grid does. This implies that sub-categories are placed under the main product categories existing in the store, while the end-products are placed under the corresponding sub-categories. This structure is constant during the whole shopping interface-customer interaction. This means that customers face the same product categories, sub-categories and end-products assortments and descriptions during their navigation, eliminating through that potential confusion and difficulties in using the store. These (i.e., product categories, sub-categories and end-products) are displayed through a product catalogue mechanism placed at the Web pages' left frame (Figure 52). Since the majority of customers in the study reported that they would like the idea of the "left-framed product catalogue," this

feature should also be incorporated in the freegird's design. This "left-framed" product catalogue should be continuously displayed during the whole shopping activity, labelled in a clear, concise and understandable way. As soon as customers enter the store, they face only the main product categories included in the product catalogue. Moreover, customers are capable on going in-depth in any main product category they wish only if they select the corresponding services provided by the "freegrid" layout. These "navigational" services refer to either the hierarchical navigation through the product catalogue or the use of the search mechanisms, both offered by this layout (Figure 52). Moreover, it should be noted that *the product catalogue displays only the lists corresponding to the level in which customers are each time* (i.e., main product categories list *or* product sub-categories list *or* end-products list).

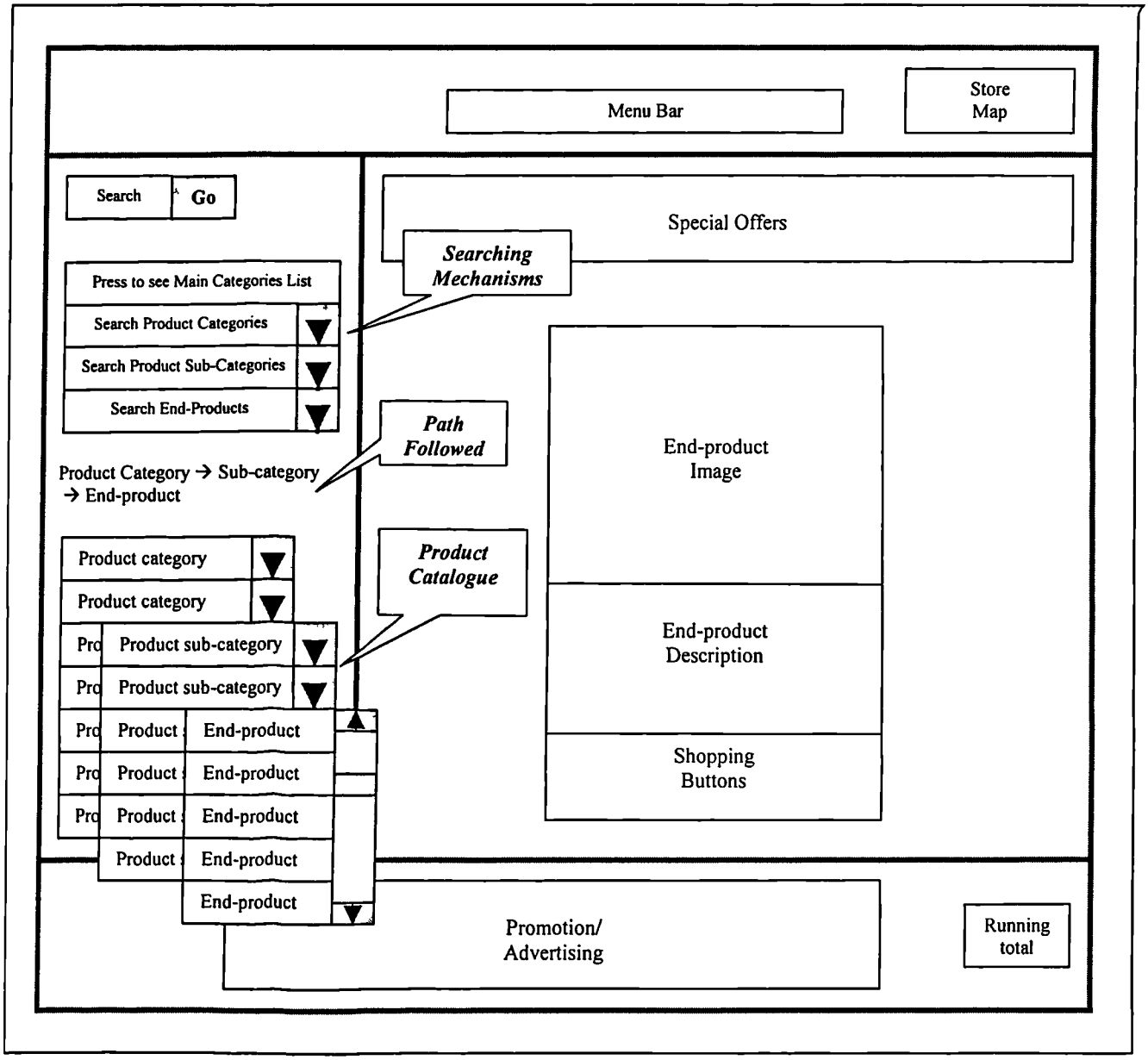


Figure 52: The Proposed "Freegrid" Layout Abstract Interface Design

More specifically, the searching mechanisms, continuously displayed on the screen, include the following alternative functions (Figure 52):

- **"Press to see Main Categories List" button:** This button enables customers to access the main product categories list at once, any time they want during their shopping activity. By pressing this button the main product categories offered by the store are directly displayed on the product catalogue.

- **"Search Product Categories" mechanism:** This searching mechanism enables customers to select a specific product category at once, any time they want during their shopping activity. This means, that as soon as customers select a specific product category through this searching mechanism, the corresponding sub-categories are directly displayed on the product catalogue.

- **"Search Product Sub-Categories" mechanism:** This enables customers to select a specific product sub-category at once, any time they want during their shopping activity. As soon as customers select a specific product sub-category through this searching mechanism, the corresponding end-products are directly displayed on the product catalogue.

- **"Search End-Products" mechanism:** This searching mechanism enables customers to select a specific end-product at once, any time they want during their shopping activity. As soon as customers select a specific end-product through this searching mechanism, the end-products included in the same product sub-category are directly displayed on the product catalogue, while at the same time the selected end-product, accompanied with its related description/information, is displayed on the right frame of the screen. The latter (i.e., the capability to select an end-product at once to be displayed on the right frame), constitutes the only difference between the "search end-products" and "search product sub-categories" mechanisms.

- **"Keyword/Free-text" searching:** This searching mechanism enables customers to reach any product-related information they want at once, any time they want during their shopping activity. Depending on what they search for (e.g., a specific sub-category), the contents of the corresponding category in which the searched item belongs to (e.g., product category) are directly displayed on the product catalogue. In addition, in case the searched item is an end-product, this would be also displayed at

once on the right frame of the screen, accompanied with its description/information. At the same time, the left-framed product catalogue displays all the end-products belonging to the same sub-category.

Therefore, the left frame includes only product-related navigational mechanisms (i.e., product catalogue and search engines). It should be clarified that all the above searching mechanisms display their contents in an alphabetical order, in order to facilitate customers' searching activity (except, of course, the "press to see main categories list" button and the "keyword/freetext" searching mechanism, where such a sorting is not applicable). Along the same lines, it is also proposed that the product catalogue follows an alphabetical order.

In addition, it should be noted that the "freegrid" layout should also avoid forcing customers to "scroll up and down" in order to see all the product catalogue's contents. However, this is probably not applicable in the case of the end-products level.

Furthermore, the path that customers follow each time during their navigation is also displayed in the left frame (Figure 52). This function is useful whenever customers are located at the end-product level and want to reach the sub-category level at once. This implies, that customers do not have to use the "search product categories" mechanism described above. In sum, through the use of the "path" navigational service in this particular case, customers can reach the level they want using one, instead of two, "clicks."

It is, therefore, apparent that a *direct relationship between the product catalogue and the searching mechanisms,* should be implemented towards effectively applying the "freegrid's" navigational concept (Figure 51) within a Web shopping interface (Figure 52). Through this combination, customers are provided with two major navigational alternatives:

- **Hierarchical Navigation** *(grid's concept)*: Customers should pass through the product sub-category level in order to reach an end-product.

- **Free Navigation** *(free-form's concept)*: Customers can use the extensive searching services described above in order to reach any product level they want at once, regardless their current position within the store.

Based on the aforementioned discussion, the "freegrid" layout offers the following specific navigation capabilities/alternatives:

- ***"Vertical"*** navigation (e.g., product category X → end-product X)
- ***"Horizontal"*** navigation (e.g., sub-category X → sub-category Y)
- ***"Diagonal"*** navigation (e.g., end-product X → product category Y)
- ***"Circle"*** navigation (e.g., product category X → sub-category X → end-product X → end-product Y → sub-category Y → product category Y)

It should be clarified that the aforementioned navigational design concept can be effectively applied also in cases where more than three product-levels are used.

Figure 52 presents a mock-up demo of the "freegrid" shopping interface based on the findings discussed above. It is clear that the right frame displays the selected end-product accompanied with its detailed description/information. The right frame displays end-products only when customers "click"/select a specific end-product. This means, that in all other cases (i.e., when customers just navigate through the store's product categories', sub-categories' and end-products' levels without "clicking"/selecting a specific end-product), the right frame can be used for other store activities/services (e.g., display of special offers, advertisements, promotions, general information, etc.). Furthermore, only one end-product is displayed each time on the right frame, since it was shown that customers liked this particular product presentation technique. Finally, the necessary shopping buttons (e.g., "increase/decrease quantities", "view shopping basket's contents", "insert products into the shopping basket", etc.) are placed right under the end-product's description, as this was also found to facilitate customers' shopping activity to a great extent.

Moreover, the shopping basket's running total is continuously displayed on the shopping interface, as many customers stated that such a service facilitates their shopping activity to a great extent. They also want a flexible shopping basket management service, implying that they want to select or unselect products, increase or decrease quantities, etc. without having to go back to the Web page from which they had selected the specific product or products. In general, it was concluded that customers prefer to minimize their effort towards navigating within the store. Furthermore, promotional/advertising banners can be continuously and dynamically implemented on the bottom of the shopping interface, because customers really enjoyed this function.

Finally, a "linked" to the store's product-levels store map is proposed to be implemented, as it proved to be preferred by a great number of customers (i.e., it effectively simulates the 3-D world of conventional retailing). This could also be implemented in a hierarchical format. This means, that the store map continuously displays in a graphical format the corresponding contents of the level that customers are located each time. For example, when customers enter the store, the store map includes only the main product categories; when customers select a specific product category, the store map includes only the corresponding sub-categories. However, due to "screen limitations" this service may probably not be applicable in the case of end-products.

The "freegrid" layout should also confront some other critical issues investigated in the present research. These are summarised below:

a) ***Entertainment:*** The "freegrid" layout should incorporate some of the free-form's "dynamic" tools and features that were found to significantly entertain more the customers visiting this particular layout. These basically refer to the dynamically changing product assortment implemented within the three-level free-form layout. However, these features should not be implemented on the basic store layout/structure (i.e., this should be kept the same during the whole navigation and even for a long period of time), but on some special services and events that run within the store. These could probably be the following: (1) personalised product recommendations, (2) sales promotion activities, (3) personalised advertisements, (4) dynamically changing end-product descriptions, and so on.

b) ***Content/information provision:*** The content/information which is directly related to the layout (e.g., product categories description, etc.) should be constant, short, clear and concise. In addition, it should be reminded that the left-frame product catalogue displays only the corresponding contents to the level in which customers are placed each time (e.g., in case customers are placed in the end-product level, the product catalogue displays only the corresponding sub-category's end-products). This way, the provided content is reduced and customers' confusion due to "data/information overload" and "complexity" is eliminated. However, the information provided should be rich in cases of end-product descriptions, advertisements, sales, product recommendations, information about new products and store events, etc., as this was found to help, support and surprise customers. It was also concluded that it is very helpful for

customers to be able to see the end-products' images/photos accompanied with their detailed descriptions.

c) ***Entertainment, time spent for shopping and "impulse purchases":*** Keeping customers within the store as much time as possible should not be an "end in itself." Besides, it was concluded that customers spend comparatively more time for shopping when they face difficulties to search for and locate their shopping list products, and use the store in general. However, in cases that customers locate and buy their desired products at once (i.e., planned purchases) and immediately after they leave the store, it is obvious that impulse purchases are eliminated. On the other hand, within the conventional retailing 3-D world, customers inevitably face products that they have not planned to buy before entering the store and might, therefore, buy them. Such a fact is not applicable within a Web retail store environment because of the limited product display room (i.e., computer interface) and the technology capabilities (i.e., customers can conduct their planned purchases at once through the use of search engines and immediately leave the store). Furthermore, some other customers may not even visit the store, as they are able to implement a "home continuous replenishment process" (i.e., the corresponding to the store continuous replenishment ECR's key process) by placing a shopping list into the system and just wait for the products to be delivered to them at their home. Therefore, the need to communicate "impulse purchased" products (i.e., beers, chewing gums, etc.) to customers visiting an online grocery store is apparent. Thus, it is concluded that the shopping interface should be attractive in order to make customers visit the store and spend time on navigating within it. However, as the layout proved to not affect impulse purchases, the role of the "entertainment function" becomes very important towards creating an "attractive" shopping environment over the Web. Entertaining customers during their shopping activity is very crucial as it was shown to constitute one of the basic "virtual store atmosphere weapons" used to make customers enjoy their shopping experience, not "rushing" them to leave the store as soon as they select their shopping list products. Therefore, the possibility to conduct impulse purchases is, undoubtedly, increased.

d) ***Promotional sales:*** Promotional sales are the result of customer satisfaction from the shopping trip experience, along with the store's offer of quality and attractive promotions. The present study, however, concluded that the layout

does not significantly affect promotional sales. In addition, the basic conditions for increasing promotional sales are to provide an easy to use shopping interface, help customers find their desired/planned products easily, provide high quality promotions, and entertain them. All these, contribute to the increase of time spent for shopping, providing, therefore, to customers the necessary time to pay attention to promotions.

7.1.3. Dependent Variables Selection Methodology

The development of the research hypotheses and the corresponding selection of the dependent variables investigated by the present study, was based on one hand on reviewing the conventional retailing store layout literature and identifying the most critical layout-related factors, and on the other on investigating the corresponding literature in the area of Internet retailing, available at the moment. It is obvious, however, that one study cannot include and thoroughly investigate virtual store layout effects on every possible consumer behaviour dimension. To that end, the six dependent variables of the present study were selected through *a series of methodological steps* taken. More specifically:

- **Perceived Usefulness:** Reviewing the conventional retailing store layout literature (Chapter 2), it was found that the basic characteristic of the grid layout is that it facilitates routine and planned shopping behaviour. In other words, it is proved that this particular layout enables customers to effectively locate their shopping list products (i.e., planned purchases) within the store. Besides, this constitutes the basic reason that the grid layout is widely used by conventional grocery stores, as it has been proved that the majority of customers visiting this type of stores have already planned their purchases before entering the store. Therefore, since the present study's research context is the online grocery sector, it was decided to investigate this critical issue (i.e., virtual retail store layout effects on "planned shopping behaviour") in order to contribute to the Internet grocery retailing store layout theory building along with providing direct managerial implications for virtual grocery retailers. Emphasis was placed, therefore, on reviewing the existing literature in the area of Internet retailing in order to find a suitable construct for measuring virtual retail store layout effects on "online planned consumer behaviour". To that end, the "perceived usefulness" TAM construct, was found to be the most appropriate one

(this is documented in Chapter 3). In addition, TAM is widely used by other researchers in similar to this research, studies.

- **Ease of Use:** Along the same lines, reviewing the conventional retailing store layout literature (Chapter 2), it was found that the free-form is perceived by customers as the "easiest to use" layout. This constitutes the basic reason that some conventional retail stores (e.g., Duty-free stores) use this particular layout in order to offer to their customers a convenient shopping experience. This implies, that "ease of using the store" is perceived as a critical issue in conventional retailing. In parallel, reviewing the Internet retailing literature (Chapter 2), it was found that "ease of use" also constitutes a critical dimension towards offering a convenient shopping experience to online customers. Furthermore, it was found that "ease of use" is strongly affected by the online store layout and, thus, virtual retailers should consider it when designing their stores. Based on the aforementioned research insights, it was decided to include "ease of use" as a dependent variable within the research context of the present study. Emphasis was placed, therefore, on reviewing Internet retailing literature towards finding a suitable construct for effectively measuring this particular consumer behaviour dimension. To that end, the "ease of use" TAM construct was found to be the most appropriate one (this is documented in Chapter 3). In addition, as also discussed above, TAM is widely used by other researchers in similar to this research, studies.

- **Entertainment:** Reviewing the conventional retailing store layout literature, it was found that "customers' perceived entertainment" during shopping activity is strongly affected by the store layout. In addition, it was found that "perceived entertainment" constitutes a major criterion that customers use when selecting a conventional retail store to conduct shopping (Chapter 2). On the other hand, customers' "perceived entertainment" during shopping activity constitutes a critical issue also for Internet retailing, while it has been proved that it is strongly affected by the shopping interface layout. (Chapter 2). Since "perceived entertainment" constitutes a critical consumer behaviour dimension affected by the store layout, in both conventional and Internet retailing, it was decided to include it in the context of the present study. To that end, emphasis was placed on reviewing Internet retailing literature towards finding a suitable construct for effectively measuring this particular consumer behaviour dimension. To that end, the "entertainment" construct used by O'Keefe et al. study, was found to be an appropriate one (this is documented in Chapter 3).

- **Time:** Reviewing the conventional and Internet retailing literature, it was found that "time" customers spend for shopping within the store, constitutes a very important issue for all retailers (Chapter 2 and 3). In addition, it has been proved that this particular consumer behaviour dimension (i.e., shopping time) is strongly affected by the store layout in both conventional and Internet retailing (Chapter 2 and 3). Therefore, it was decided to include and measure this dependent variable through the laboratory experiment, towards confirming existing Internet retailing research insights, along with providing evidence about how each of the investigated layouts affect the time that customers spend for shopping.

- **Promotional Sales & Impulse Purchases:** Reviewing the conventional retailing store layout literature (Chapter 2), it was found that store layout strongly affects "sales of promotional items" and "impulse purchases". These particular issues are very crucial for business effectiveness in the retail sector (both conventional and virtual). In addition, retailers design their stores in such a way to increase sales of promotional items along with encouraging impulse purchases. It was decided, therefore, to include these critical variables in the present research. The tools used for measuring them are thoroughly discussed in Chapter 3.

It should be noted, however, that many other relevant variables could also have been included in the present study. For example, "revisits" constitutes a critical consumer behaviour variable for grocery retailing, mostly due to the "fast moving products" served by this particular business sector. However, it was not included in the present study, due to the objective constraints discussed above (i.e., one study cannot include and thoroughly investigate virtual store layout effects on every possible consumer behaviour dimension). In addition, "sales volume" constitutes another important variable, which, however, could not be included in the present study due to the provision of the same budget to all the subjects (i.e., 20 pounds in UK; 12.000 GRD in Greece). Nevertheless, based on the aforementioned discussion, it is clear that the selected variables are very relevant and critical to the Internet retailing store layout research context investigated by the present study. Further research, however, can incorporate and measure other relevant variables (e.g., "revisits") within the same research context.

Furthermore, it should be clarified that there was not any separate statistical analysis conducted regarding the relationship among the selected dependent variables, as the literature review (Chapter 2) upon which the research hypotheses were generated did not include any theoretical documentation of a relationship between them (e.g., to run a

MANOVA there should be sufficient theoretical documentation of relationships among the dependent variables). However, this constitutes on one hand a limitation of the study (thoroughly discussed in the "limitation of the study" section later in the Chapter), and on the other, a future research direction towards investigating possible relations between these particular dependent variables (thoroughly discussed in the "future research directions" later in the Chapter). Besides, as discussed in Chapter 1, the basic objective of this particular study was to investigate whether the virtual store layout affects each of the corresponding dependent variables separately, along with testing whether the conventional store layout theory should be applied on its present form in the context of Internet retailing, rather than investigating potential relationships between the dependent variables.

In sum, the relevance of the aforementioned dependent variables for this and similar future research initiatives (i.e., evaluation of different layouts) in terms of theory development or testing (i.e., confirmatory research) and management implications is clear. More specifically, as discussed above, the role and the importance of each of the specific dependent variables used by the present study is crucial for both conventional and Internet retailing. Besides, there is a well-established theory in the area of conventional retailing providing robust results regarding store layouts effects on consumer behaviour regarding each of the these variables. Correspondingly, similar future research initatives in the area of Internet retailing should not neglect the six variables used herein, as they have been proved to constitute critical success factors for business effectiveness, as far as layout effects on consumer behaviour are concerned. Of course, many other important variables like the "revisit" one discussed above, should be also included and investigated by future research efforts.

7.1.4. Critique of the Present Research Findings by Human Computer Interaction Research Insights

Many research initiatives have dealt with identifying Internet retail store interface factors that affect consumer buying behaviour. Most of these research efforts have not used the established conventional retailing theory as a reference point. However, there are many other cases in which conventional Marketing theory was effectively utilised within an Electronic Commerce research context (i.e., the 4 P's of the marketing mix, the 5-stages model of consumer buying behaviour, etc.).

The basic discipline utilised by researchers towards investigating consumer behaviour influencing factors created by an Internet retail shopping interface, is the "Human Computer Interaction" (HCI). HCI as a research discipline was developed long before Web's appearance. At the beginning, HCI was applied to a non-shopping environment, concentrating to usability issues related to the interaction between humans and computers, in general. Currently, HCI's application is very common within the Web trading research context, constituting an interesting and important research approach. However, the present study's approach is not placed under the HCI umbrella, but rather, it uses HCI as a reference point. It is reminded that HCI principles and guidelines for effective Web site design (Chapter 2) were used, on one hand, to improve the laboratory store's interfaces towards making them more "user friendly" (Chapter 5) instead of being used as the basic underlying theory supporting the present research objectives and driving the corresponding research questions. On the other hand, HCI theory was used towards investigating whether some of the present study's findings could have been predicted based on the usability and human factors literature (Chapter 6).

Comparing the proposed "freegrid" layout type to HCI principles and guidelines for effective Web site design, it is clear that this particular layout confirms some of the basic guidelines dictated by HCI (Chapter 6). A potential critique upon the contribution of the present study could, therefore, be based on the fact that, at the moment, many Web grocery stores already use a "freegrid-look" type of layout based on what HCI and corresponding usability studies dictate. However, it is believed that this fact does not controvert the contribution of this study due to the following reasons:

1) The present research, adequately confronted its corresponding research objectives and questions by introducing and adopting an hybrid/innovative and multidisciplinary research approach.

2) The present study proved that the layout affects consumer buying behaviour over the Web, through the use of robust statistical techniques.

3) The present research concluded that the "freegrid" layout is an emerging layout for the Internet grocery sector, following a quite big number of methodological steps while using an established theoretical background and robust research techniques.

4) The present research followed a very focused research approach in terms of the application area (i.e., grocery sector over the Web) and the issue under investigation (i.e., layout).

5) The present research introduced the "freegrid" layout as an emerging layout pattern for Internet retailing, describing and documenting in detail all the attributes and characteristics governing its operation, combining all the relevant research findings. Thus, specific research insights are provided, contributing to Internet retailing store layout theory building.

6) Usability studies have not used the established conventional retailing store layout theory as a reference point. On the other hand, established conventional marketing and consumer behaviour theories have been widely used in the context of Electronic Commerce research, providing important research insights.

7) Not all existing grocery stores over the Web employ a "freegrid" type of layout (Chapter 4). In addition, the fact that usability principles and guidelines for effective Web site design are somehow "generic," means that there is vast room for focused research initiatives in this area, something which is also dictated by several other researchers (Chapter 2). Besides, HCI literature does not propose any specific store layout pattern suitable for and "tailor-made" to the grocery sector over the Web, but, rather, provides principles and guidelines for effective Web site design in general, which could possibly be not applicable and effective in certain business sectors. In other words, virtual store layout may affect consumer buying behaviour differently from sector to sector.

8) Finally, the present study creates several avenues for further research while providing direct, specific and exploitable managerial implications.

7.1.5. Virtual Retail Store Layout Preferences and Purpose of Internet Use

One of the most important findings of the present research was that the "perceived usefulness" for the free-form layout decreases when the use of the Internet for Electronic Commerce purposes increases. Thus, there is a need to improve the free-form layout, and the "freegrid" adoption is expected to adequately confront this problem.

In addition, it was concluded that an increase in the use of the Internet for hobby purposes is expected to increase the "perceived usefulness" of those customers visiting the free-form layout. This finding is expected to be also applicable also in the case of the "freegrid" layout which retains the free-form's "entertaining" features.

7.1.6. Virtual Retail Store Selection Criteria and Layout Preferences

The present research revealed five factors that customers use as virtual retail store selection criteria: (a) customer care, (b) merchandise and security, (c) effective shopping, (d) virtual store atmosphere, and (e) virtual retail reputation.

More specific conclusions regarding selection criteria include the following. An increase in the importance that customers assign to the "effective shopping" attribute (i.e., quick access of the Web site and availability of the displayed merchandise) is expected to decrease the perceived entertainment offered to them when visiting the grid layout. As customers become more "time sensitive," they entertain themselves less when visiting the grid layout. Besides, the grid layout is considered to be the easiest one to use and the one in which customers spend the least shopping time. Therefore, when the importance given to "quick shopping" increases, customers try to spend less time for shopping. Thus, they would just enter the store to buy their desired products and exit. Perceived entertainment would therefore decrease, as this case of shopping experience looks more like a "routine" job rather than like an "entertaining" activity. It is concluded, therefore, that the "freegrid" adoption is expected to both confront the need for effective shopping while providing at the same time an "entertaining shopping experience" to the customers visiting it.

Furthermore, an increase in the importance customers pay for "care" given to them when visiting a free-form layout store is expected to increase their "perceived usefulness" towards finding their shopping list products. Besides, the free-form layout is perceived as the most useful layout. Therefore, customer service, after sales support, quality of advertising and existence of sales within the store, implemented together within a supportive and information-rich shopping interface offered by the free-form layout, enable customers to effectively search for, locate and buy their shopping list products (i.e., perceived usefulness increases). The above finding is expected to also be applicable in the case of the "freegrid" layout in which the "ease of using" the store dimension is enhanced.

7.2. Managerial Implications

"The commercial benefits from improving the Web interface and experience presented to consumers, are enormous" (O'Keefe et al. 2000, p. 613).

Managerial exploitation of the present study's results by virtual retailers will undoubtedly contribute to the development of more effective and consumer supportive shopping interfaces. This research proved that the layout of an Internet retail store affects consumer buying behaviour. Therefore, the store layout constitutes an issue to which virtual retailers should pay special attention. The evaluation results provided for each particular layout type, revealed that customers really "care" about the layout; they are not "insensible" to the layout of an Internet grocery store they visit. Consumers have particular preferences, reactions, concerns and problems related to the layout of the store they use to conduct their shopping. In addition, the virtual retail store layout affects critical issues related to shopping activity (i.e., perceived usefulness, ease of use, etc). To that end, the emerging "freegrid" layout is recommended to be adopted by virtual retailers. However, there should be further research towards its improvement (this is thoroughly discussed in the "limitations of the study" and in the "future research directions" sections later in the Chapter). Advice regarding the freegrid's effective development and application by virtual retailers along with some other important recommendations are discussed below.

Virtual retailers that want to use the "freegrid" layout should follow a series of methodological steps described in Figure 53. It should be noted, however, that during the whole procedure, virtual retailers should be supported by Internet retailing and Web design/development experts. Current virtual retailers should use the attributes utilised in the Internet survey (Chapter 4) as a tool for classifying their layout in one of the three layouts used by the present study (Step 1). Then, they will be able to incorporate the appropriate attributes to the selected layout in order for it to become a similar type to the "free-form" layout (Step 2). The final step (Step 3) however, which is the most crucial and important one, refers to the incorporation of the "freegrid's" specific features and attributes provided by the present study.

For example, in case a virtual retailer uses a "home page" button, a "product catalogue" and a "menu bar" in his/her store layout, this layout should be classified in the "grid category" (Step 1). Then, this virtual retailer should incorporate a "search engine" in order for this to become similar to a "free-form" layout (Step 2). Finally, this virtual

retailer should incorporate and use all the "freegrid's" specific attributes and features in order for this layout to become a "freegrid" layout (Step 3). It is obvious, however, that future virtual retailers should bypass the first two steps (as they do not posses a virtual retail store at the moment) and just use the third step's guidelines, always under the support of Internet retailing and Web design/development experts. Finally, in case current virtual retailers realise that their layout cannot be classified in any of the Step's 1 layout categories (e.g., their layout possesses only a "product catalogue" and a "menu bar"), they should incorporate all the free-form's attributes to their layout, before proceeding to the third step of the methodology.

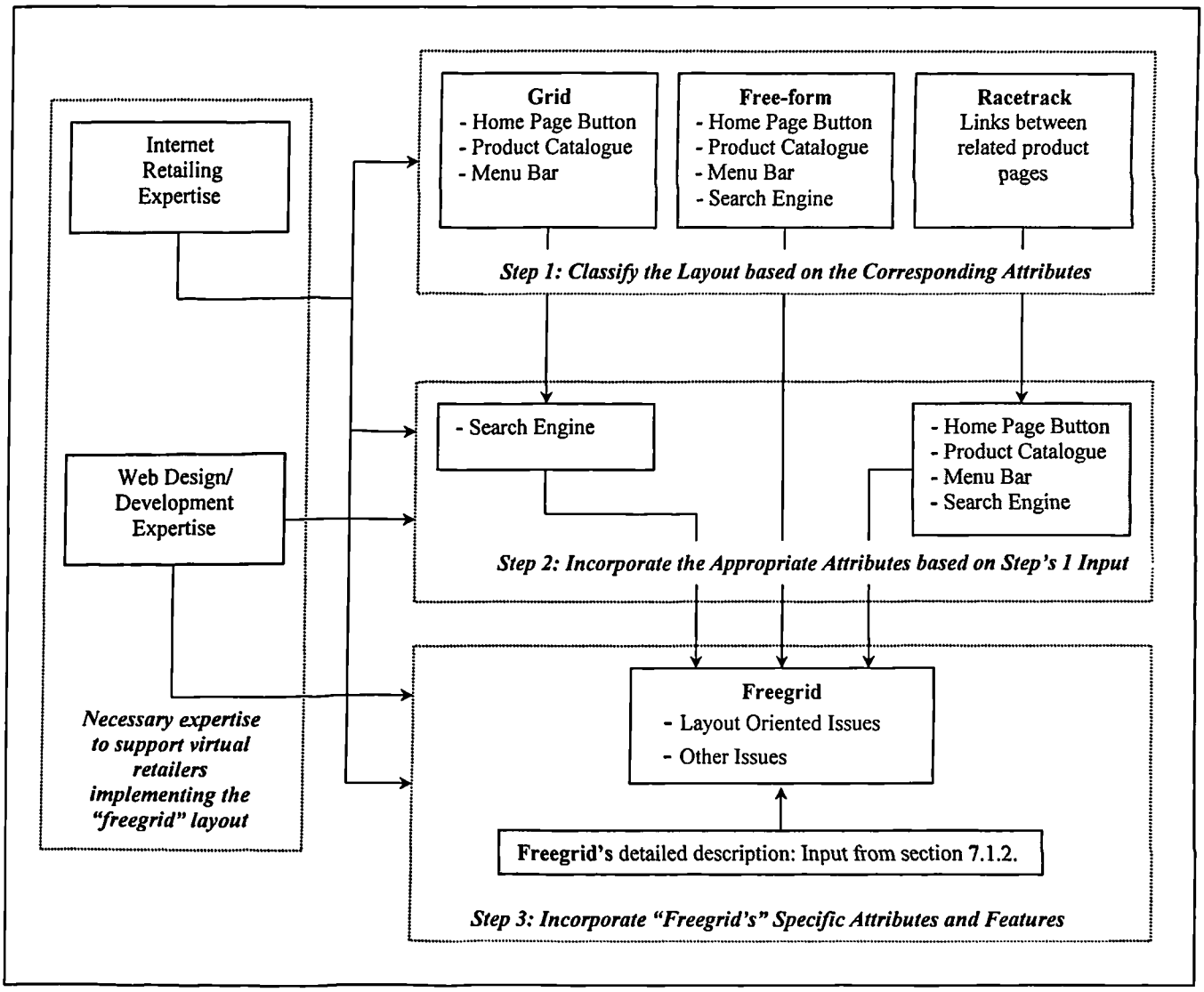


Figure 53: The Proposed "Freegrid" Adoption Methodology for Virtual Retailers

The aforementioned methodology helps current virtual retailers to first realise in which layout category their layout belongs to, and based on that, proceed with the appropriate improvements, adjustments and modifications. This means, that "roughly" knowing in

which layout category their layout belongs to, they will be able to proceed with the appropriate modifications more effectively.

Internet retailing experts and Web designers/developers should, therefore, take into account the following specific guidelines (Step 3, Figure 53) in order to effectively support virtual retailers towards developing and applying the "freegrid" layout.

Layout Oriented Issues

- Provide a hierarchical/tree, simple and concise structure.
- Provide short, clear, descriptive and concise content/information/terms related to the layout and to product categories, sub-categories and end-products labels' description.
- Provide alternative and extensive searching and navigational capabilities.
- Keep the product assortment and the layout constant during the whole navigation.
- Continuously display the "product catalogue" and the "searching mechanisms" on the left-frame.
- Display (through the "product catalogue") *only the corresponding to the level in* which customers are placed each time (i.e., product category, sub-category, end-product level) contents.
- Avoid, whenever applicable, forcing customers to "scroll up and down."
- Provide a linked "store map" continuously displayed on the screen, also implemented in a hierarchical format.
- Continuously display the running total on the screen .
- Implement a flexible "shopping basket" management service, in terms of customers' effort (i.e., number of "keyboard/mouse clicks", "pages" accessed) needed to increase/decrease quantities, select/unselect products, checking shopping basket's contents, etc.
- Implement "personalised," "entertaining" and "dynamic" features, in areas other than the store layout (e.g., personalised product recommendation, personalised promotion and advertising, dynamically changing end-products' descriptions, etc).
- Use images and detailed descriptions for every end-product.
- Place "shopping buttons" (e.g., "insert product in the shopping basket" button, etc.) right below the product description.
- Display products on the right frame, one at a time.

Other Issues

- Implement and communicate to customers the "security in transactions" feature of the store.
- Implement a "quick Web site."
- Offer quality promotions and advertisements.
- Ensure high quality and wide variety of the merchandise.

Except for the above guidelines, it is clear that virtual retailers should place particular emphasis on the "freegrid's" design, detailed description of which is included in section 7.1.2. (part of Step 3 of the methodology described in Figure 53). This section provides both theoretical and detailed practical guidelines towards effectively designing and implementing the "freegrid" layout within the context of a Web shopping interface.

Furthermore, the analysis indicated that there are some differences in layout preferences depending on different customer demographic characteristics (e.g., educational level, gender, occupation, age group). Thus, "layout personalisation" or adaptation to specific customer wishes and preferences, constitutes a challenging but complex marketing objective. The fact is, however, that technology capabilities can enable virtual retailers to offer personalised shopping interfaces over the Web and, therefore, personalised layouts.

Finally, a general but important managerial implication is that conventional retailing and marketing theory is not directly applicable within the Internet retailing context. Therefore, virtual retailers should be alerted and very careful when using the established conventional marketing theory principles and guidelines over the Web. Many business failures on the Web in the past occurred because conventional marketing strategies and techniques were "copy-pasted" in the world of Internet retailing with the technology capabilities as the only driving force and reference point for support of these business activities over the Web. Internet retailing theory should "set the rules" and technology should be used as a "tool" towards fulfilling these rules. Therefore, Web development (technology) experts should be cooperating with Internet retailing experts in order to effectively apply theory on the Web. However, it should be added that technical experts can also contribute to Internet retailing theory development (e.g., the invention of the telematic device which provided the "scent" option capability to virtual retailers).

7.3. Limitations of the Study

This study had certain limitations that should be recognised when interpreting results to draw conclusions. These limitations are briefly discussed in the following sections.

a) **Laboratory vs. field experiment:** The employment of a laboratory instead of a field experiment constitutes a basic limitation regarding the generalisation and applicability of the results. In addition, the limited shopping budget (i.e., 20 pounds and 12.000 drachmae for the United Kingdom and Greece, respectively), given to subjects for free, constituted another limitation. It was, however, observed that subjects spent considerably more shopping time in the final experiments than in the pilot. This observation indicates that they paid attention on how to spend their "real shopping budget" within the final experiment, which in turn enhances the reliability and external validity of the laboratory experiment results in the sense that a "real shopping simulation" was somehow achieved.

b) **Sampling:** Two Universities (i.e., Brunel University and Athens University of Economics and Business) constituted the sampling frames for the corresponding experiments run in the two countries. One can probably claim that this survey is somehow "University- biased". However, many similar research initiatives (i.e., laboratory experiments) have used Universities very often as sampling frames. This, in other words, constitutes a common research practice in the area. Furthermore, the sample size constitutes another limitation of the present study, although it was big enough to conduct the statistical analysis needed to accomplish the research objectives. However, it is obvious that as the sample size becomes larger, the quality and reliability of the results are improved. On the other hand, the combination of the two countries' samples was treated in such a way as they had been drawn from the same population. Finally, the fact that Internet penetration is higher in the UK than it is in Greece, probably constitutes another limitation.

c) **Relationship among the dependent variables:** There was not any separate statistical analysis conducted regarding the relationship among the dependent variables. On the other hand, using Structural Equation Modelling to relate dependent variables, would require a quite larger than the present sample size, as according to Hair et al. (1992), 200 observations is proposed as being the "critical sample size" for applying structural equation modelling. Furthermore, the literature review did not include any theoretical documentation of a relationship between the

dependent variables. Therefore, within the context of the present study, assessing group differences on a single dependent variable (ANOVA), instead of multiple dependent variables simultaneously (MANOVA) was the most appropriate research approach. MANOVA was not used since there was no sufficient documentation of relationships among dependent variables.

d) **Application area:** Since the laboratory store used for the experiments was a grocery store, the findings provided through the present study should be interpreted with caution when applied to other Internet retail sectors (e.g., clothes, furniture, electronics, flowers, etc).

e) **Layout types used:** Not all three alternative layouts used in the laboratory grocery store are commonly used in the conventional grocery sector. The grid layout is the one that is basically used in conventional grocery stores, while the other two are commonly used in other types of retail stores (i.e., department stores, duty-free shops, etc.). However, it was unknown before executing this research whether the grid layout would prove to be the most effective for Internet grocery stores as well. Finally, using the three layouts enabled the researcher to develop an improved layout type, namely the "grid--free-form" based mixture (i.e., "freegrid").

f) **Use of more or different layout types:** Except for the three layouts used in the present study, other layout patterns could also have been used as "manipulated variables" in the specific research design. These could alternatively be existing Internet retailing layouts or completely new layout patterns designed and developed within the laboratory.

g) **Layout Personalisation:** The "freegrid" layout provided by the present study may not be the most effective one for all customers visiting an Internet grocery sector. These customers might prefer some other layout type. This could be the grid, the free-form, or any other. This possibility raises the issue of "layout-personalisation" to specific customers' needs and wants on an "one-to-one" basis, which, technology enabled, is applicable in the context of Internet retailing. Until now, however, virtual retail stores over the Web which implement personalisation features, offer the same basic layout to their customers (e.g., amazon, Tesco, Walmart, peapod, netgrocer, ebay, etc.).

h) **"Freegrid's" test against real customers:** The "freegrid" is proposed as an emerging layout for Internet retailing, resulted through the combination of the grid with the free-form layouts. It is apparent, that this new type of layout may have several advantages that, however, still remain to be tested against real customers in further research. In other words, since the proposed "freegrid" layout has not been tested yet, it should be characterised as an "emerging" instead of "effective" layout for Internet retailing.

7.4. Future Research Directions

The completion of the research presented in this dissertation introduces a number of interesting and challenging research questions that could become the subject of future research initiatives. Based on that and also on the fact that Internet retailing constitutes a quite different from conventional retailing business environment, there are several avenues and directions for further research that arise. These are diagrammatically presented in Figure 54.

First of all, the present research dealt with the grocery sector. Future research initiatives can, therefore, focus on other sectors (e.g., tourism, banking, etc). Such research may reveal that the virtual store atmosphere in general, and virtual store layout in particular affects consumer buying behaviour differently from sector to sector.

As also discussed in the limitations of the study section above, it is apparent that future research should deal with testing the "freegrid" layout against real customers towards evaluating its performance and further improving its operational concept. To that end, the "freegrid" layout can be compared to other layout types, replicating the present experiment. Such a study can use either the same variables used herein or new ones. It can use either a laboratory or a field experimental setting. Such a research would contribute towards further improving the "freegrid" layout. Future research could deal, for example, with comparing the "freegrid" to the five layout patterns provided by Gillenson et al. (2000). Furthermore, researchers can investigate the relationship among the dependent variables utilised in the present study through employing other statistical methods (e.g., Structural Equation Modelling, MANOVA).

Layout constitutes just one of the internal store impression determinants. Future research can deal with the investigation of other store impression determinants like "product

display techniques," "storefront" (which in the case of Internet retailing is the Web site's home page, while in the case of conventional retailing it belongs to the external impressions part of the corresponding store atmosphere model discussed in Chapter 1), etc. Such kind of research can even isolate and measure the effects of a single determinant (i.e., home page effects) or simultaneously measure the effects of more than one virtual store impression determinants on consumer buying behaviour. Another similar type of research may refer to the manipulation of the "product assortment" variable, which would be available, for example, in three alternative versions. This means that subjects would visit the same store, facing different assortment techniques. The findings of such research will contribute to the Internet retailing "category management" theory.

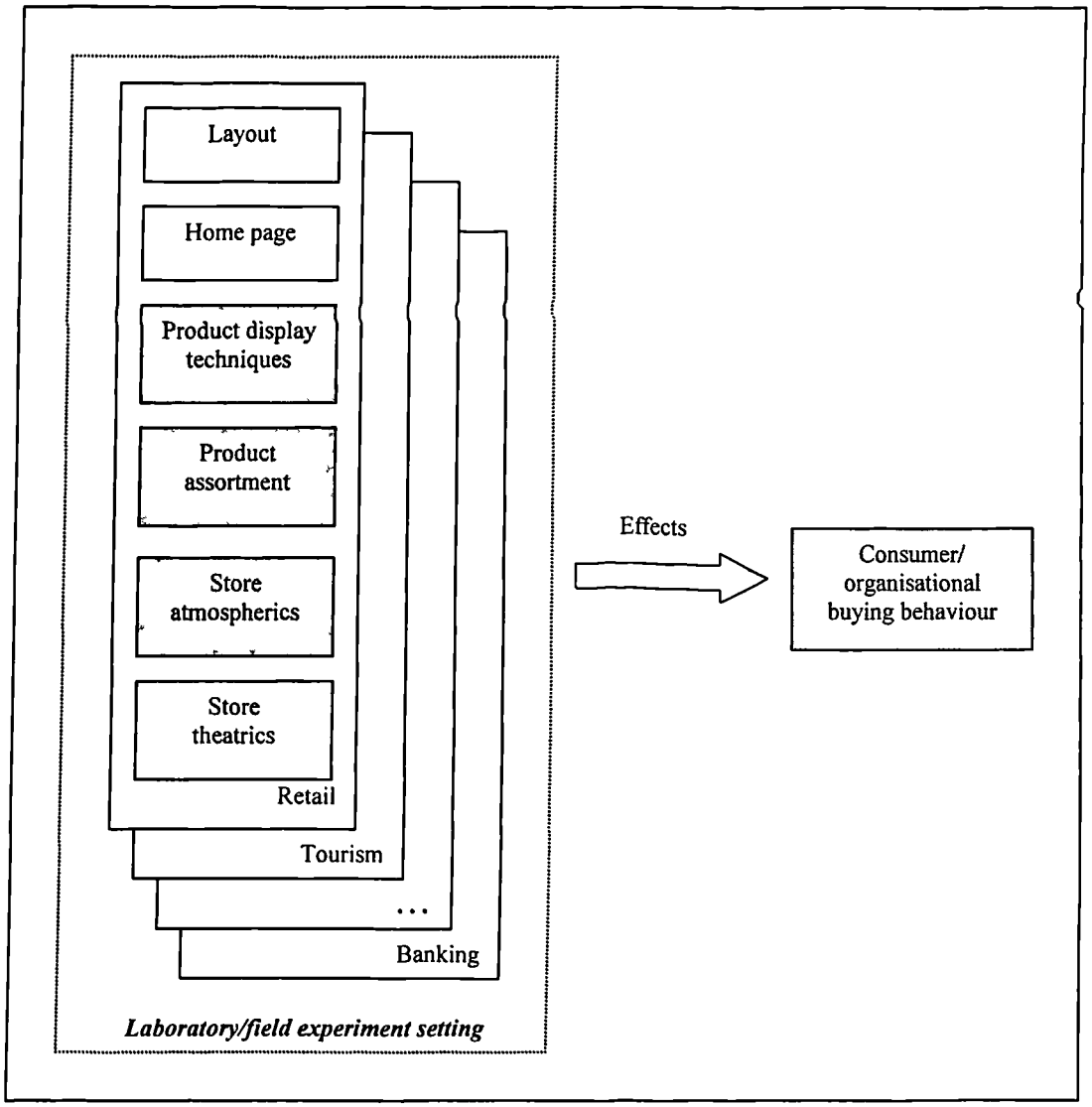


Figure 54: Some Future Research Directions

Future research can also deal with measuring the following "virtual store atmospherics" effects on consumer buying behaviour.

a) ***"Site view"*** effects on consumer buying behaviour: "Lighting" and "colour" effects on consumer buying behaviour can be measured either separately or simultaneously.

b) ***"Sound"*** effects on consumer buying behaviour: A research initiative measuring the sound (e.g., music) effects on consumer buying behaviour will also provide interesting insights that can be directly exploited by virtual retailers.

c) ***"Scent"*** effects on consumer buying behaviour: Technology capabilities enable Web sites to provide their customers with the capability to smell their products (e.g., perfumes). Therefore, it is applicable to use "scent" as a manipulated variable measuring whether it affects consumer buying behaviour or not.

Furthermore, technology capabilities can be applied to create innovative and effective experimental settings (e.g., different animation techniques), therefore enabling researchers to measure virtual theatrics' effects on consumer buying behaviour. For example, virtual theatrical effects can be utilised for measuring sales promotion effectiveness. More specifically, the moderating factor (i.e., manipulated variable) could be the promotional method used with three different levels/treatments. All other determinants (e.g., layout, colours, etc) could remain the same:

- use of video in which a girl promotes a specific product
- use of photograph where the same girl promotes the same product
- use of a banner where also the same girl promotes the same product

Since the Web is also utilised to a great extent for business-to-business transactions, similar kind of causal research could also be applied for measuring Web site atmosphere effects on organisational buying behaviour. Despite the fact that the decision regarding the selection of a business partner to buy products from, is basically based on other than the site atmosphere factors (i.e., business contracts, business relationships, prices, special offers, etc), it would be interesting to examine potential secondary virtual atmosphere effects.

Finally, a challenging future research approach is one that would lead to the development of a general model which could provide personalised layouts or shopping interfaces. Such a model should develop an exhaustive attribute selection framework including consumers' preferences, wishes, needs, behavioural patterns and characteristics, all in a detailed format. In parallel, several alternative shopping

interfaces or layouts should be developed. Based both on this framework and on the alternative store interface versions, an experiment can probably provide a "matching framework." The framework would then provide specific recommendations to virtual retailers regarding the "appropriate shopping interface for a particular type of customer."

APPENDICIES

APPENDIX A. Description of Constructs

Perceived Usefulness		
PU1	The store that I have just visited is useful for searching and buying products.	
PU2	The store that I have just visited improves my performance in product searching and buying.	
PU3	The store that I have just visited enables me to search and buy products faster.	
PU4	The store that I have just visited enhances my effectiveness in product searching and	
PU5	The store that I have just visited makes it easier to search for and purchase products.	
PU6	The store that I have just visited increases my productivity in searching and purchasing	
Ease of Use		
EOU1	The store that I have just visited is easy to use.	
EOU2	It is easy to become skillful at using the store I have just visited.	
EOU3	Learning to operate the store I have just visited is easy.	
EOU4	The store that I have just visited is flexible to interact with.	
EOU5	My interaction with the store I have just visited is clear and understandable.	
EOU6	It is easy to interact with the store I have just visited.	
Entertainment		
ENT1	The store I have just visited was lots of fun to browse.	
ENT2	I thought that the store I have just visited was clever and quite entertaining.	
ENT3	The store I have just visited was not just selling -- it was entertaining me and I appreciated	
ENT4	I liked the look and feel of the store I just visited.	
Purpose of Internet Use		
Social Communication	**SC1**	Meet new people
	SC2	Visit Chat Room
	SC3	Influence a Group
	SC4	Join a Group
Electronic Commerce	**EC1**	Buy Something
	EC2	Make Money
	EC3	Advertise
	EC4	Sell Something
Information Search	**IS1**	Get Educational Information
	IS2	Get Employment Information
	IS3	Work for a Job
	IS4	Get Product Information
Hobby	**H1**	Enjoy Myself
	H2	Hobby Information
	H3	Play Games
	H4	Download Software
	H5	Listen to Music

Table 41: Description of the Used Constructs' Items

APPENDIX B. Experiment's Supporting Material

B.1. Random Placement Form (United Kingdom & Greece)

Please tick one of the available (not ticked) numbers

Numbers	Tick in this column	Numbers	Tick in this column
61.		91.	
62.		92.	
63.		93.	
64.		94.	
65.		95.	
66.		96.	
67.		97.	
68.		98.	
69.		99.	
70.		100.	
71.		101.	
72.		102.	
73.		103.	
74.		104.	
75.		105.	
76.		106.	
77.		107.	
78.		108.	
79.		109.	
80.		110.	
81.		111.	
82.		112.	
83.		113.	
84.		114.	
85.		115.	
86.		116.	
87.		117.	
88.		118.	
89.		119.	
90.		120.	

Παρακαλώ σημειώστε έναν από τους παρακάτω διαθέσιμους (δηλ. όχι σημειωμένους) αριθμούς

Αριθμοί	Σημειώστε σε αυτήν τη στήλη	Αριθμοί	Σημειώστε σε αυτήν τη στήλη
1.		31.	
2.		32.	
3.		33.	
4.		34.	
5.		35.	
6.		36.	
7.		37.	
8.		38.	
9.		39.	
10.		40.	
11.		41.	
12.		42.	
13.		43.	
14.		44.	
15.		45.	
16.		46.	
17.		47.	
18.		48.	
19.		49.	
20.		50.	
21.		51.	
22.		52.	
23.		53.	
24.		54.	
25.		55.	
26.		56.	
27.		57.	
28.		58.	
29.		59.	
30.		60.	

B.2. Experiment Administration Form (United Kingdom & Greece)

ADMINISTRATION FORM

Subject Code Number (SCN)	User Name	Password	Layout	Name	Telephone	E-Mail
61.	shop	20113	Grid			
62.	shop	20213	Grid			
63.	shop	20313	Grid			
64.	shop	20413	Grid			
65.	shop	20513	Grid			
66.	shop	20613	Grid			
67.	shop	20713	Grid			
68.	shop	20813	Grid			
69.	shop	20913	Grid			
70.	shop	21013	Grid			
71.	shop	21113	Grid			
72.	shop	21213	Grid			
73.	shop	21313	Grid			
74.	shop	21413	Grid			
75.	shop	21513	Grid			
76.	shop	21613	Grid			
77.	shop	21713	Grid			
78.	shop	21813	Grid			
79.	shop	21913	Grid			
80.	shop	22013	Grid			
81.	shop	20123	Free-form			
82.	shop	20223	Free-form			
83.	shop	20323	Free-form			
84.	shop	20423	Free-form			
85.	shop	20523	Free-form			
86.	shop	20623	Free-form			
87.	shop	20723	Free-form			
88	shop	20823	Free-form			
89.	shop	20923	Free-form			
90.	shop	21023	Free-form			
91.	shop	21123	Free-form			
92.	shop	21223	Free-form			
93.	shop	21323	Free-form			
94.	shop	21423	Free-form			
95.	shop	21523	Free-form			
96.	shop	21623	Free-form			
97.	shop	21723	Free-form			
98.	shop	21823	Free-form			
99.	shop	21923	Free-form			
100.	shop	22023	Free-form			
101.	shop	20133	Racetrack			
102	shop	20233	Racetrack			
103.	shop	20333	Racetrack			
104.	shop	20433	Racetrack			
105.	shop	20533	Racetrack			
106.	shop	20633	Racetrack			
107.	shop	20733	Racetrack			
108.	shop	20833	Racetrack			
109.	shop	20933	Racetrack			
110.	shop	21033	Racetrack			
111.	shop	21133	Racetrack			
112.	shop	21233	Racetrack			
113.	shop	21333	Racetrack			
114.	shop	21433	Racetrack			
115.	shop	21533	Racetrack			
116.	shop	21633	Racetrack			
117.	shop	21733	Racetrack			
118.	shop	21833	Racetrack			
119.	shop	21933	Racetrack			
120.	shop	22033	Racetrack			

ΦΟΡΜΑ ΔΙΑΧΕΙΡΙΣΗΣ

Subject Code Number (SCN)	User Name	Password	Layout	Όνομα	Τηλέφωνο	E-Mail
1.	shop	10113	Grid			
2.	shop	10213	Grid			
3.	shop	10313	Grid			
4.	shop	10413	Grid			
5.	shop	10513	Grid			
6.	shop	10613	Grid			
7.	shop	10713	Grid			
8.	shop	10813	Grid			
9.	shop	10913	Grid			
10.	shop	11013	Grid			
11.	shop	11113	Grid			
12.	shop	11213	Grid			
13.	shop	11313	Grid			
14.	shop	11413	Grid			
15.	shop	11513	Grid			
16.	shop	11613	Grid			
17.	shop	11713	Grid			
18.	shop	11813	Grid			
19.	shop	11913	Grid			
20.	shop	12013	Grid			
21.	shop	10123	Free-form			
22.	shop	10223	Free-form			
23.	shop	10323	Free-form			
24.	shop	10423	Free-form			
25.	shop	10523	Free-form			
26.	shop	10623	Free-form			
27.	shop	10723	Free-form			
28.	shop	10823	Free-form			
29.	shop	10923	Free-form			
30.	shop	11023	Free-form			
31.	shop	11123	Free-form			
32.	shop	11223	Free-form			
33.	shop	11323	Free-form			
34.	shop	11423	Free-form			
35.	shop	11523	Free-form			
36.	shop	11623	Free-form			
37.	shop	11723	Free-form			
38.	shop	11823	Free-form			
39.	shop	11923	Free-form			
40	shop	12023	Free-form			
41.	shop	10133	Racetrack			
42.	shop	10233	Racetrack			
43.	shop	10333	Racetrack			
44.	shop	10433	Racetrack			
45.	shop	10533	Racetrack			
46.	shop	10633	Racetrack			
47.	shop	10733	Racetrack			
48.	shop	10833	Racetrack			
49.	shop	10933	Racetrack			
50.	shop	11033	Racetrack			
51.	shop	11133	Racetrack			
52.	shop	11233	Racetrack			
53.	shop	11333	Racetrack			
54.	shop	11433	Racetrack			
55.	shop	11533	Racetrack			
56.	shop	11633	Racetrack			
57.	shop	11733	Racetrack			
58.	shop	11833	Racetrack			
59.	shop	11933	Racetrack			
60.	shop	12033	Racetrack			

B.3. Instructional Leaflet (United Kingdom & Greece)

Instructional Leaflet

As a result of the rapid growth of the Internet and the World Wide Web, many organisations are using this new medium for a variety of purposes. This study examines the virtual store environment effects on consumer buying behaviour. The application area of this research is the Grocery sector. This particular sector is characterised by high turnover and high volume of business-to-consumer transactions on a daily basis, comprising, therefore, a challenging research issue.

The experiment in which you will participate consists of three sections. In Section 1 you will be asked to fill out a small questionnaire, which will take approximately 5-10 minutes to complete. This part of the questionnaire (Part A) deals with questions regarding Internet usage and shopping behaviour. In Section 2, you will be asked to enter the virtual store and conduct shopping (login name and password will be provided to you right before entering the store by the experiment administrator). You are offered a "20 pounds free shopping budget" to purchase any product or products you wish from this lab-store. The products you will select (i.e., number of items purchased, specific brands) will be physically purchased for you from a conventional Grocery store, and then delivered to you within 15 days at the same place where you participated in the experiment. For the scope of the present study you are free to buy any products you like from the virtual store you are about to enter, however, the total cost of these products should not exceed 20 pounds. You will also be provided with a shopping list, to fill out right before entering the store, in order to plan your shopping. You are kindly requested to enter categories of products (i.e., detergents, refreshments, etc.) instead of brands (i.e., Tide, Coke, etc.) in this shopping list. Furthermore, own label products that exist in the store will be purchased for you from "Sainsbury's" hypermarket. Finally, it should be clarified that delivery cost is included in product prices.

This online store looks more like a small grocery store employing a quite narrow but representative product variety rather like a hypermarket. It does not include a wide variety of fresh produce (i.e., fruits, vegetables, eggs) and other fresh products (i.e., meat, bread, fresh butter), or special products (e.g., cigars, newspapers, books, shoes, electronics). However, some fresh products like yoghurt, milk, cheese and juices are offered.

In Section 3, which will take place right after you decide to exit the store (you are free to navigate within the store for as much time as you wish), you will be asked to fill out the second half of the questionnaire. It consists of two (2) parts. Part B will take approximately 5-10 minutes to complete. It includes a series of questions regarding the shopping experience you just had in the store. Finally, Part C will take 2-3 minutes to complete and contains only a few questions for classification purposes.

Please note that your participation is voluntary. You may choose not to participate. You may refuse to answer particular questions. Finally, at the end you will be asked some questions and your answers will be tape-recorded. You indicate your voluntary agreement to participate by completing and returning Part A, Part B and Part C of the questionnaire. All of your responses will be kept completely confidential and the major results of the study will be communicated to you upon completion of this research.

Thank you very much for your participation!

Adam P. Vrechopoulos, Ph.D. Candidate
Brunel University, Department of Information Systems and Computing
Supervisors: Professor Bob O'Keefe, Head of Department
Professor Georgios I. Doukidis, Visiting Professor

Ενημερωτικό Φυλλάδιο

Ως αποτέλεσμα της ραγδαίας εξέλιξης του Internet και του World Wide Web, πολλοί οργανισμοί χρησιμοποιούν αυτό το νέο μέσο για μια σειρά δραστηριοτήτων και σκοπών. Η παρούσα έρευνα εξετάζει τις επιδράσεις του αγοραστικού περιβάλλοντος ενός εικονικού καταστήματος στο Internet στη συμπεριφορά του καταναλωτή. Το πεδίο εφαρμογής της έρευνας αυτής αναφέρεται στο Λιανεμπόριο και πιο συγκεκριμένα στο αγοραστικό περιβάλλον ενός «ηλεκτρονικού Σούπερ Μάρκετ» στο Internet. Ο συγκεκριμένος κλάδος χαρακτηρίζεται από μεγάλους τζίρους και μεγάλα μεγέθη συναλλαγών επιχείρησης-προς-τελικό καταναλωτή (Business-to-Consumer), σε καθημερινή βάση. Ως εκ τούτου, ο κλάδος αυτός συνιστά μια αρκετά ενδιαφέρουσα ερευνητική περιοχή με πολλές προεκτάσεις.

Το πείραμα στο οποίο θα συμμετέχετε, αποτελείται από 3 Ενότητες. Στην 1η Ενότητα θα σας ζητηθεί να συμπληρώσετε ένα μικρό ερωτηματολόγιο, το οποίο θα σας πάρει περίπου 5-10 λεπτά. Το μέρος αυτό του ερωτηματολογίου (Μέρος Α) αναφέρεται σε θέματα που αφορούν στη χρήση και στην αγοραστική συμπεριφορά των καταναλωτών απέναντι στο Internet. Στην 2η Ενότητα, θα σας ζητηθεί να εισέλθετε στο εικονικό κατάστημα και να υλοποιήσετε τις αγορές σας (το login name και το password θα σας δοθεί από τον υπεύθυνο του πειράματος). Έχετε 12.000 δρχ. ως διαθέσιμο ποσό για την υλοποίηση των αγορών σας και μπορείτε συνεπώς να αγοράσετε όποια προϊόντα επιθυμείτε από το εικονικό κατάστημα. Τα προϊόντα που θα επιλέξετε (δηλ. αριθμός προϊόντων, συγκεκριμένες μάρκες) θα αγορασθούν για σας από κάποιο «φυσικό Σούπερ Μάρκετ» και θα σας παραδωθούν εντός 15 ημερών στο ίδιο μέρος στο οποίο συμμετείχατε στο πείραμα. Για τους σκοπούς της συγκεκριμένης έρευνας είστε ελεύθεροι να αγοράσετε όποια προϊόντα επιθυμείτε, όμως το συνολικό κόστος αυτών δεν θα πρέπει να ξεπερνά τις 12.000 δρχ.. Θα σας δωθεί επίσης και μια αγοραστική λίστα προϊόντων την οποία θα πρέπει να συμπληρώσετε πριν εισέλθετε στο εικονικό κατάστημα. Θα σας παρακαλούσαμε να μην εισάγετε σε αυτή την λίστα μάρκες προϊόντων (π.χ. Coca-Cola, Tide, κ.τ.λ.) αλλά κατηγορίες προϊόντων (π.χ. Αναψυκτικά, Απορρυπαντικά, κ.τ.λ.). Επιπροσθέτως, μερικά "Own Label" προϊόντα (π.χ. χαρτί κουζίνας "ΑΒ Βασιλόπουλος") που υπάρχουν στο κατάστημα, θα αγορασθούν από τα Σούπερ Μάρκετ «ΑΒ ΒΑΣΙΛΟΠΟΥΛΟΣ». Τέλος, θα πρέπει να διασαφηνιστεί ότι το κόστος μεταφοράς και παράδοσης των προϊόντων περιλαμβάνεται στις τιμές και αυτό εξηγεί τα σχετικά υψηλά επίπεδά τους.

Το κατάστημα αυτό μοιάζει περισσότερο με ένα μεγάλο "μπακάλικο" το οποίο έχει μια περιορισμένη αλλά όσο το δυνατόν αντιπροσωπευτική γκάμα προϊόντων, παρά με ένα "hypermarket". Δεν περιλαμβάνει φρέσκα προϊόντα όπως φρούτα, λαχανικά, αυγά, κρέας, ψωμί, βούτυρο, κ.τ.λ., κυρίως λόγω μεταφορικών προβλημάτων. Παρόλα αυτά, μερικά φρέσκα προϊόντα όπως γιαούρτι, γάλα, τυρί και χυμοί, υπάρχουν στον κατάστημα. Τέλος, το κατάστημα δεν περιλαμβάνει προϊόντα όπως τσιγάρα, εφημερίδες, περιοδικά, κ.τ.λ.

Στην 3η Ενότητα, η οποία θα λάβει χώρα αμέσως μετά την έξοδό σας από το εικονικό κατάστημα, (μπορείτε να πλοηγηθήτε στο κατάστημα όση ώρα επιθυμείτε), θα σας ζητηθεί να συμπληρώσετε το δεύτερο μέρος του ερωτηματολογίου το οποίο με τη σειρά του αποτελείται από 2 μέρη. Το Μέρος Β θα σας πάρει περίπου 5-10 λεπτά να το συμπληρώσετε. Περιλαμβάνει μια σειρά ερωτήσεων που αναφέρονται στην αγοραστική εμπειρία που είχατε επισκεπτόμενοι το συγκεκριμένο κατάστημα. Τέλος, το Μέρος Γ θα σας πάρει περίπου 2-3 λεπτά να το συμπληρώσετε και περιέχει μόνο μερικές ερωτήσεις για καθαρά λόγους ταξινόμησης.

Θα πρέπει να σημειωθεί ότι η συμμετοχή σας είναι εθελοντική. Μπορείτε να επιλέξετε να μην συμμετέχετε. Μπορείτε επίσης να αρνηθήτε να απαντήσετε σε συγκεκριμένες ερωτήσεις. Επίσης, στο τέλος του πειράματος θα σας ζητηθεί να απαντήσετε σε μερικές ερωτήσεις και οι απαντήσεις που θα δώσετε θα μαγνητοφωνηθούν. Δηλώνετε την εθελοντική σας συμμετοχή στην έρευνα αυτή επιστρέφοντας τα Μέρη Α, Β και Γ του ερωτηματολογίου. Όλες οι απαντήσεις σας θα μεταχειριστούν με απόλυτη εμπιστευτικότητα και τα βασικά συμπεράσματα της παρούσας μελέτης θα σας παρουσιασθούν μετά την ολοκλήρωση της έρευνας.

Σας ευχαριστούμε πολύ για την συμμετοχή

Αδάμ Βρεχόπουλος, Υποψήφιος Διδάκτωρ
Brunel University
Department of Information Systems and Computing
Επιβλέποντες: Καθηγητής Bob O'Keefe, Πρόεδρος Τμήματος
Καθηγητής Georgios I. Doukidis, Επισκέπτης Καθηγητής

B.4. Questionnaire's Part A (United Kingdom & Greece)

SCN:

QUESTIONNAIRE

You are kindly requested to fill out this questionnaire. It should be noted that different styles of questions are included and your attention while filling out this questionnaire (e.g., circling the appropriate numbers) is crucial for the reliability of the results. Thank you for your participation!

Part A: Internet Usage and Shopping Behaviour

A.1. Below is a list of possible purposes for using the Internet. Please indicate whether you engage in a particular activity and rate each, indicating its *frequency of use* (by circling the appropriate number).

	Use				
	Never	Rarely	Occasionally	Quite Frequently	Daily
1. Visit Chat room	1	2	3	4	5
2. Influence a Group	1	2	3	4	5
3. Join a Group	1	2	3	4	5
4. Make Money	1	2	3	4	5
5. Advertise	1	2	3	4	5
6. Sell Something	1	2	3	4	5
7. Get Educational Information	1	2	3	4	5
8. Get Employment Information	1	2	3	4	5
9. Work for a Job	1	2	3	4	5
10. Enjoy Myself	1	2	3	4	5
11. Hobby Information	1	2	3	4	5
12. Play Games	1	2	3	4	5
13. Download Software	1	2	3	4	5
14. Listen to Music					

A.2. Which types of products/services have you purchased (i.e., pay for them; free downloads are not included) through the Internet in the past (please tick)?

1. Both Intangible (e.g., software, tickets, information, etc.) and Tangible (e.g., hardaware, books, clothes, furniture, etc.) ☐
2. Only Intangible (e.g., software, tickets, information, etc.) ☐
3. Only Tangible (e.g., hardaware, books, clothes, furniture, etc.) ☐
4. I have never made any purchases through the Internet ☐

A.3. Please indicate the importance of the following store attributes when selecting an Internet retail store to conduct your purchases (by circling the appropriate number).

		Not at all Important	Somewhat Important	Of Medium Importance	Important	Very Important
1.	Prices of the merchandise	1	2	3	4	5
2.	Quality of the merchandise	1	2	3	4	5
3.	Variety/Assortment of the merchandise	1	2	3	4	5
4.	Store Atmosphere (i.e., product display techniques, store décor, background music, store layout, etc.)	1	2	3	4	5
5.	Customer Service and Support (i.e., personalised support during shopping, delivery/pick up service, alternative payment methods, etc.)	1	2	3	4	5
6.	Quality of Advertising	1	2	3	4	5
7.	Sales and Specials (i.e., in-store promotions, etc.)	1	2	3	4	5
8.	After Sales Support (i.e., information about new products and special offers through e-mail, etc.)	1	2	3	4	5
9.	Store reputation	1	2	3	4	5
10.	Quick access to the store's Web site/Web site's speed	1	2	3	4	5
11.	Availability of the displayed merchandise (i.e., minimal stock-outs)	1	2	3	4	5
12.	Security in transactions	1	2	3	4	5

SCN:

ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ

Σας παρακαλούμε όπως συμπληρώσετε το παρόν ερωτηματολόγιο. Θα πρέπει να σημειωθεί ότι έχουν χρησιμοποιηθεί διαφορετικών ειδών ερωτήσεις και η προσοχή σας κατά τη διάρκεια συμπλήρωσής τους (π.χ. βάζοντας σε κύκλο τις απαντήσεις σας) είναι εξαιρετικά σημαντική για την αξιοπιστία των αποτελεσμάτων. Σας ευχαριστούμε για την συμμετοχή!

Μέρος Α: Χρήση Internet και Καταναλωτική Συμπεριφορά

Α.1 Παρακάτω είναι μια λίστα με πιθανούς λόγους χρήσης του Internet. Παρακαλώ απαντήστε σχετικά με το κατά πόσο χρησιμοποιήτε το Internet για κάθε μια από τις παρακάτω διαδικασίες, προσδιορίζοντας τη *συχνότητα χρήσης* (*βάζοντας σε κύκλο το κατάλληλο νούμερο*).

	Χρήση Ποτέ ----------Σπάνια----------Μερικές Φορές--------Αρκετά Συχνά-----Καθημερινά
1. Επίσκεψη σε Chat room	1----------2----------3----------4----------5
2. Επιρροή γκρουπ	1----------2----------3----------4----------5
3. Συμμετοχή σε γκρουπ	1----------2----------3----------4----------5
4. Κερδίζω χρήματα	1----------2----------3----------4----------5
5. Διαφημίζω	1----------2----------3----------4----------5
6. Πουλάω κάτι	1----------2----------3----------4----------5
7. Παίρνω εκπαιδευτική πληροφορία	1----------2----------3----------4----------5
8. Παίρνω εργασιακή πληροφορία	1----------2----------3----------4----------5
9. Δουλεύω	1----------2----------3----------4----------5
10. Διασκεδάζω	1----------2----------3----------4----------5
11. Παίρνω πληροφορίες για τα hobby μου	1----------2----------3----------4----------5
12. Παίζω παιχνίδια	1----------2----------3----------4----------5
13. Κατεβάζω Λογισμικό	1----------2----------3----------4----------5
14. Ακούω Μουσική	1----------2----------3----------4----------5

Α.2. Τι είδους προϊόντα/υπηρεσίες έχετε αγοράσει από το Internet (δηλ. έχετε πληρώσει για αυτά - τα δωρεάν "downloads" δεν συμπεριλαμβάνονται) στο παρελθόν (παρακαλώ σημειώστε το κατάλληλο τετραγωνάκι με ν)?

1. Άϋλα προϊόντα (π.χ., λογισμικό, εισητήρια, πληροφορία, κ.τ.λ.) και Υλικά προϊόντα (π.χ., υπολογιστές, βιβλία, ρούχα, έπιπλα, κ.τ.λ.) ☐
2. Μόνο Άϋλα προϊόντα (π.χ., λογισμικό, εισητήρια, πληροφορία, κ.τ.λ.) ☐
3. Μόνο Υλικά προϊόντα (π.χ., υπολογιστές, βιβλία, ρούχα, έπιπλα, κ.τ.λ.) ☐
4. Δεν έχω αγοράσει ποτέ μέσω Internet ☐

Α.3. Παρακαλώ προσδιορίστε τη σημαντικότητα που έχουν για εσάς τα παρακάτω χαρακτηριστικά κατά τη διαδικασία επιλογής ενός καταστήματος λιανεμπορίου στο Internet *(βάζοντας σε κύκλο το κατάλληλο νούμερο)*

		Καθόλου Σημαντικό	Κάπως Σημαντικό	Σχετικά Σημαντικό	Σημαντικό	Πολύ Σημαντικό
1.	Τιμές προϊόντων	1	2	3	4	5
2.	Ποιότητα προϊόντων	1	2	3	4	5
3.	Ποικιλία προϊόντων	1	2	3	4	5
4.	Ατμόσφαιρα Καταστήματος (π.χ., τεχνικές παρουσίασης προϊόντων, διακόσμηση, μουσική, δομή καταστήματος, κ.τ.λ.)	1	2	3	4	5
5.	Εξυπηρέτηση και Υποστήριξη Πελατών (π.χ., εξατομικευμένη υποστήριξη κατά τη διάρκεια της αγοραστικής δραστηριότητας, παράδοση προϊόντων στο σπίτι /δυνατότητα παραλαβής από το κατάστημα, εναλλακτικοί τρόποι πληρωμής, κ.τ.λ.)	1	2	3	4	5
6.	Ποιότητα διαφήμισης	1	2	3	4	5
7.	Εκπτώσεις (π.χ., προωθήσεις προϊόντων στο κατάστημα)	1	2	3	4	5
8.	Υποστήριξη πελατών μετά την πώληση (π.χ., πληροφορίες για νέα προϊόντα και προωθητικές δραστηριότητες μέσω e-mail, κ.τ.λ.)	1	2	3	4	5
9.	Φήμη Καταστήματος	1	2	3	4	5
10.	Γρήγορη πρόσβαση στο Web site / Ταχύτητα του Web site	1	2	3	4	5
11.	Διαθεσιμότητα προϊόντων (δηλ., ελάχιστα stock-outs)	1	2	3	4	5
12.	Ασφάλεια στις συναλλαγές	1	2	3	4	5

B.5. Shopping List (United Kingdom & Greece)

SCN:

SHOPPING LIST	

A/A	Product Category
1.	
2.	
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40.	

SCN:

ΛΙΣΤΑ ΑΓΟΡΩΝ

A/A	**Κατηγορία Προϊόντων**
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B.6. User Name and Password form (United Kingdom & Greece)

SCN:

User Name:	
Password:	

B.7. Questionnaire's Parts B and C (United Kingdom & Greece)

SCN:

QUESTIONNAIRE

You are kindly requested to fill out this questionnaire. It should be noted that different styles of questions are included and your attention while filling out this questionnaire (e.g., circling the appropriate numbers) is crucial for the reliability of the results. Thank you for your participation!

Part B: Shopping Experience Evaluation

B.1. Please indicate your agreement/disagreement with the next set of statements using the following rating scale (by circling the appropriate number):

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

		Strongly Disagree						Strongly Agree
1.	The store that I have just visited is useful for searching and buying products.	1	2	3	4	5	6	7
2.	The store that I have just visited improves my performance in product searching and buying.	1	2	3	4	5	6	7
3.	The store that I have just visited enables me to search and buy products faster.	1	2	3	4	5	6	7
4.	The store that I have just visited enhances my effectiveness in product searching and buying.	1	2	3	4	5	6	7
5.	The store that I have just visited makes it easier to search for and purchase products.	1	2	3	4	5	6	7
6.	The store that I have just visited increases my productivity in searching and purchasing products.	1	2	3	4	5	6	7
7.	The store that I have just visited is easy to use.	1	2	3	4	5	6	7
8.	It is easy to become skillful at using the store I have just visited.	1	2	3	4	5	6	7
9.	Learning to operate the store I have just visited is easy.	1	2	3	4	5	6	7
10.	The store that I have just visited is flexible to interact with.	1	2	3	4	5	6	7
11.	My interaction with the store I have just visited is clear and understandable.	1	2	3	4	5	6	7
12.	It is easy to interact with the store I have just visited.	1	2	3	4	5	6	7
13.	The store I have just visited was lots of fun to browse.	1	2	3	4	5	6	7
14.	I thought that the store I have just visited was clever and quite entertaining.	1	2	3	4	5	6	7
15.	The store I have just visited was not just selling -- it was entertaining me and I appreciated that.	1	2	3	4	5	6	7
16.	I liked the look and feel of the store I just visited.	1	2	3	4	5	6	7

Part C: Demographic Data

C1. Age: 18-25 ☐ 26-30 ☐ 31-35 ☐ 36-50 ☐ >50 ☐

C2. Gender: Male ☐ Female ☐

C3. Education: High School/Lyceum ☐ Undergraduate ☐ Graduate ☐ Post Graduate ☐

C4. Occupation: _____

C5. Average monthly budget spent for grocery shopping: ☐

Thank you very much for your participation!

SCN:

ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ

Σας παρακαλούμε όπως συμπληρώσετε το παρόν ερωτηματολόγιο. Θα πρέπει να σημειωθεί ότι έχουν χρησιμοποιηθεί διαφορετικών ειδών ερωτήσεις και η προσοχή σας κατά τη διάρκεια συμπλήρωσής τους (π.χ. βάζοντας σε κύκλο τις απαντήσεις σας) είναι εξαιρετικά σημαντική για την αξιοπιστία των αποτελεσμάτων. Σας ευχαριστούμε για την συμμετοχή!

Μέρος Β: Αξιολόγηση Αγοραστικής Εμπειρίας

Β.1. Παρακαλώ, σημειώστε το βαθμό που συμφωνείτε/διαφωνείτε με τις επόμενες δηλώσεις, χρησιμοποιώντας την παρακάτω κλίμακα *(βάζοντας σε κύκλο το κατάλληλο νούμερο)*:

1	2	3	4	5	6	7
Διαφωνώ Απολύτως	Διαφωνώ	Διαφωνώ Κάπως	Ουδέτερος/η	Συμφωνώ Κάπως	Συμφωνώ	Συμφωνώ Απολύτως

		Διαφωνώ Απολύτως						Συμφωνώ Απολύτως
1.	Το κατάστημα που μόλις επισκέφτηκα είναι χρήσιμο για την αναζήτηση και την αγορά προϊόντων.	1	2	3	4	5	6	7
2.	Το κατάστημα που μόλις επισκέφτηκα βελτιώνει την απόδοσή μου στον εντοπισμό και την αγορά προϊόντων.	1	2	3	4	5	6	7
3.	Το κατάστημα που μόλις επισκέφτηκα μου δίνει τη δυνατότητα να ψάχνω και να αγοράζω προϊόντα γρήγορα.	1	2	3	4	5	6	7
4.	Το κατάστημα που μόλις επισκέφτηκα αυξάνει την αποτελεσματικότητά μου στην αναζήτηση και αγορά προϊόντων.	1	2	3	4	5	6	7
5.	Το κατάστημα που μόλις επισκέφτηκα κάνει εύκολη την αναζήτηση και την αγορά προϊόντων.	1	2	3	4	5	6	7
6.	Το κατάστημα που μόλις επισκέφτηκα αυξάνει την απόδοσή μου σχετικά με την αναζήτηση και αγορά προϊόντων.	1	2	3	4	5	6	7
7.	Το κατάστημα που μόλις επισκέφτηκα είναι εύκολο στη χρήση.	1	2	3	4	5	6	7
8.	Είναι εύκολο να αποκτήσεις δεξιότητες όσον αφορά τη χρήση του καταστήματος που μόλις επισκέφτηκα.	1	2	3	4	5	6	7
9.	Το να μάθεις να λειτουργείς το κατάστημα που μόλις επισκέφτηκα είναι εύκολο.	1	2	3	4	5	6	7
10.	Το κατάστημα που μόλις επισκέφτηκα είναι ευέλικτο στο να αλληλεπιδράς μαζί του.	1	2	3	4	5	6	7
11.	Η αλληλεπίδρασή μου με το κατάστημα που μόλις επισκέφτηκα είναι καθαρή και κατανοητή.	1	2	3	4	5	6	7
12.	Είναι εύκολο να αλληλεπιδράς με το κατάστημα που μόλις επισκέφτηκα.	1	2	3	4	5	6	7
13.	Το κατάστημα που μόλις επισκέφτηκα μου πρόσφερε αρκετή διασκέδαση κατά τη διάρκεια της πλοήγησης.	1	2	3	4	5	6	7
14.	Πιστεύω ότι το κατάστημα που μόλις επισκέφτηκα ήταν έξυπνο και πολύ διασκεδαστικό.	1	2	3	4	5	6	7
15.	Το κατάστημα που μόλις επισκέφτηκα δεν πουλούσε απλά – με διασκέδασε και το εκτίμησα αυτό.	1	2	3	4	5	6	7
16.	Μου άρεσε η όψη και η αίσθηση του καταστήματος που μόλις επισκέφτηκα.	1	2	3	4	5	6	7

Μέρος Γ: Δημογραφικά Στοιχεία

Γ1. Ηλικία: 18-25 ☐ 26-30 ☐ 31-35 ☐ 36-50 ☐ >50 ☐

Γ2. Φύλο: Άνδρας ☐ Γυναίκα ☐

Γ4. Μόρφωση: Γυμνάσιο/ Λύκειο ☐ Προπτυχιακός ☐ Πτυχιούχος ☐ Μετα-πτυχιακό ☐

Γ5. Επάγγελμα:_____

Γ6. Μέσο μηνιαίο χρηματικό ποσό για αγορές από Σούπερ Μάρκετ: ☐

Σας ευχαριστούμε πολύ για την συμμετοχή σας!

APPENDIX C. Virtual Laboratory Retail Store

C.1. Entity Relationship Diagram and Abstract Interface Design per Layout

C.1.1. Grid Layout

C.1.1.1. Development of the Entity-Relationship Diagram

The entity–relationship diagram for the grid layout design in a virtual store was developed. The relevant diagram is presented in Figure 55 (The E-R diagram was implemented in Microsoft SQL Server 2000, where every entity is a separate table). In Figure 55, the fields of each entity are also presented, so that the database will be able to keep all required information.

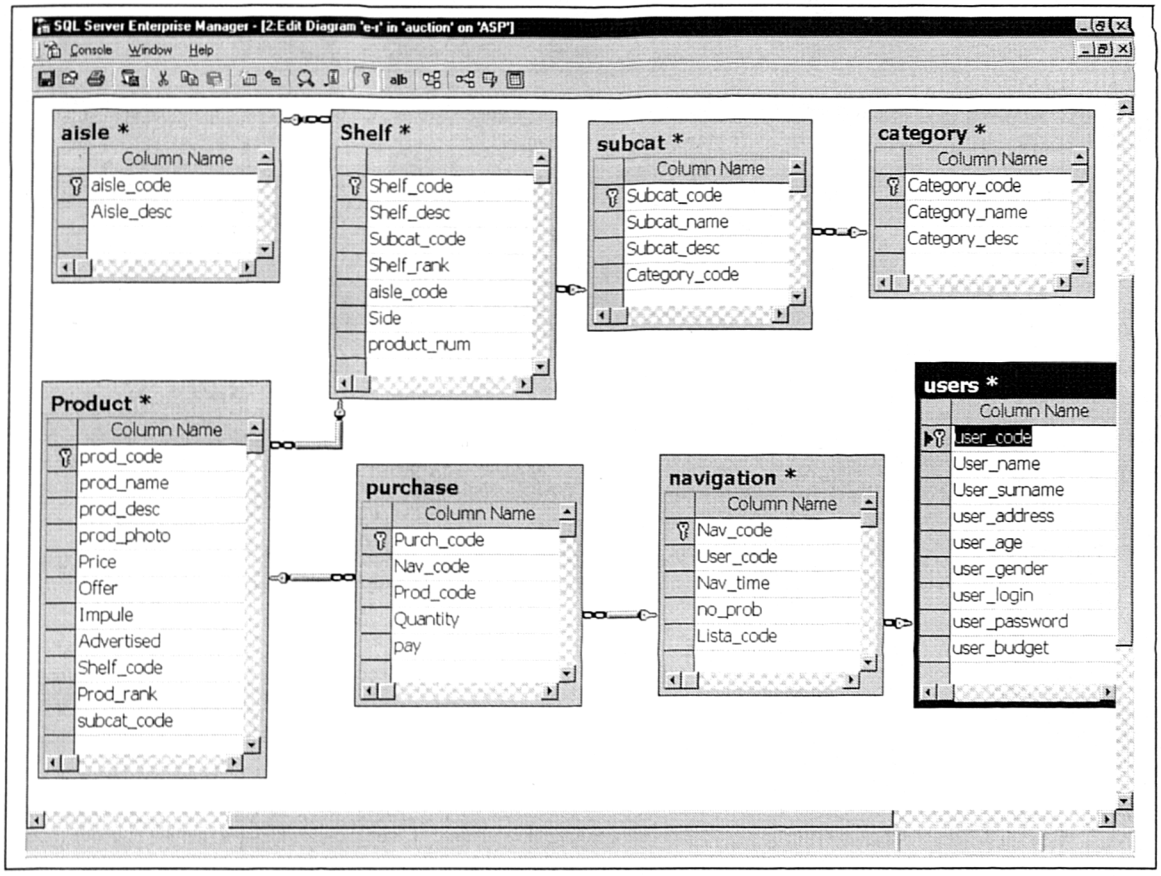


Figure 55: The Entity Relationship Diagram for the Grid Layout

C.1.1.2. Abstract Interface Design

User interface design is a critical activity in interactive applications including hypermedia (Schwabe and Rossi 1995). Therefore, user interfaces were designed which were both user friendly and followed the rules of each particular layout.

a) Login page

In this page the customer would fill a form giving his/her login/user name, and password. This page was the same in all three different store layout designs, and depending on the user name and password, the customer would randomly enter one of the three approaches (layouts), by clicking the button "Enter". At the same time a basket was initiated and all customer transactions were recorded.

b) Main Page (Page G1)

This page appeared every time the customer was at any navigational node. An abstract design of this page is presented in Figure 56:

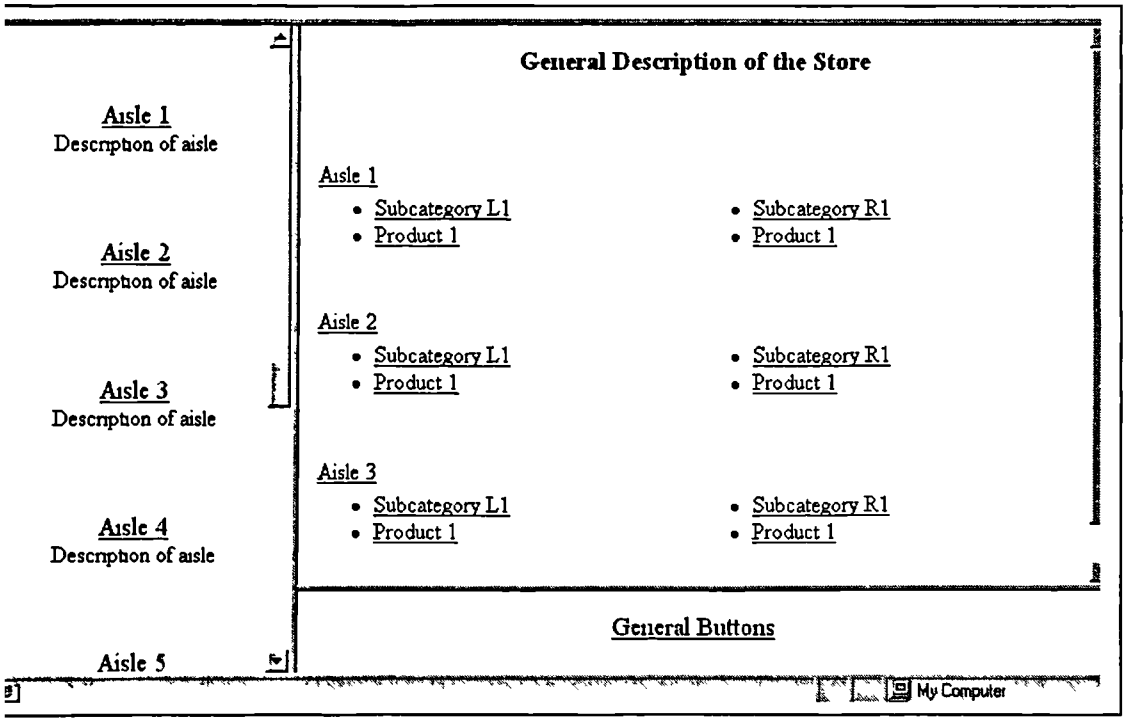


Figure 56: Main Page (Page G1) of the Grid Layout

Notes:

- General buttons are the buttons described in Chapter 5.

- It is allowable for the customer at a navigational node to have access to the first from the left subcategory and to the first from the right subcategory of every aisle, and also to the first product of those subcategories
- When an aisle is selected, the customer moves to page G2
- When a subcategory is selected, the customer moves to page G3.
- When a product is selected, the customer moves to page G4.
- When the customer is scrolling down or up the left or the right frame of this page, it is like he/she is walking up and down in front of the aisles.
- Neighborhood aisles appear according to the node that the customer is on

c) Page G2

This page simulated the walking of a customer in the middle of an aisle. An abstract page looks like Figure 57.

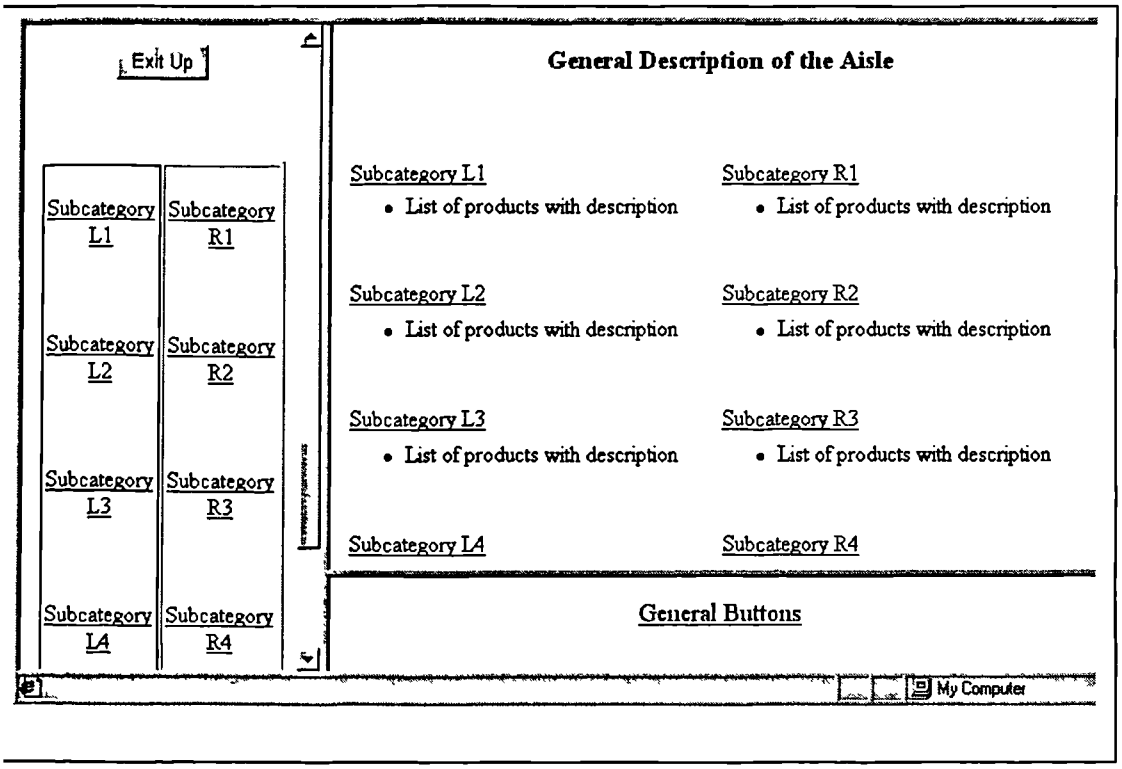


Figure 57: Page G2 of the Grid Layout

Notes:

- A description of the subcategory may appear on the left frame
- The buttons "Exit Up" and "Exit Down" lead to the navigational nodes up and down the aisle.
- The left frame is divided in two columns in order to represent the left and right sides of the aisle.

- At the right frame (except for the subcategories links), a list of the products of each subcategory appears. There are no links to concentrate on those products. To visit the products, the customer must concentrate (turn) to a side and then choose a subcategory. It is assumed that when walking in the middle of an aisle, the customer is just browsing the products.
- By selecting a subcategory, the customer moves to page G3.

d) Page G3

This page (Figure 58) appeared when the customer would select a specific shelf (subcategory).

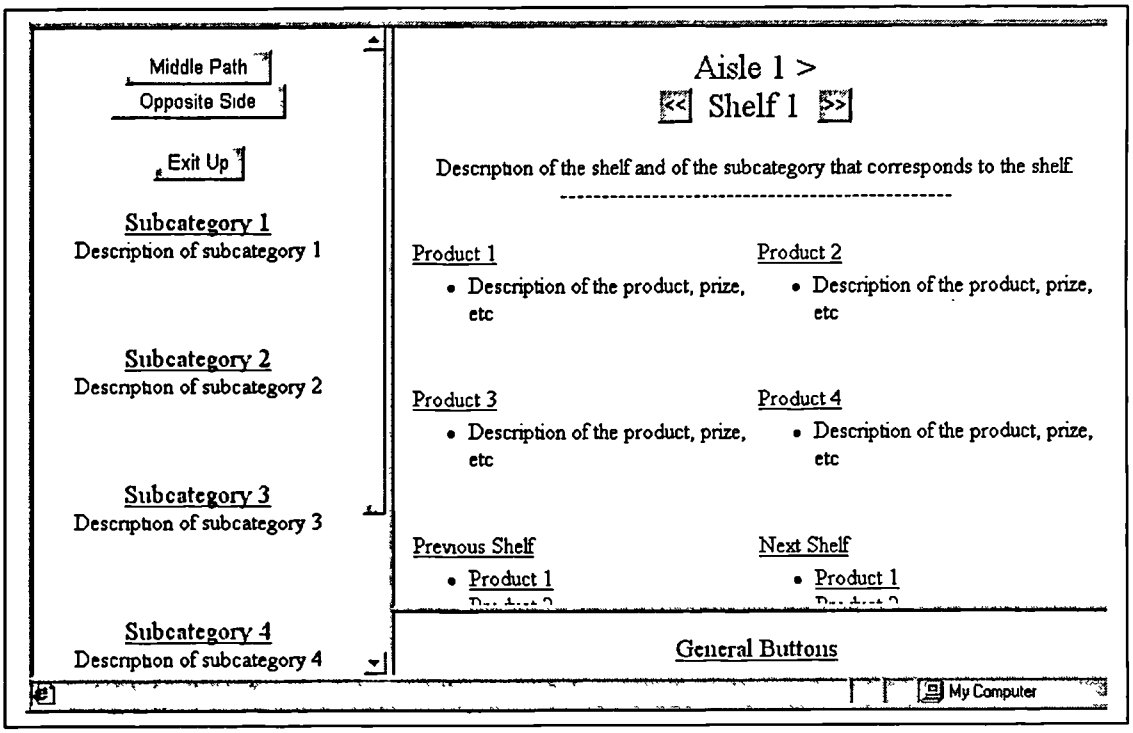


Figure 58: Page G3 of the Grid Layout

Notes:

- The button "Middle path" moves the customer to page G2.
- The button "Opposite side" moves the customer to the opposite shelf of the same aisle.
- The buttons "Exit up" and "Exit down" are the same as the ones in page G2
- The buttons next to the title of the shelf lead the customer to the next or the previous shelf on the same side of the specific aisle.
- At the right frame (except for the links to the products) of the shelf there are also links to the next and the previous shelf and to a number (half) of products on those shelves.

e) Page G4

This page appeared when the customer selects a specific product (Figure 59).

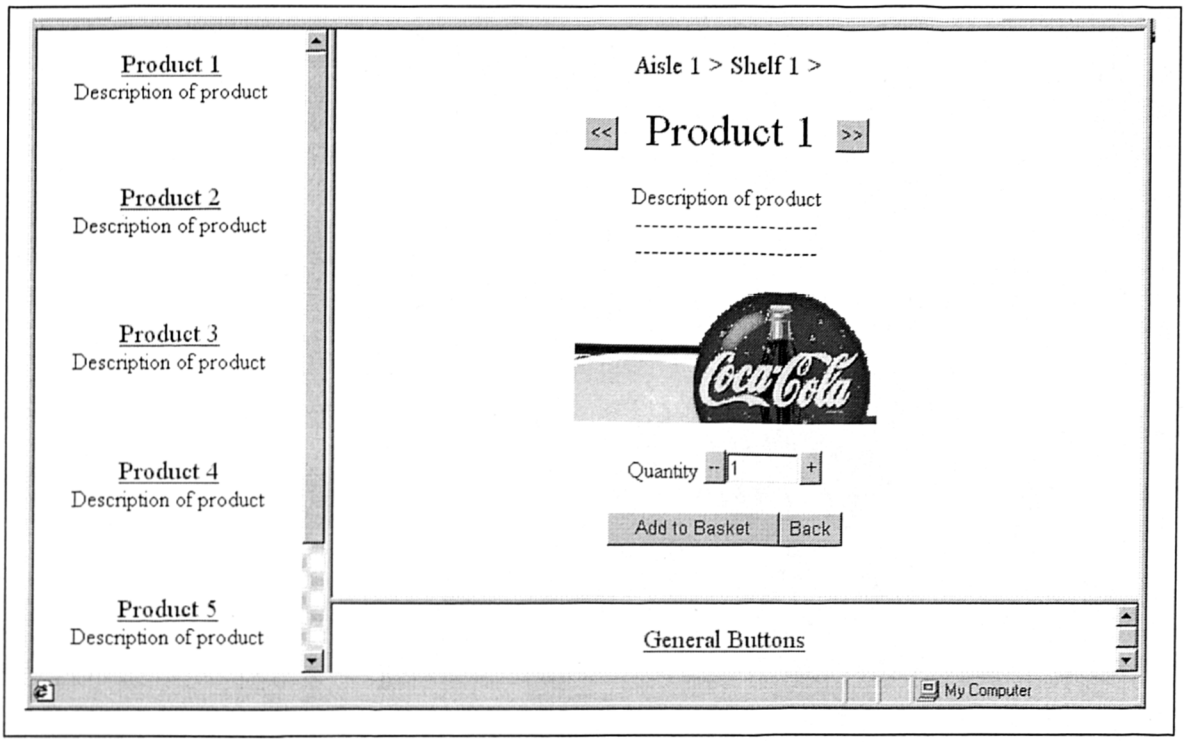


Figure 59: Page G4 of the Grid Layout

Notes:

- At the left frame the user has access to all the products of the shelf.
- The field quantity has a default value of 1. The customer can increase or decrease the quantity by using the appropriate buttons.
- The button "Add to basket" adds the specific product and its quantity to the customer's basket.
- The customer can navigate to page G3 by clicking the button "back".

f) Page "Basket"

This page appeared on a separate window. When the customer would close this window he/she would go back at the same page where he/she was before (Figure 60).

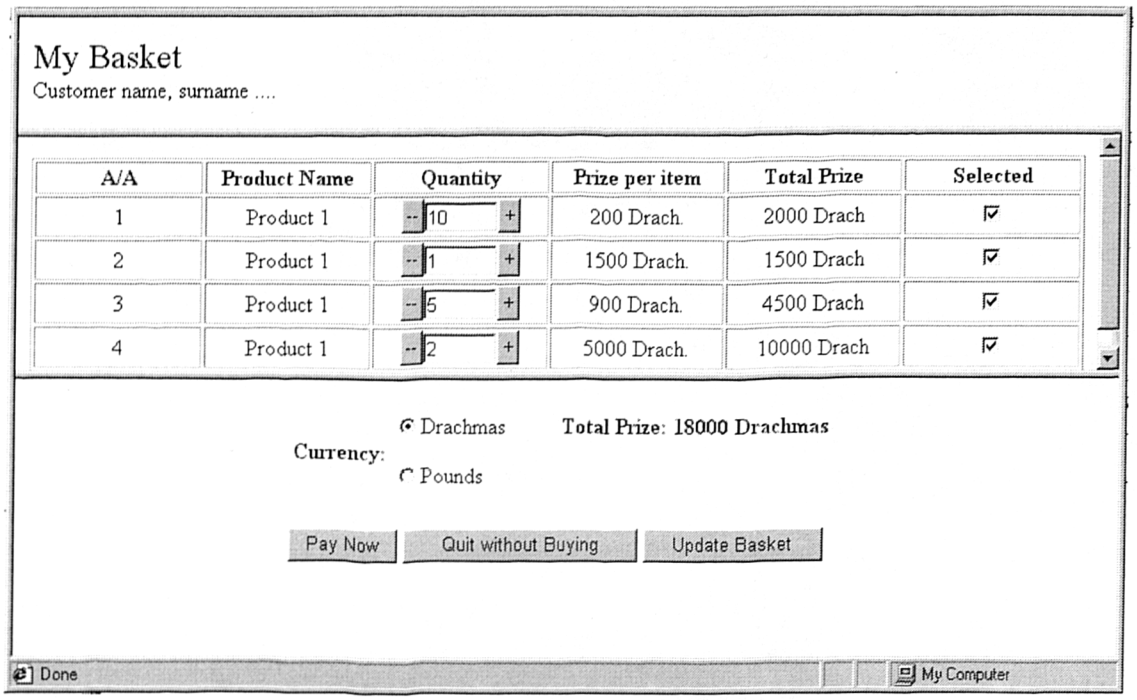


Figure 60: Page "Basket" of the Grid Layout

Notes:

- Page "Basket" appears every time the customer wants to check his/her basket (button "view basket" from general buttons), or check out (button "quit" from general buttons), or add a product to his/her basket (button "add to basket" from page G4).
- The customer may change the quantity of the products he/she has put in his/her basket by using the appropriate buttons.
- The customer may unselect a product that he/she has put in his/her basket by using the check box "Selected."
- The option "Currency" is a radio button. The customer may switch to "Drachmae" or "Pounds" depending on the currency he/she wants to use.
- In order to implement the changes described in (2), (3) and (4), the customer must click the button "Update Basket."
- The button "Pay now," can be used by the customer to check out from the store and make the payment. When the customer clicks this button, the database updates all the appropriate records and the page "Login" appears.
- In case a customer wants to navigate within the store without buying anything, he/she must click the button "Quit without buying." Then the databases update some basic records (e.g., time of staying) and the "Login" page appears again.

C.1.2. Free-Form Layout

C.1.2.1. Development of the Entity-Relationship Diagram

The analysis presented above lead to the development of the entity–relationship diagram for the freeform layout design. The corresponding diagram is presented in Figure 61. This E-R diagram was implemented in Microsoft SQL Server 2000, where every entity is a table.

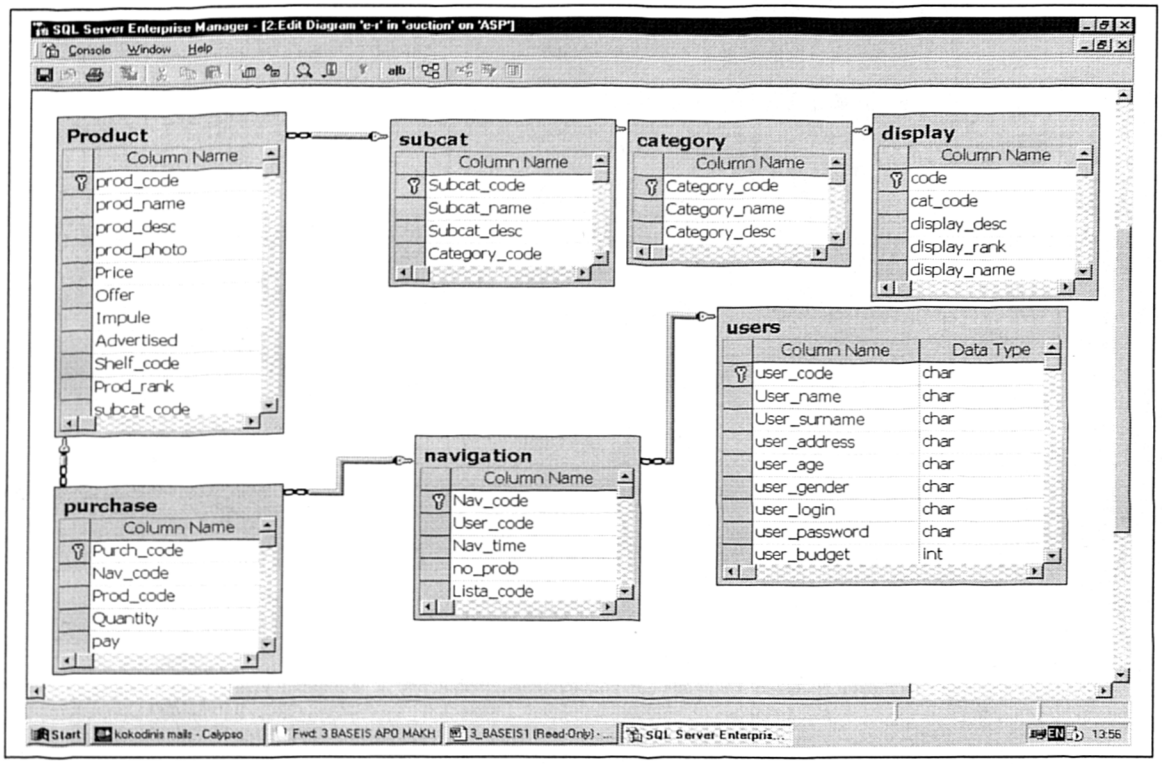


Figure 61: Entity-Relationship Diagram for the Free-form Layout

C.1.2.2. Abstract Interface Design

a) Login Page

This page was the same as the corresponding one in the grid layout design.

b) Page F1

This page (Figure 62) appeared in the entrance (when the customer would make a login into the store) and in all navigational nodes (nodes where the customer is not in front of a specific display, a specific subcategory or a specific product).

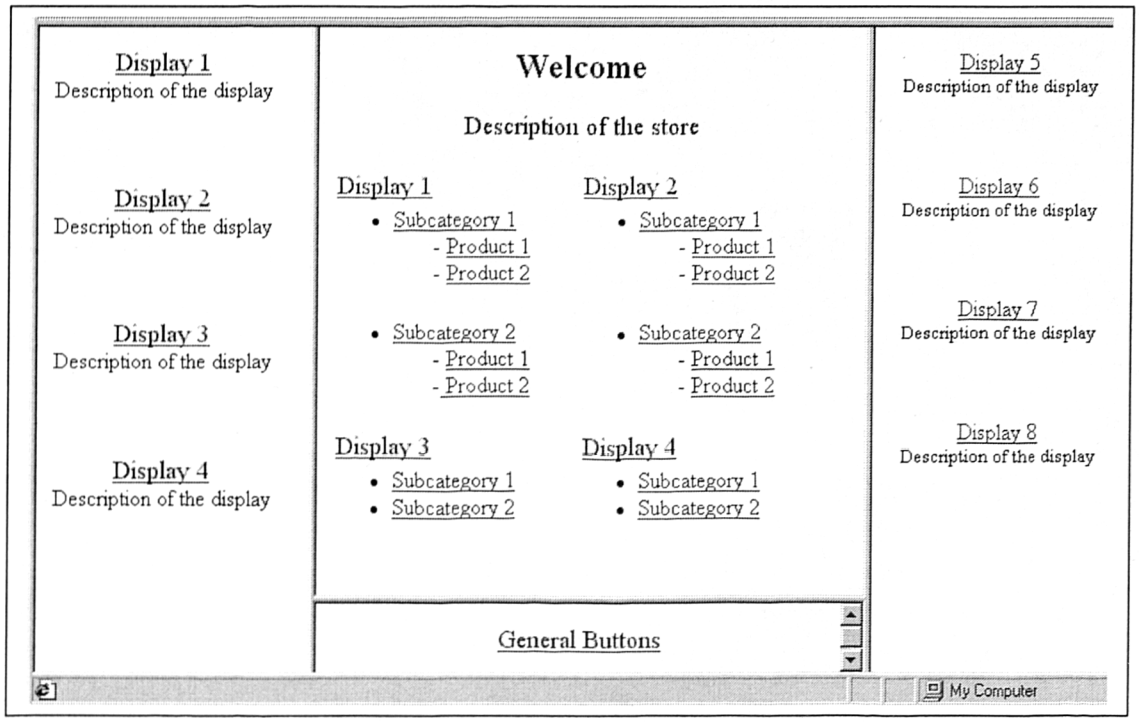


Figure 62: Page F1 of the Free-form Layout

Notes:

- The general buttons are the same as the ones in the grid display layout, except for the search button provided by the free-form layout.
- At the middle frame, there are links for the displays, subcategories, products that are near the customer's current position (level 1). For these displays, the customer has also visual access to some products. For the displays that are farther away, the customer can see only the displays and the subcategories (level 2).
- There are links for every display at the left frame. It is assumed that when the customer is in the navigational nodes, he/she has direct access to every display (that is the basic principal of the free-form layout).
- Finally, there are also links to the displays of the third visual level at the right frame.

c) Page F2

This page appeared when the customer was in front of a display (Figure 63).

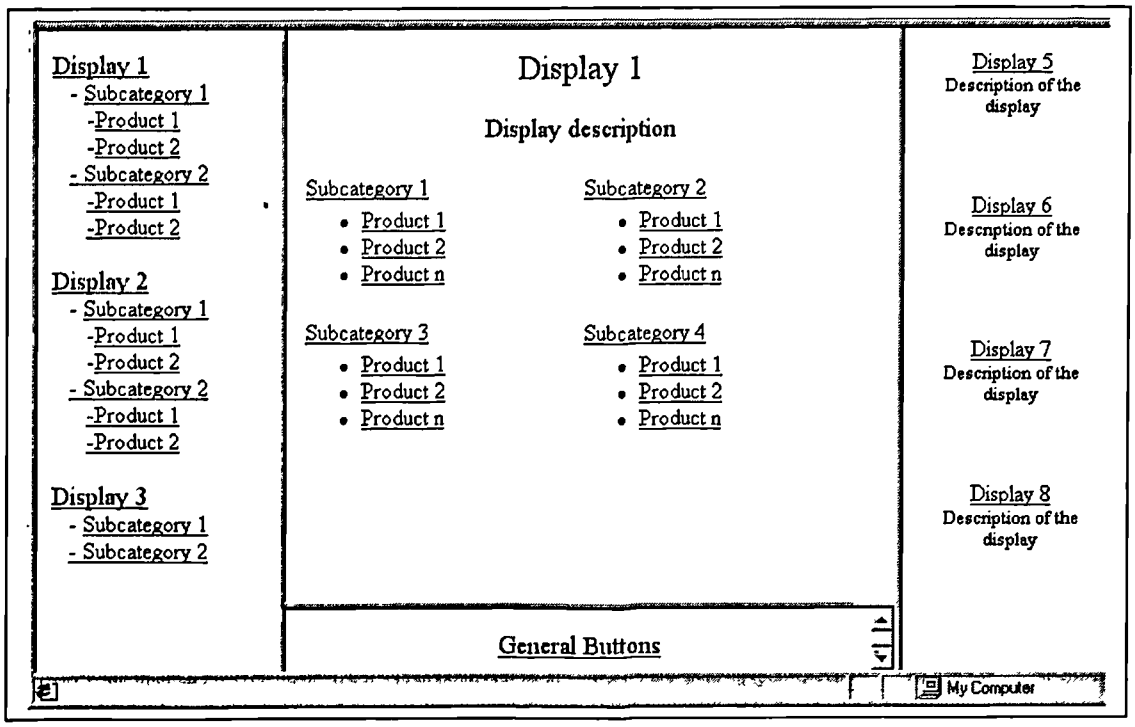


Figure 63: Page F2 of the Free-form Layout

Notes:

- At the left frame: for the nearest displays, the customer has visual access to both subcategories and products. For displays farther away, the customer has only visual access to subcategories.
- At the middle frame: the customer has access to all subcategories of the specific display and to all products of those subcategories.
- At the right frame: there are links for the third visual level displays.

d) Page F3

This page appeared when the customer concentrates to a specific subcategory (Figure 64).

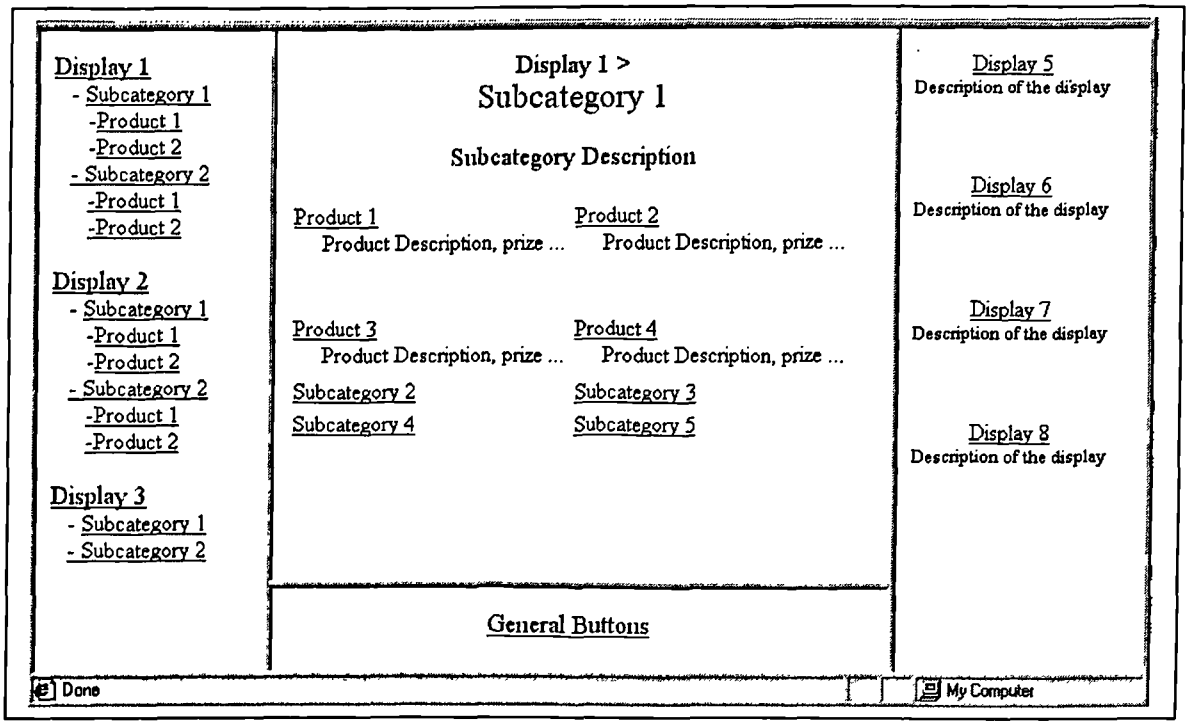


Figure 64: Page F3 of the Free-form Layout

Notes:

- The left and right frames are the same as the ones in page F2.
- At the middle frame, the customer has access to all subcategory products and neighboring subcategories.

e) Page F4

This page appeared when the customer would concentrate into a specific product (Figure 65).

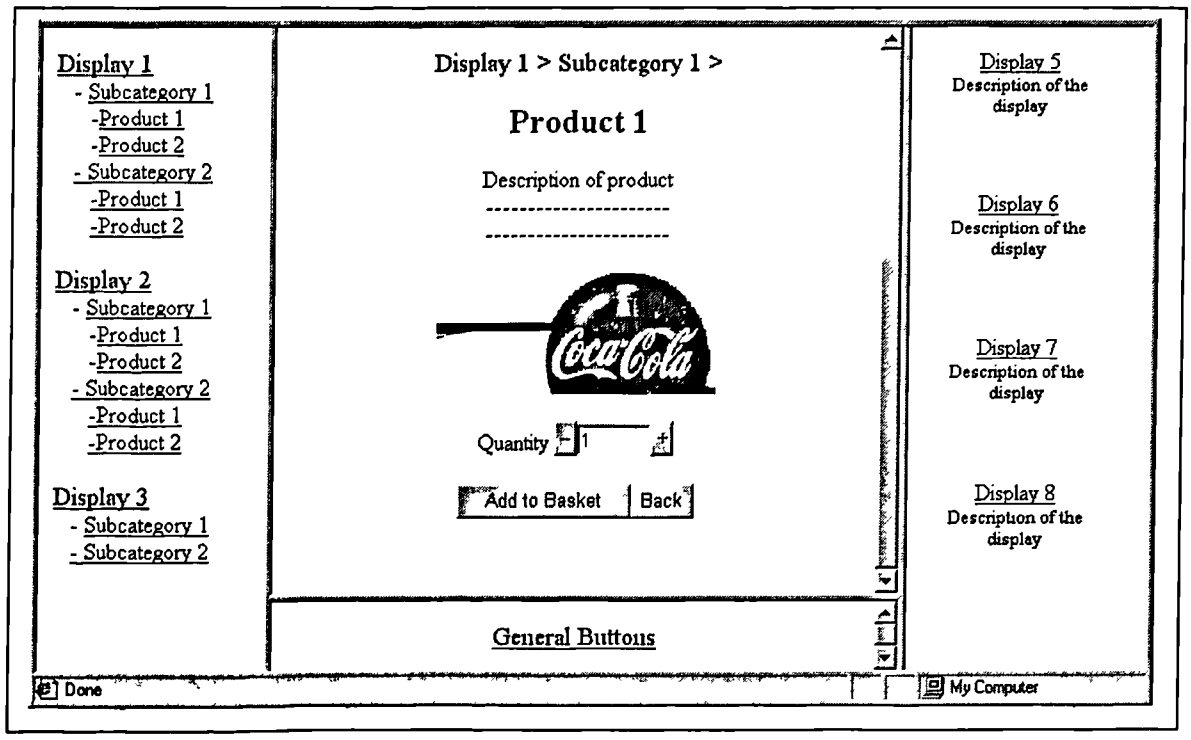


Figure 65: Page F4 of the Free-form Layout

Notes:

- The left and right frames are also the same as the ones in page F2.
- The middle frame is the same as in the grid layout design.

f) Page "Basket

This page was the same as the one in the grid layout design.

C.1.3. Racetrack Layout

C.1.3.1. Development of the Entity-Relationship Diagram

The entity–relationship diagram that was developed for the racetrack layout design is presented in Figure 66. This E-R diagram was implemented in Microsoft SQL Server 2000, where every entity is a table.

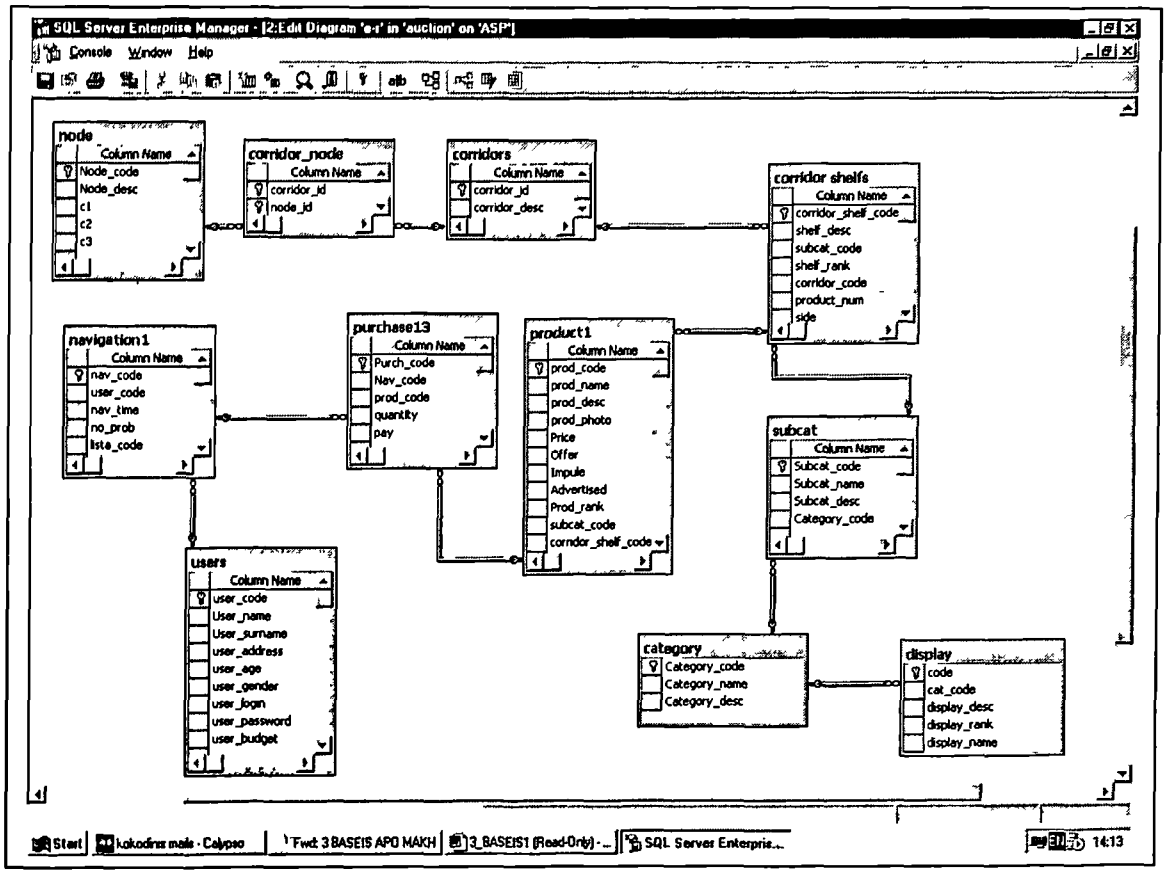


Figure 66: The Entity-Relationship Diagram for the Racetrack Layout

C.1.3.2. Abstract Interface Design

a) Login Page

This page was the same as the corresponding one in the grid layout design.

b) Page R1

This page appeared in the entrance position (when the customer logins into the store) and in all crossing nodes. It was the page in which the customer should select a corridor to enter (Figure 67).

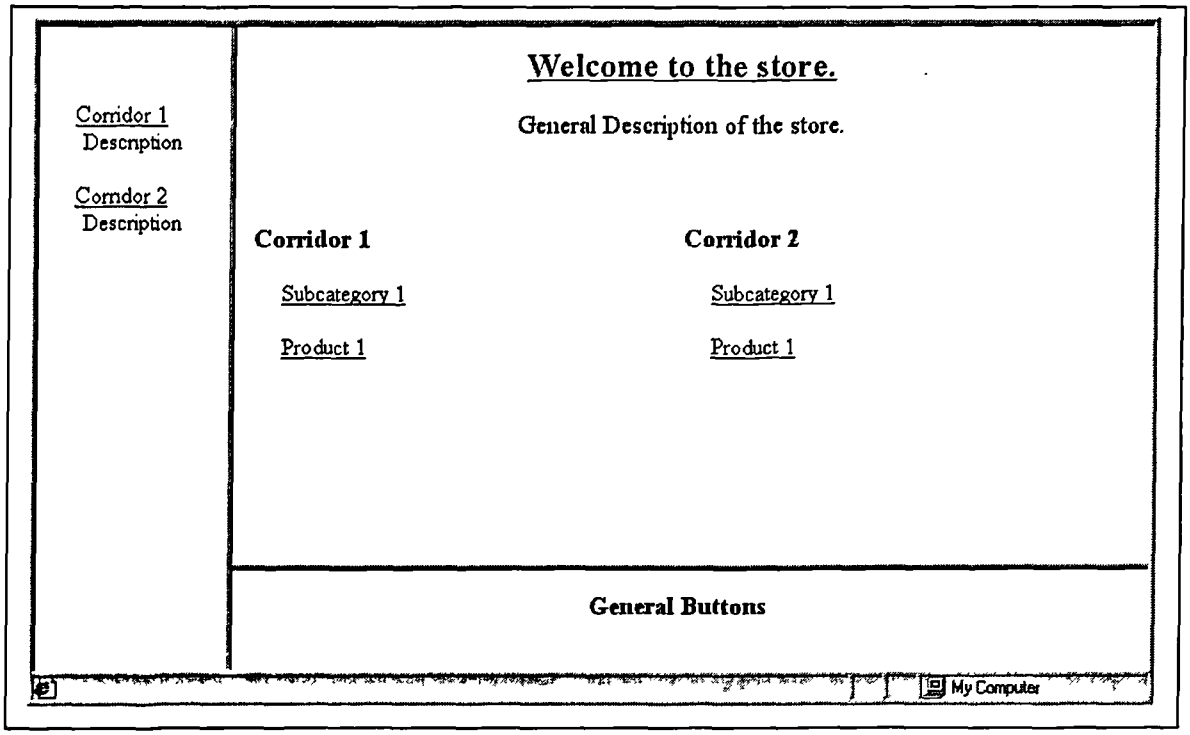


Figure 67: Page R1 of the Racetrack Layout

Notes:

- The general buttons are the same as the ones in the grid display layout except for the fact that the home page button is not provided.
- At the right frame, there are links for the corridors, the subcategories and the products that are accessible from the crossing node.
- At the left frame, there are links for the corridors only.

c) Page R2

This page simulated the walking of a customer in the middle of the corridor. An abstract page looked like Figure 68:

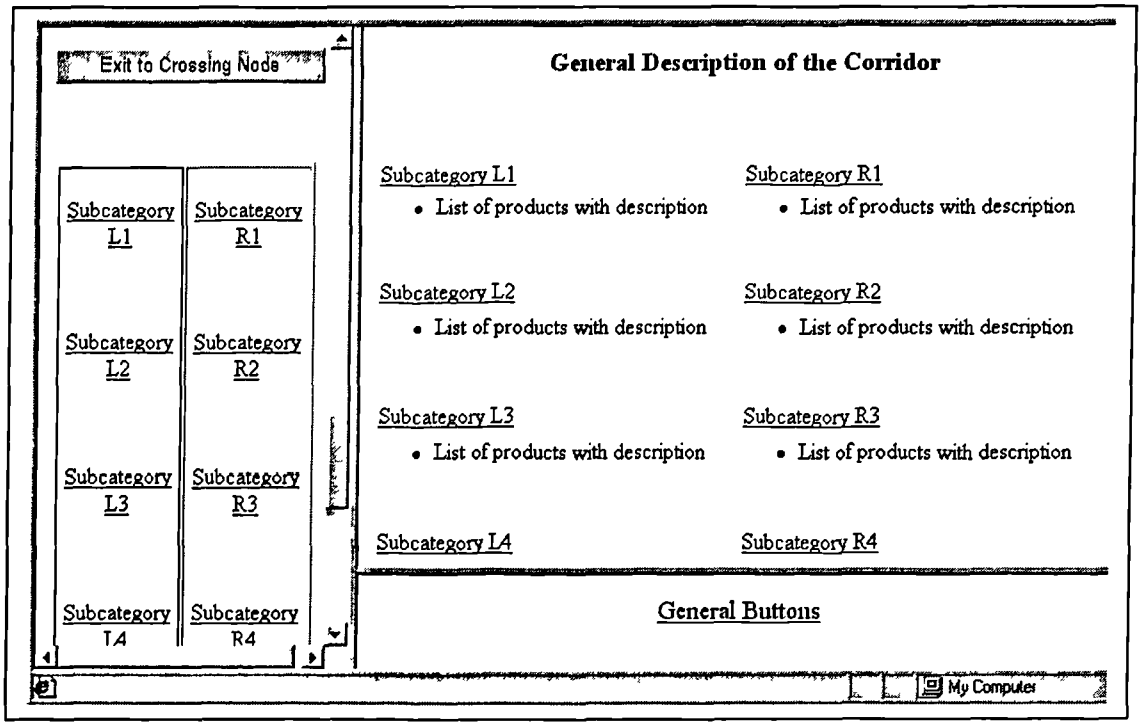


Figure 68: Page R2 of the Racetrack Layout

Notes:

- At the left frame there is a description of each subcategory.
- The button "Exit to Crossing Nodes" leads to the crossing nodes (i.e., Page R1).
- The left frame is divided in two columns in order to represent the left and right side of the corridor.
- At the right frame (except for the subcategories links), there is a list of each subcategory products. There are no links to concentrate to those products. To visit the products, the customer must choose a subcategory. It is assumed, therefore, that when walking in the middle of an aisle, the customer is just browsing the products which is simulated by the fact that he/she has to select a subcategory first in order to view the product (i.e., to view the product, its price and description, and be able to select it)
- By selecting a subcategory, the customer moves to page R3.

d) Page R3

This page (Figure 69) appeared when the customer would select a specific subcategory.

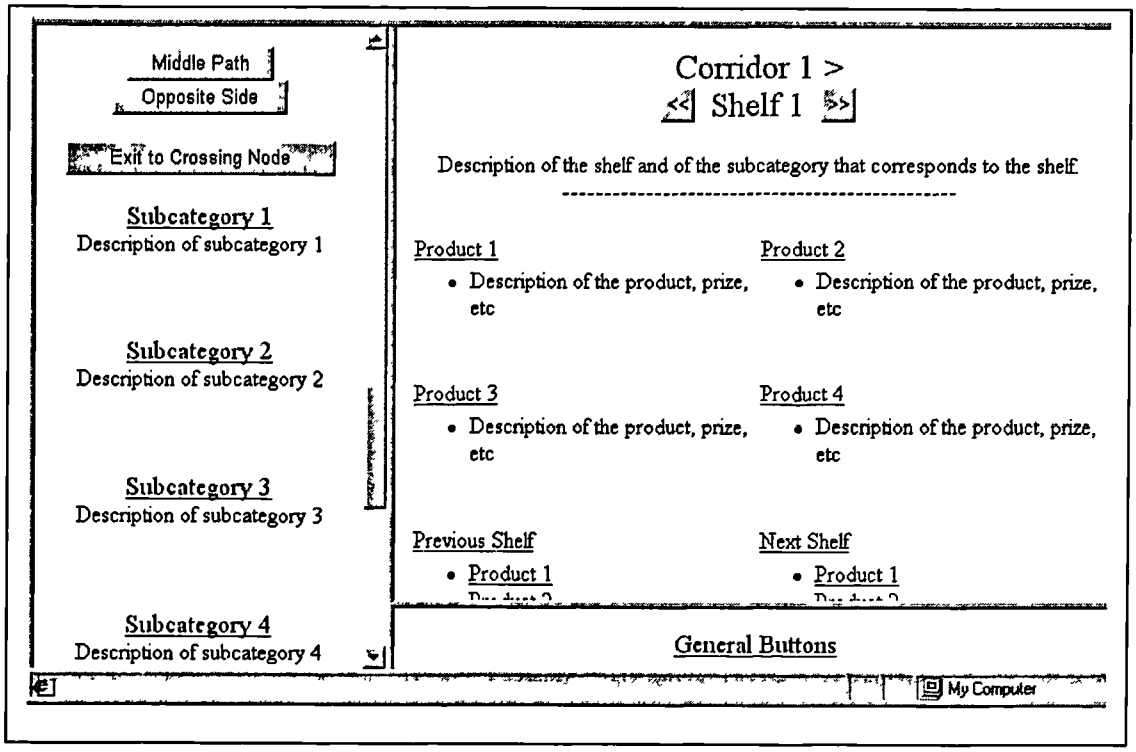


Figure 69: Page R3 of the Racetrack Layout

Notes:

- The button "Middle path" moves the customer to page R2.
- The button "Opposite side" moves the customer to the opposite shelf in the same corridor.
- The button "Exit to Crossing Node " is the same as in page R2.
- The buttons placed next to the shelf (right frame) lead the customer to the next or the previous shelves on the same side of the specific corridor.

e) Page R4

This page appeared when the customer would select a specific product (Figure 70).

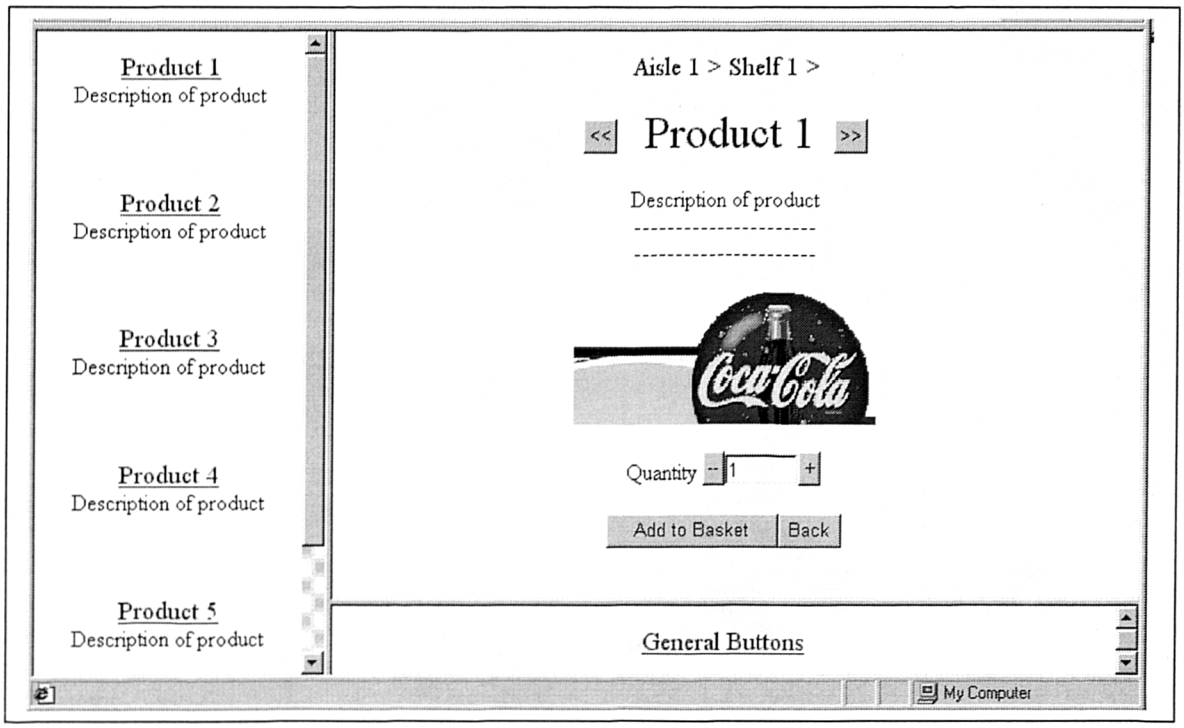


Figure 70: Page R4 of the Racetrack Layout

Notes:

- At the left frame, the customer has access to all the shelf's products.
- The field quantity has a default value equal to 1. The customer can increase or decrease the quantity by using the appropriate buttons.
- By keying the button "Add to basket" the specific product in the selected quantity is placed on the customer's basket.
- The customer can navigate to page P3 by clicking the button "back."

f) Page "Basket"

This page was the same as for the previous layouts.

C.2. Revised Web Pages Based on Human Computer Interaction Principles for Web design

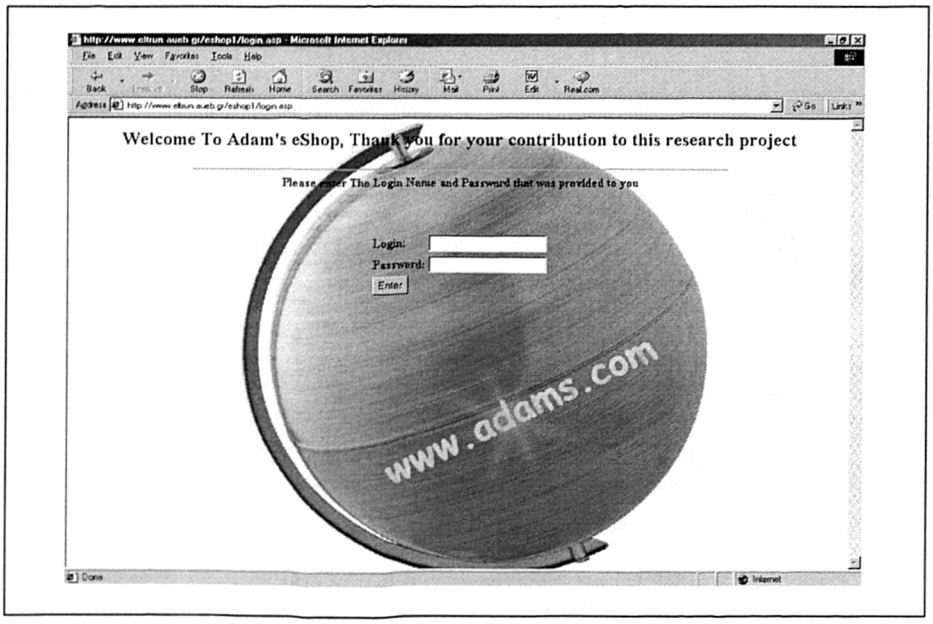


Figure 71: The Revised "Login" Page

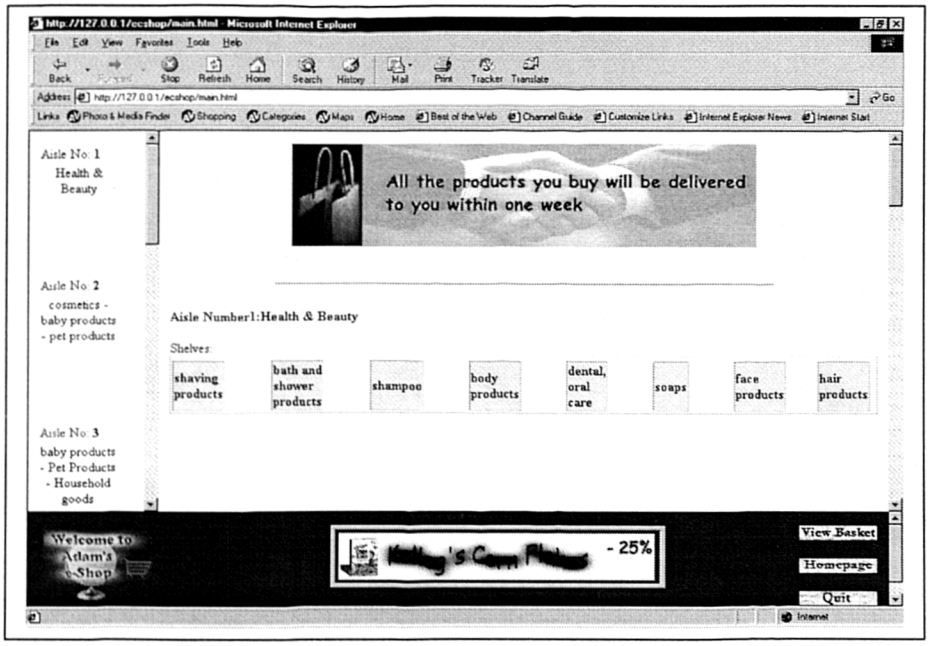


Figure 72: The Revised Main Page (G1) of the Grid Layout

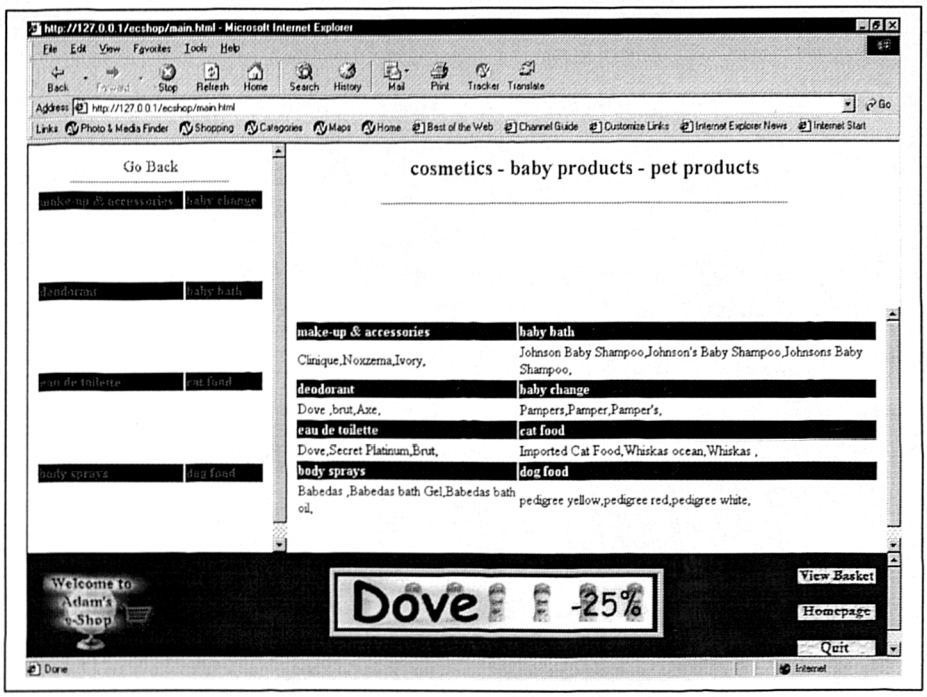


Figure 73: The Revised Page G2 of the Grid Layout

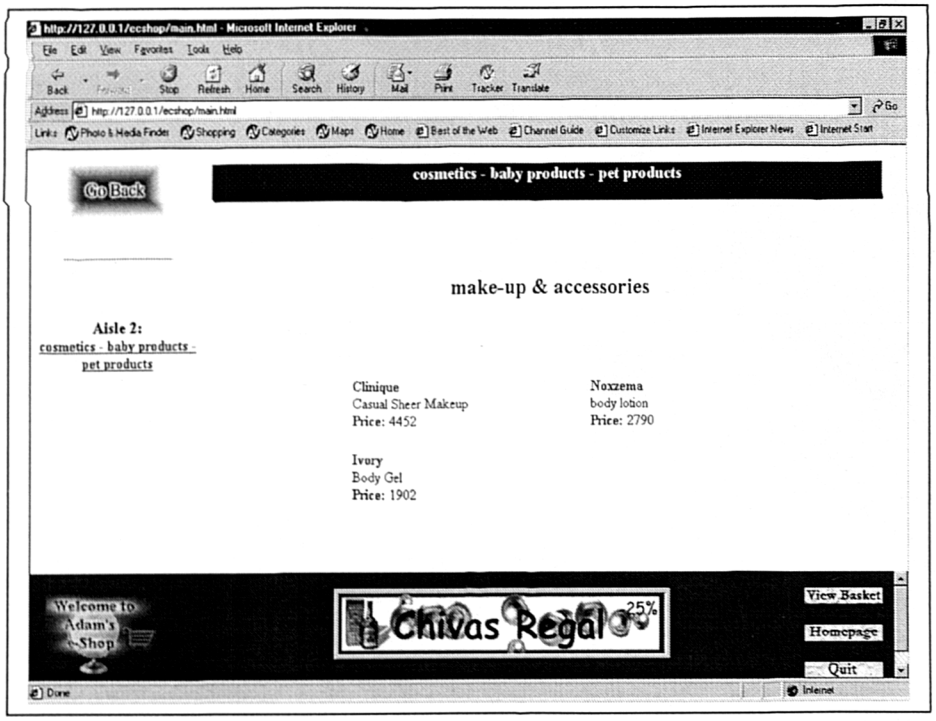


Figure 74: The Revised Page G3 of the Grid Layout

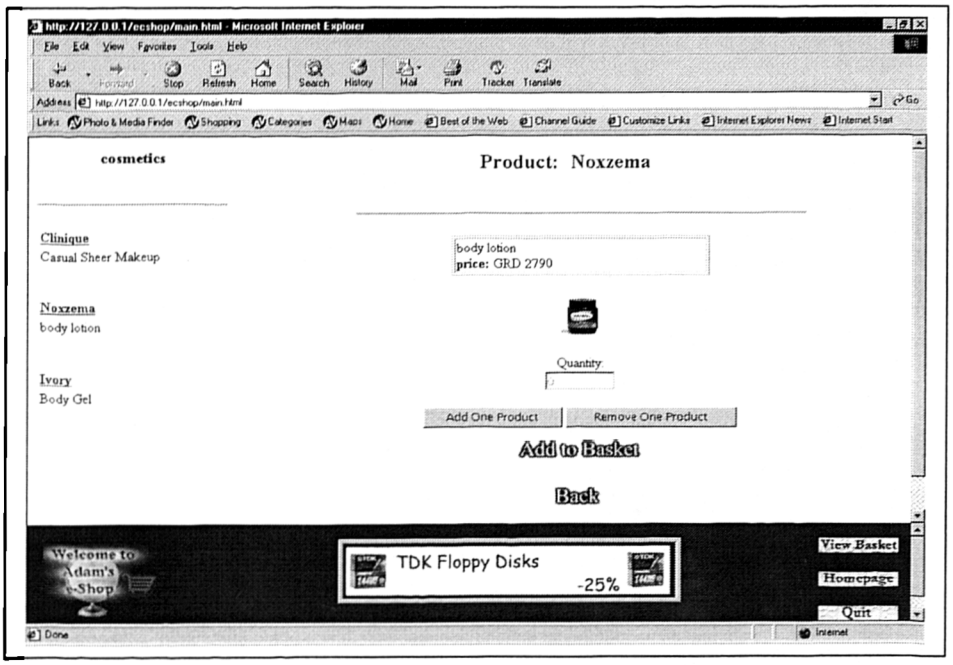


Figure 75: The Revised Page G4 of the Grid Layout

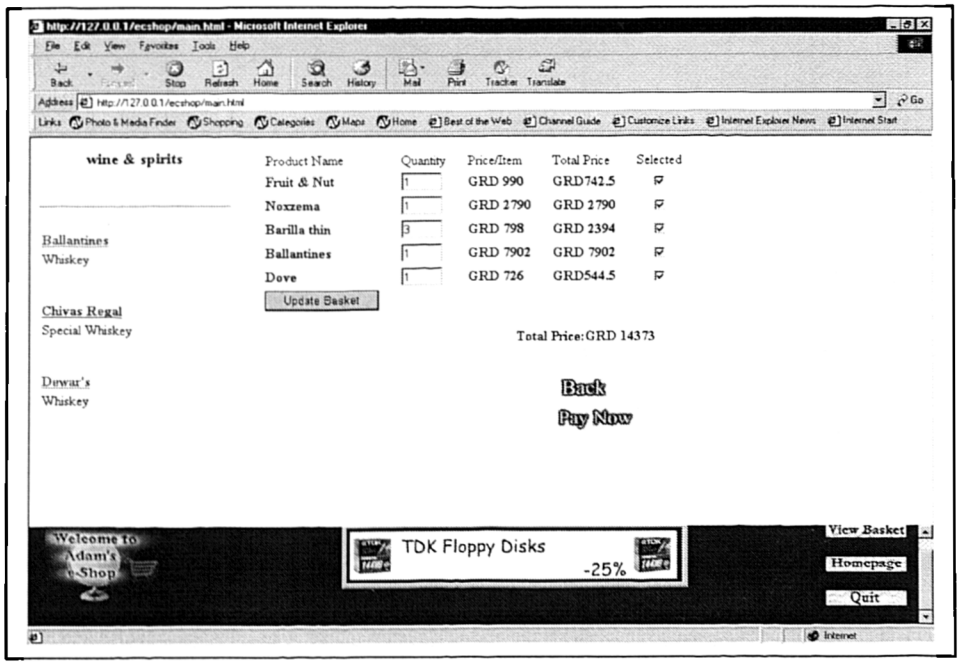


Figure 76: The Revised Page "Basket" of the Grid Layout

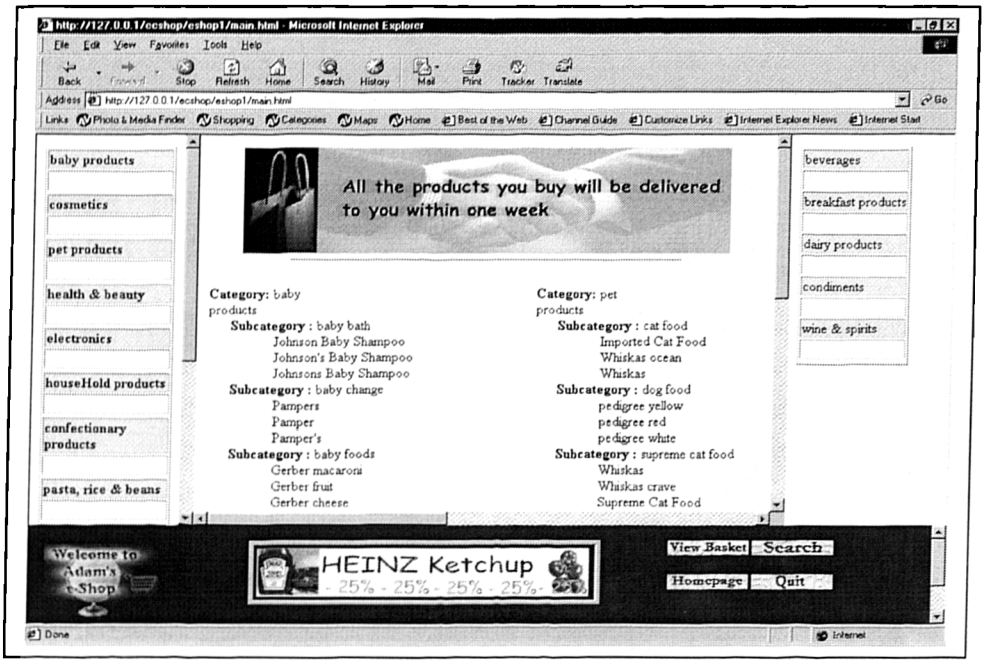


Figure 77: The Revised Page F1 of the Free-form Layout

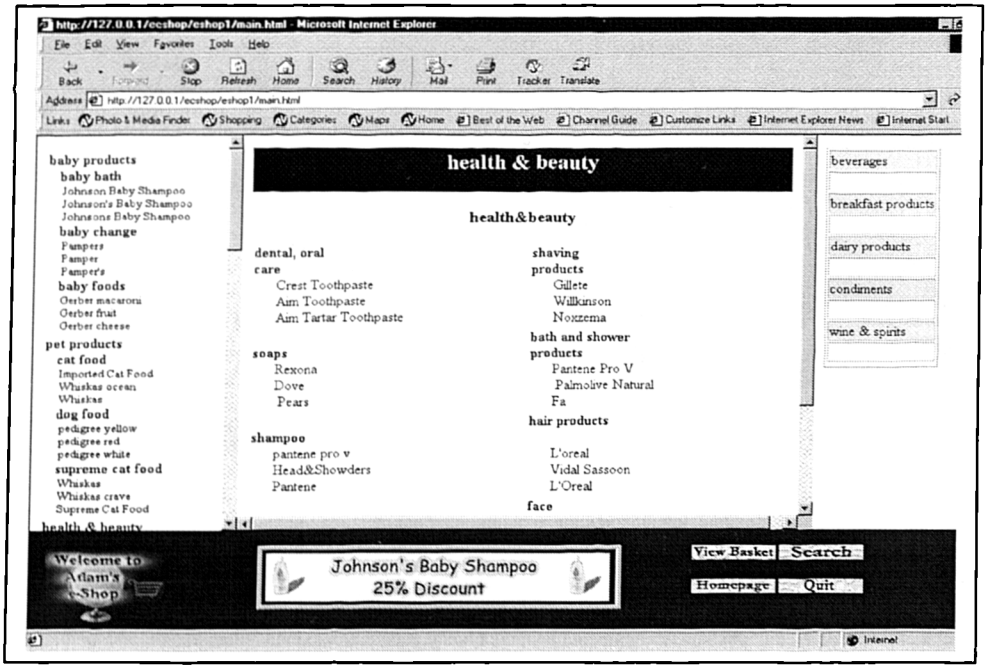


Figure 78: The Revised Page F2 of the Free-form Layout

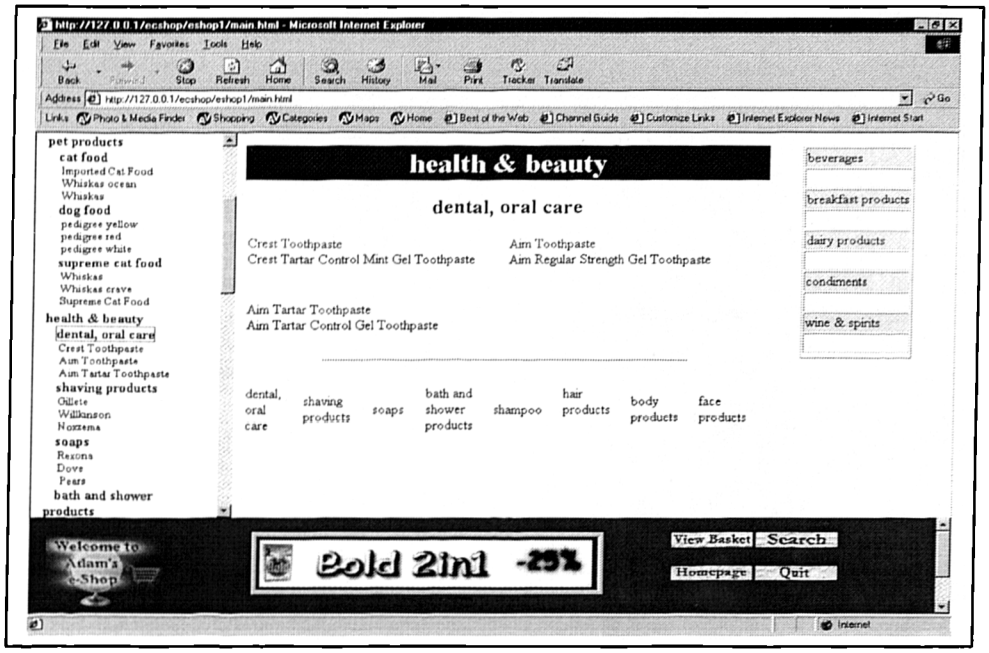


Figure 79: The Revised Page F3 of the Free-form Layout

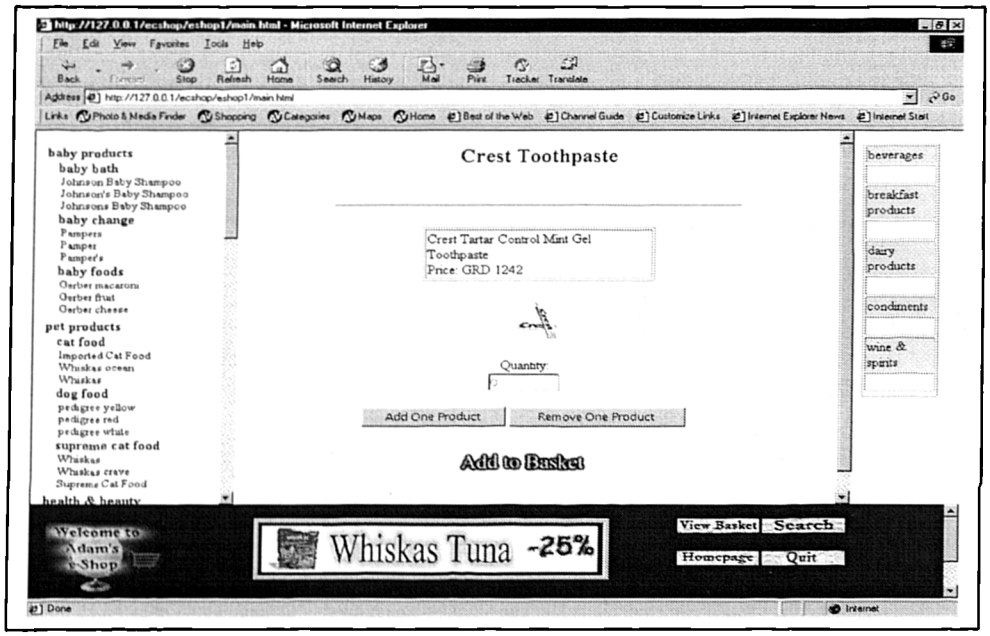


Figure 80: The Revised Page F4 of the Free-form Layout

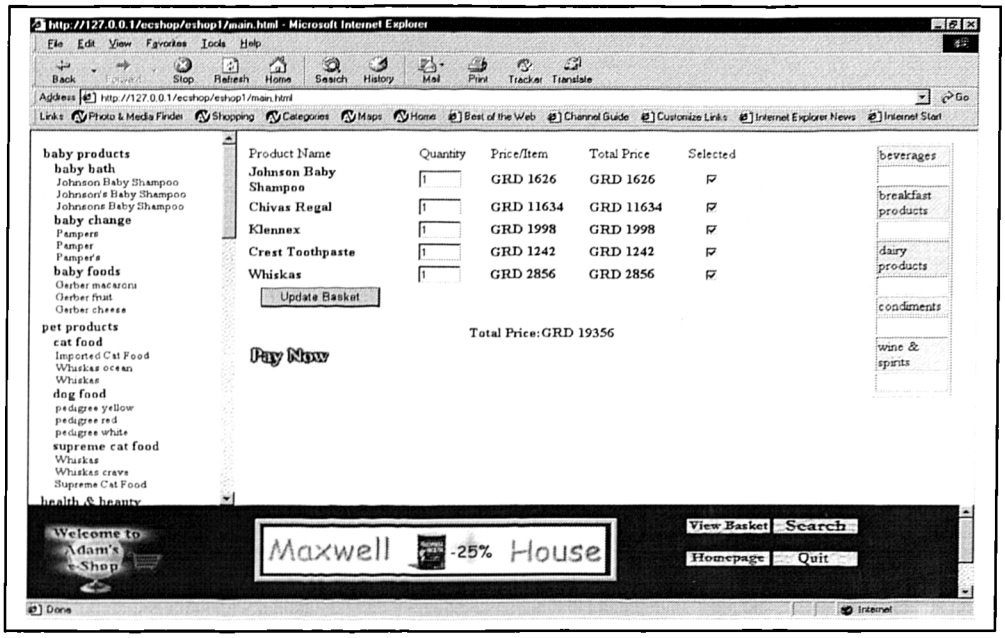


Figure 81: The Revised Page "Basket" of the Free-form Layout

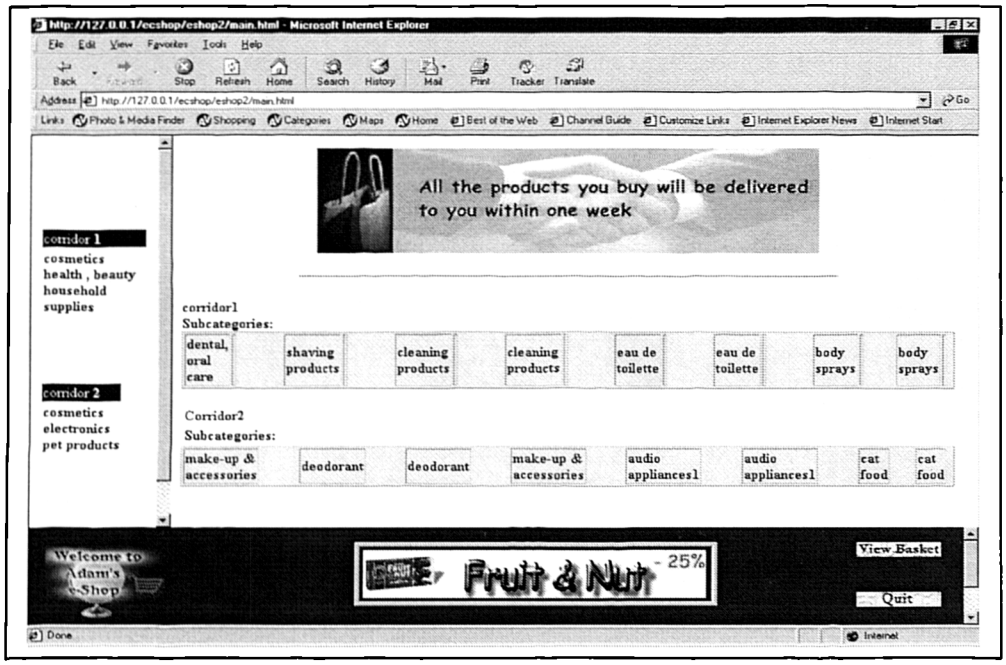


Figure 82: The Revised Page R1 of the Racetrack Layout

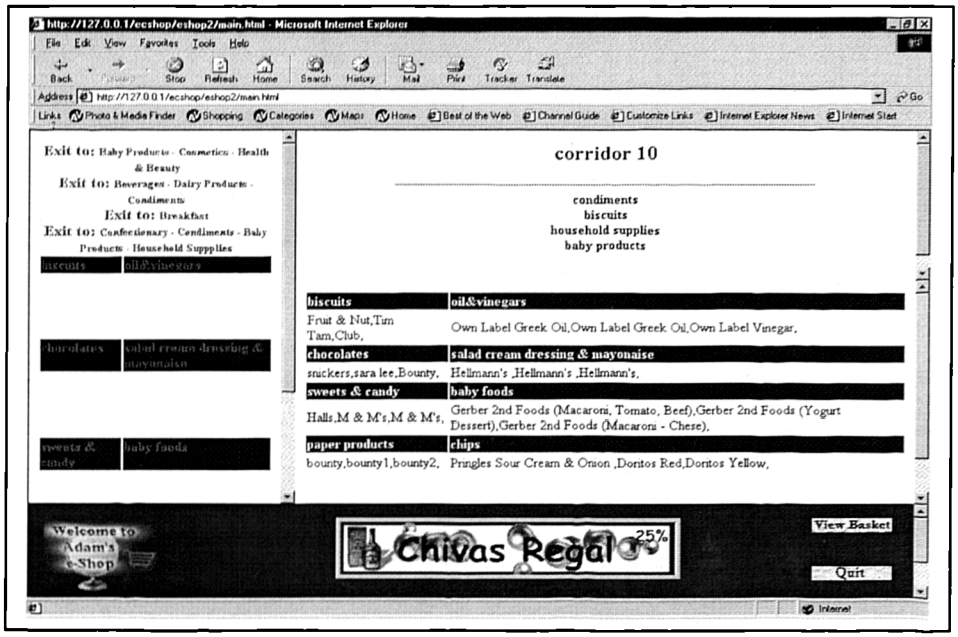


Figure 83: The Revised Page R2 of the Racetrack Layout

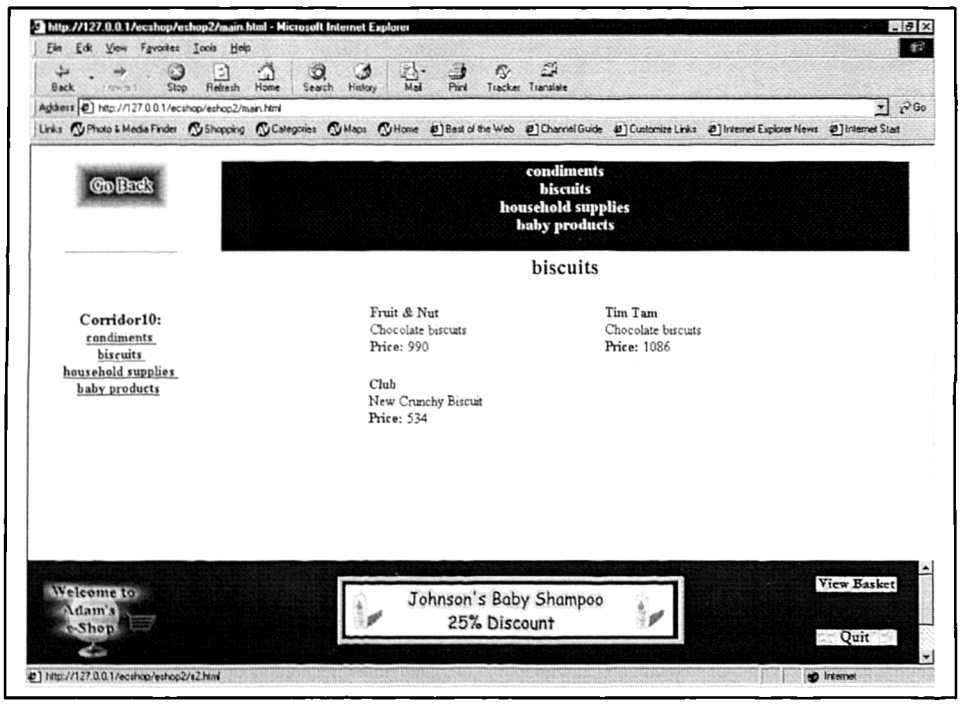


Figure 84: The Revised Page R3 of the Free-form Layout

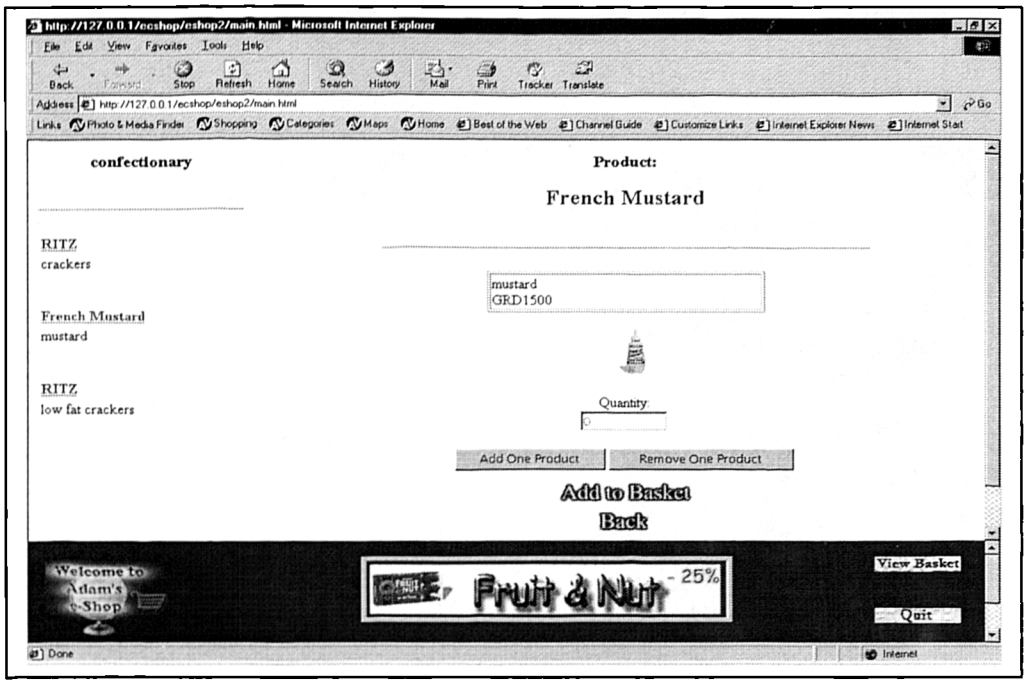


Figure 85: The Revised Page R4 of the Free-form Layout

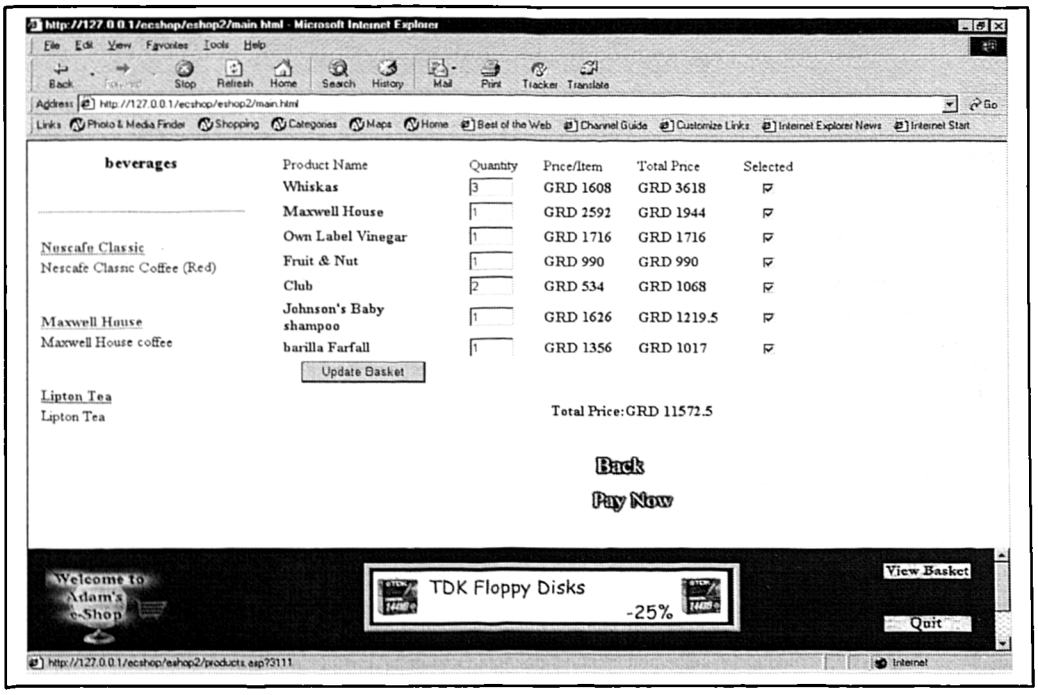


Figure 86: The Revised Page "Basket" of the Racetrack Layout

C.3. Technical Description

The implementation of the virtual store was based on the 3-Tier Architecture Model (Falkou et al. 1999), and the platform that was used was provided by Microsoft. Though 2-tier client/server architectures are still dominant in distributed computing environments, there is a steady migration towards 3-tier configurations.

In 3-tier client-server architectures, functions are separated into presentation, business application and data components. The 3-tier architecture provides potentially more adaptive architecture than the 2-tier architecture as it is designed with the flexibility level to support both changes in the business environment and in technology.

The main benefits of 3-tier (and more generally of n-tier) architecture, in comparison to a 2-tier architecture, are the following:

- better flexibility ensured by the capability to dynamically distribute the load between several servers, and by the ability to settle the application layer in different locations;
- better fault recovery mechanisms ensured by the capability to have the middle-tier layer distributed on several servers,
- less complex system administration, because the applications can be centrally managed on the server side, whereas in a 2-tier architecture the application layer is often physically distributed to several client workstations,
- refined security mechanisms,
- better modularity, useful for software reuse and integration of legacy applications, resulting from the separation of presentation, application and data components.

All 3 tiers (Client-tier, Application-server-tier and Data-Server-Tier) were implemented using Microsoft's Technology and Tools as presented in Figure 87.

Microsoft's Windows-based Distributed Network Architecture (DNA) solution using Internet Information Server (IIS) and Active Server Pages (ASP) to provide dynamic content and user interfaces, were applied. Custom-built COM (Component Object Model) objects were used to process and encapsulate the e-shop's business logic. Finally, Microsoft SQL Server 2000 was used to store product and customer information and process advanced queries.

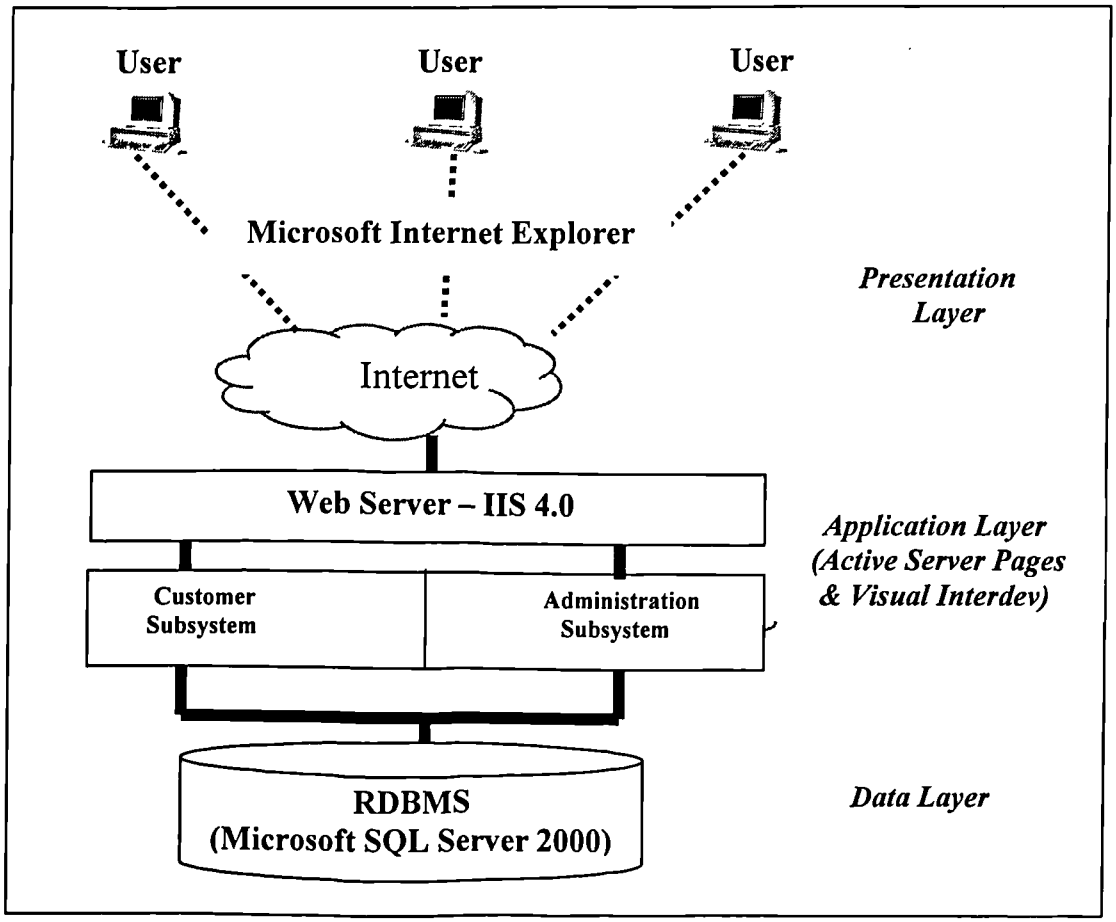


Figure 87: The 3-Tier Architecture Implemented

The eShop's physical Web architecture consists of two main servers (i.e., one Web server and one SQL server). The hardware requirements and services used for these servers are presented in Table 42.

Server	Services	Explanation
Web Server	IIS 4.0 Microsoft Transaction Server (MTS) 2.0	Contains the site's ASP (Active Server Pages) files.
SQL Server	SQL Server 2000 (RDBMS)	Provides all database services for the site, including customer, product and pricing information, as well as the commerce tables for shopping baskets.

Table 42: Physical Architecure

C.4. Brand and Product List

	Brand	Product Descrption
1	Johnson's	Baby Shampoo
2	Johnson's	Chamomile Shampoo
3	Johnsons	Honey shampoo
4	Pampers	size 4
5	Pampers	size 1
6	Pampers	size 3
7	Gerber	Macaroni tomato and beef dinner
8	Gerber	Mixed Fruit yogurt Dessert
9	Gerber	Macaroni & Cheese
10	Heinz	Ketchup
11	Pummaro	Ketchup
12	Raguletto	Pasta Sauce
13	Own Label Greek Oil	250 gr. Bottle
14	Own Label Greek Oil	500 gr. Bottle
15	Own Label Vinegar	250 gr. Vinegar
16	Hellmann's	Blue Dressing
17	Hellmanns's	Creamy Dressing
18	Hellmann's	Mayoinaise
19	Coca Cola	Fizzy Drink
20	Barilla	Spaghetti
21	Barilla	Pasta Thin linguine #11
22	Uncle Bens	Converted rice
23	Becks	Beer
24	Carlsberg	Beer
25	Own Label Bulk Wine	1 Litre
26	Own Label Bulk Wine	1 Litre
27	Ballantines	Whiskey
28	Chivas Regal	Special Whiskey
29	Dewar's	Whiskey
30	Smirnoff	Vodka
31	Stolichnaya	Vodka
32	Aboslut	Vodka
33	Beefeater	Gin
34	Gordon's	Gin
35	Tanqerey Gin	Gin
36	Bacardi	Rum
37	Cointreau	Liquer/Mixer
38	Grand Marnier	Liquer
39	Sprite	Fizzy Drink
40	Fanta	Fizzy Drink
41	Copri Sonne	Grape Fruit Juice
42	Copri Sonne	Strawberry Fruit Juice
43	Tang	Tang 10-Pack Drink Pouches - Orange Uproar Flavour
44	Vittel	Table water
45	Evian	6-Pack Table water
46	Perrier	Sparkling Water
47	Nescafe	Classic Coffee (Red)

48	Maxwell House	Filter Coffee
49	Lipton	Tea
50	Kernel Corn	Corn
51	Kellogs	Cornflakes
52	All Bran	Cornflakes / cereals
53	Bonne Mamam	Cherry Marmalade
54	Bone Mamam	Strawberry Marmalade
55	Bonne Mamam	Blackberry Marmalade
56	Own Label Honey	100 gr. Bottle
57	Own Label Honey	200 gr. Bottle
58	Own Lable Honey	500 gr. Bottle
59	Barilla farfalle	Pasta
60	Carolina	Enriched Rice
61	Uncle Bens	Brown Rice
62	Corona extra	Beer
63	Fruit & Nut	Chocolate biscuits
64	Gillete	Shaving foam
65	Own Label Bulk Wine	1 Litre Rose Wine
66	Tim Tam	Chocolate Biscuits
67	Willkinson	3-pack Shaving razors
68	Rexona	Body Soap
69	Pantene Pro V	Shampoo
70	Palmolive	Body Shower
71	Klennex	Face kleaning
72	Pantene Pro v	Conditioner
73	Crest	Toothpaste - Tartar Control Mint Gel Toothpaste
74	Club	Crunchy Biscuit
75	Snickers	Chocolate bar
76	Sara Lee	Chocolate Cake
77	Bounty	Chocolate bars
78	Halls	Candy
79	M & M's	Chocolate
80	M & Ms	Chocolate with peanuts
81	Pringles	Sour Cream & Onion Chips
82	Doritos yellow	Corn chips
83	Doritos red	Corn chips
84	French Mustard	Mustard
85	RITZ	Crackers
86	RITZ low fat	Low fat crackers
87	Whiskas	Cat food
88	Whiskas	Cat Food
89	Whiskas	Cat Food
90	Pedigree yellow	Dog food
91	Pedigree red	Dog food
92	Pedigree white	Dog food
93	Clinique	Casual Sheer Makeup
94	Noxzema	Body lotion
95	Ivory	Body Gel
96	Dove	Deodorant
97	Brut	Brut Actif Blue
98	Axe	Body Spay

99	Dove	Unisex Deodorant
100	Secret Platinum	Unisex Deodorant
101	Brut	Perfume for men
102	TDK Floppy disk	Floppy disks
103	Verbatim Floppy Disk	Floppy disks
104	Verbatim Floppy Disk mac	Apple/Mac Formatted Floppy disks
105	Duracell	Batteries - Package of four
106	Energizer Standard	Batteries - Package of four
107	Energizer 9 volt	Batteries - Package of two
108	Game Boy Game Link	Game Boy Accessories
109	Light & Magnifier	Game Boy Accessories
110	Game Boy Printer Paper	Game Boy Accessories
111	Noxzema	After save care
112	Dove	Cream Bar
113	Pears	Body Soap
114	Fa	Body Shower
115	Neutrogena	Acme cream
116	Johnson	Face Care
117	Head&Showders	Shampoo
118	Pantene	Conditioner
119	L'oreal	Hair gel
120	Vidal Sassoon	Shampoo
121	L'Oreal	Curle Gel
122	Vaseline	Intensive Care Cream
123	Clinique	Famine Care
124	Noxzema	Body care
125	Fairy	Cleaning soap
126	Ajax	All Purpose cleaner
127	Ajax Ammonial	All Purpose cleaner
128	Bounty	Paper Product
129	Onw Label 1	6-pack Toilet Paper
130	Onw Label 2	1 Roller Towel
131	Cajoline	Laundry Product
132	Tide 1 litre	Laundry Product
133	Tide	Laundry Product
134	Bold 2 in 1	Detergent
135	Tide	All Purpose Detergent
136	Gloves	Glove Large Vinyl
137	Aim Toothpaste	Regular Strength Gel Toothpaste
138	Aim Tartar Toothpaste	Tartar Control Gel Toothpaste
139	Whiskas	Cat Food
140	Babedas	Moisturizing Bath Cream
141	Babedas bath Gel	Original Bath Gel
142	Babedas bath oil	Foaming Bath Oil
143	Whiskas crave	Cat food
144	Supreme	Canned Beef Cat Food
145	Skippy	Creamy peanut Butter - Reduced Fat
146	Skippy	Chunked peanut Butter - Reduced Fat
147	Jif	Extra Crunchy Peanut Butter
148	Kraft banana Cream	3-pack banana cream
149	Kraft fudge cream	3-pack fudge cream

150	Kraft vanilia cream	3-pack vanilia cream
151	Own Label Juice	1 Litre Lemon Juice
152	Own Label Juice 1	1 Litre Coctail Juice
153	Own Label Juice 2	1 Litre Orange Juice
154	Parmalat milk	3-pack less fat milk
155	Parmalat milk	3-pack real milk
156	Parmalat milk	3-pack chocolate milk
157	Extra Vanilla Yogurt	Yogurt
158	Imported Yogurt	Yogurt
159	Extra Strawberry Yogurt	Yogurt
160	Edam 1/2 kilo	Cheese
161	Greek feta 1/2 kilo	Cheese
162	Camamber 1/2 kilo	Cheese

Table 43: Description of the Products and Brands Included in the Laboratory Store

APPENDIX D. Analysis of the Results

D.1. Pilot Reliability Tests (Cronbach alpha coefficient)

D.1.1. Purpose of Internet Use Construct

D.1.1.1. Social Communication

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	SC1	SC2	SC3	SC4
SC1	1,0000			
SC2	,4350	1,0000		
SC3	,1168	,4125	1,0000	
SC4	,0175	,1914	,7414	1,0000

N of Cases = 15,0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	7,8667	4,6952	2,1668	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
SC1	5,9333	3,9238	,1782	,1945	,7245
SC2	6,0000	3,5714	,4392	,3390	,6120
SC3	5,9333	1,9238	,6930	,6261	,3639
SC4	5,7333	2,3524	,5358	,5658	,5162

Reliability Coefficients 4 items

Alpha = ,6572 Standardized item alpha = ,6521

D.1.1.2. Electronic Commerce

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	EC1	EC2	EC3	EC4
EC1	1,0000			
EC2	-,2476	1,0000		
EC3	-,0801	,7136	1,0000	
EC4	-,0461	,6032	,5202	1,0000

N of Cases = 15,0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	6,8000	6,3143	2,5128	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
EC1	4,6000	5,9714	-,1383	,0922	,7919
EC2	5,4000	3,6857	,5150	,6191	,2713
EC3	5,5333	4,1238	,5931	,5292	,2806
EC4	4,8667	2,6952	,5290	,3882	,1908

Reliability Coefficients 4 items

Alpha = ,5209 Standardized item alpha = ,5634

D.1.1.3. Information Search

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	IS1	IS2	IS3	IS4
IS1	1,0000			
IS2	,6193	1,0000		
IS3	,6868	,5199	1,0000	
IS4	,0000	-,3062	-,1592	1,0000

N of Cases = 15,0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	18,2000	2,4571	1,5675	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
IS1	13,4000	1,2571	,7045	,6056	-,0568
IS2	13,5333	1,5524	,3406	,4814	,3037
IS3	13,4667	1,4095	,4932	,5011	,1520
IS4	14,2000	2,3143	-,1863	,1766	,8210

Reliability Coefficients 4 items

Alpha = ,4548 Standardized item alpha = ,5398

D.1.1.4. Hobby

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	H1	H2	H3	H4	H5
H1	1,0000				
H2	,7198	1,0000			
H3	,6191	,4930	1,0000		
H4	,4170	,2748	,3472	1,0000	
H5	,6389	,4886	,5377	,3299	1,0000

N of Cases = 15,0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	16,5333	14,6952	3,8334	5

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
H1	12,9333	8,6381	,7966	,6777	,7159
H2	12,8000	10,3143	,6342	,5237	,7732
H3	14,4000	10,9714	,6441	,4280	,7789
H4	12,7333	11,2095	,4126	,1924	,8304
H5	13,2667	8,0667	,6395	,4440	,7824

Reliability Coefficients 5 items

Alpha = ,8150 Standardized item alpha = ,8258

D.1.2. Perceived Usefulness

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	PU1	PU2	PU3	PU4	PU5
PU1	1,0000				
PU2	,9305	1,0000			
PU3	,8658	,8439	1,0000		
PU4	,8770	,9334	,8784	1,0000	
PU5	,9410	,8707	,9089	,8819	1,0000
PU6	,8098	,8749	,8814	,9397	,8623

	PU6
PU6	1,0000

N of Cases = 15,0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	25,2667	120,0667	10,9575	6

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
PU1	20,9333	83,9238	,9257	,9549	,9732
PU2	21,2667	89,2095	,9338	,9411	,9743
PU3	21,0667	80,7810	,9177	,8654	,9747
PU4	20,8667	82,5524	,9474	,9374	,9711
PU5	21,1333	82,1238	,9391	,9390	,9720
PU6	21,0667	83,9238	,9141	,9168	,9744

Reliability Coefficients 6 items

Alpha = ,9776 Standardized item alpha = ,9791

D.1.3. Ease of Use

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	EOU1	EOU2	EOU3	EOU4	EOU5
EOU1	1,0000				
EOU2	,7858	1,0000			
EOU3	,7563	,8239	1,0000		
EOU4	,6462	,6188	,6126	1,0000	
EOU5	,8611	,7775	,6366	,7642	1,0000
EOU6	,9138	,7563	,6336	,8109	,9424

	EOU6
EOU6	1,0000

N of Cases = 15,0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	27,9333	97,6381	9,8812	6

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
EOU1	23,3333	66,6667	,8924	,9389	,9332
EOU2	22,9333	70,9238	,8380	,8014	,9401
EOU3	22,8000	70,7429	,7561	,8441	,9491
EOU4	23,5333	70,6952	,7593	,8270	,9487
EOU5	23,5333	65,4095	,8973	,8998	,9326
EOU6	23,5333	66,5524	,9202	,9686	,9300

Reliability Coefficients 6 items

Alpha = ,9488 Standardized item alpha = ,9490

D.1.4. Entertainment

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	ENT1	ENT2	ENT3	ENT4
ENT1	1,0000			
ENT2	,8766	1,0000		
ENT3	,8938	,8078	1,0000	
ENT4	,8026	,7019	,6875	1,0000

N of Cases = 15,0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	15,1333	44,2667	6,6533	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ENT1	11,4667	22,8381	,9445	,9000	,8882
ENT2	11,2667	25,7810	,8559	,7713	,9182
ENT3	11,4000	27,1143	,8581	,8038	,9199
ENT4	11,2667	25,9238	,7706	,6485	,9462

Reliability Coefficients 4 items

Alpha = ,9380 Standardized item alpha = ,9394

D.2. Normality Tests as an assumption for *t*-tests (sample size = 20)

D.2.1. Perceived Usefulness

D.2.1.1. Grid

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
PUGGR	,925	20	,154
PUGUK	,894	20	,055

D.2.1.2. Free-form

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
PUFGR	,967	20	,662
PUFUK	,917	20	,090

D.2.1.3. Racetrack

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
PURGR	,887	20	,049
PURUK	,950	20	,405

D.2.2. Ease of Use

D.2.2.1. Grid

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
EOUGGR	,936	20	,264
EOUGUK	,968	20	,684

D.2.2.2. Free-form

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
EOUFGR	,949	20	,402
EOUFUK	,898	20	,061

D.2.2.3. Racetrack

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
EOURGR	,948	20	,385
EOURUK	,967	20	,651

D.2.3. Entertainment

D.2.3.1. Grid

Tests of Normality

	Shapiro-Wilk		
	Statistic	Df	Sig.
ENTGGR	,958	20	,492
ENTGUK	,935	20	,251

D.2.3.2. Free-form

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
ENTFGR	,968	20	,681
ENTFUK	,891	20	,053

D.2.3.3. Racetrack

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
ENTRGR	,931	20	,218
ENTRUK	,918	20	,092

D.2.4. Time

D.2.4.1. Grid

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
TIMEGGR	,967	20	,664
TIMEGUK	,928	20	,184

D.2.4.2. Free-form

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
TIMEFGR	,962	20	,553
TIMEFUK	,943	20	,339

D.2.4.3. Racetrack

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
TIMERGR	,980	20	,906
TIMERUK	,889	20	,051

D.2.5. Promotion Effectiveness (Greece)

D.2.5.1. Items

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
PR_ITEMS	1,00	,420	20	,010**
	2,00	,354	20	,010**
	3,00	,531	20	,010**

** This is an upper bound of the true significance.

D.2.5.2. Budget

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
PR_BUDGE	1,00	,387	20	,010**
	2,00	,361	20	,010**
	3,00	,473	20	,010**

** This is an upper bound of the true significance.

D.2.6. Impulse Purchases (Greece)

D.2.6.1. Items

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	df	Sig.
IMP_ITEM	1,00	,831	20	,010**
	2,00	,931	20	,210
	3,00	,861	20	,010**

** This is an upper bound of the true significance.

D.2.6.2. Budget

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
IMP_BUDG	1,00	,838	20	,010**
	2,00	,923	20	,134
	3,00	,855	20	,010**

** This is an upper bound of the true significance.

D.2.7. Promotion Effectiveness (United Kingdom)

D.2.7.1. Items

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
PR_ITEM	1,00	,432	20	,010**
	2,00	,238	20	,010**
	3,00	,423	20	,010**

** This is an upper bound of the true significance.

D.2.7.2. Budget

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	df	Sig.
PROM_BUD	1,00	,337	20	,010**
	2,00	,238	20	,010**
	3,00	,460	20	,010**

** This is an upper bound of the true significance.

D.2.8. Impulse Purchses (United Kingdom)

D.2.8.1. Items

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
IMP_ITEM	1,00	,832	20	,010**
	2,00	,939	20	,299
	3,00	,884	20	020

** This is an upper bound of the true significance.

D.2.8.2. Budget

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
IMP_BUDG	1,00	,874	20	,014
	2,00	,964	20	,597
	3,00	,940	20	,303

D.3. Normality Tests as an assumption for *t*-tests (sample size = 60)

D.3.1. Perceived Usefulness

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
PUGREECE	,133	60	,061
PUUK	,078	60	,200*

* This is a lower bound of the true significance.
[a] Lilliefors Significance Correction

D.3.2. Ease of Use

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
EOUGR	,106	60	,091
EOUUK	,171	60	,052

[a] Lilliefors Significance Correction

D.3.3. Entertainment

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
ENTGR	,100	60	,200*
ENTUK	,107	60	,084

* This is a lower bound of the true significance.
[a] Lilliefors Significance Correction

D.3.4. Time

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
TIMEGR	,077	60	,200*
TIMEUK	,106	60	,090

* This is a lower bound of the true significance.
[a] Lilliefors Significance Correction

D.4. *t*-Tests

D.4.1. *t*-tests per dependent variable and layout (sample size = 20)

D.4.1.1. Perceived Usefulness

D.4.1.1.1. Grid

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PUGGR	4,1330	20	1,3775	,3080
	PUGUK	4,0495	20	1,4719	,3291

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PUGGR - PUGUK	8,350E-02	1,7399	,3891	-,7308	,8978	,215	19	,832

D.4.1.1.2. Free-form

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PUFGR	5,3075	20	,8151	,1823
	PUFUK	4,3500	20	1,0861	,2429

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PUFGR - PUFUK	,9575	1,4247	,3186	,2907	1,6243	1,792	19	,078

D.4.1.1.3. Racetrack

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PURGR	3,6840	20	1,4908	,3334
	PURUK	3,4585	20	1,5550	,3477

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PURGR - PURUK	,2255	1,9129	,4277	-,6697	1,1207	,527	19	,604

D.4.1.2. Ease of Use

D.4.1.2.1. Grid

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EOUGGR	5,8000	20	,8268	,1849
	EOUGUK	5,6575	20	,6370	,1424

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	EOUGGR - EOUGUK	,1425	1,0868	,2430	-,3661	,6511	,586	19	,565

D.4.1.2.2. Free-form

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EOUFGR	5,1925	20	1,0696	,2392
	EOUFUK	4,9915	20	1,1534	,2579

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	EOUFGR - EOUFUK	,2010	1,7816	,3984	-,6328	1,0348	,505	19	,620

D.4.1.2.3. Racetrack

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EOURGR	4,6415	20	1,0246	,2291
	EOURUK	3,8495	20	1,6414	,3670

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	EOURGR - EOURUK	,7920	1,8179	,4065	-5,8819E-02	1,6428	1,948	19	,066

D.4.1.3. Entertainment

D.4.1.3.1. Grid

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ENTGGR	3,5750	20	1,4051	,3142
	ENTGUK	3,6625	20	1,4310	,3200

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	ENTGGR - ENTGUK	-8,7500E-02	1,7571	,3929	-,9098	,7348	-,223	19	,826

D.4.1.3.2. Free-form

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ENTFGR	4,9000	20	1,2338	,2759
	ENTFUK	3,8000	20	,9754	,2181

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	ENTFGR - ENTFUK	1,1000	1,4382	,3216	,4269	1,7731	1,926	19	,064

D.4.1.3.3. Racetrack

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ENTRGR	3,4625	20	1,4896	,3331
	ENTRUK	3,4000	20	1,3917	,3112

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	ENTRGR - ENTRUK	6,250E-02	1,9363	,4330	-,8437	,9687	,144	19	,887

D.4.1.4. Time

D.4.1.4.1. Grid

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	TIMEGGR	772,0500	20	261,1302	58,3905
	TIMEGUK	723,0000	20	247,4667	55,3352

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	TIMEGGR - TIMEGUK	49,0500	397,7264	88,9343	-137,0917	235,1917	,552	19	,588

D.4.1.4.2. Free-form

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	TIMEFGR	797,9500	20	309,1561	69,1294
	TIMEFUK	837,8000	20	341,5789	76,3794

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	TIMEFGR - TIMEFUK	-39,8500	439,4146	98,2561	-245,5024	165,8024	-,406	19	,690

D.4.1.4.3. Racetrack

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	TIMERGR	1005,3500	20	383,5326	85,7605
	TIMERUK	937,4000	20	370,6030	82,8693

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	TIMERGR - TIMERUK	67,9500	623,2617	139,3656	-223,7455	359,6455	,488	19	,631

D.4.2. *t*-tests per dependent variable (sample size = 60)

D.4.2.1. Perceived Usefulness

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PUGREECE	4,3748	60	1,4203	,1834
	PUUK	3,9527	60	1,4127	,1824

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PUGREECE - PUUK	,4222	1,7193	,2220	-2,1973E-02	,8663	1,902	59	,062

D.4.2.2. Ease of Use

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EOUGR	5,2113	60	1,0744	,1387
	EOUUK	4,8328	60	1,4119	,1823

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	EOUGR - EOUUK	,3785	1,5982	,2063	-3,4364E-02	,7914	1,834	59	,072

D.4.2.3. Entertainment

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ENTGR	3,9792	60	1,5080	,1947
	ENTUK	3,6208	60	1,2718	,1642

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	ENTGR - ENTUK	,3583	1,7752	,2292	-,1002	,8169	1,564	59	,123

D.4.2.4. Time

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	TIMEGR	858,4500	60	333,4592	43,0494
	TIMEUK	832,7333	60	330,6499	42,6867

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	TIMEGR - TIMEUK	25,7167	490,3708	63,3066	-100,9595	152,3929	,406	59	,686

D.5. Normality tests for ANOVA (sample size = 40)

D.5.1. Perceived Usefulness

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
PU	1,00	,941	40	,050
	2,00	,975	40	,594
	3,00	,942	40	,051

D.5.2. Ease of Use

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
EOU	1,00	,942	40	,061
	2,00	,941	40	,057
	3,00	,980	40	,744

D.5.3. Entertainment

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
ENT	1,00	,943	40	,064
	2,00	,945	40	,077
	3,00	,940	40	,049

D.5.4. Time

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
TIME	1,00	,953	40	,171
	2,00	,958	40	,255
	3,00	,947	40	,088

D.5.5. Promotion Effectiveness

D.5.5.1. Items

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	Df	Sig.
PROMITEM	1,00	,406	40	,010**
	2,00	,297	40	,010**
	3,00	,471	40	,010**

** This is an upper bound of the true significance.

D.5.5.2. Budget

Tests of Normality

		Shapiro-Wilk		
	LAYOUT	Statistic	df	Sig.
PROMBUDG	1,00	,369	40	,010**
	2,00	,305	40	,010**
	3,00	,469	40	,010**

** This is an upper bound of the true significance.

D.5.6. Impulse Purchases

D.5.6.1. Items

Tests of Normality

	LAYOUT	Shapiro-Wilk		
		Statistic	df	Sig.
IMPUITEM	1,00	,885	40	,010**
	2,00	,943	40	,068
	3,00	,901	40	,010**

** This is an upper bound of the true significance.

D.5.5.2. Budget

Tests of Normality

	LAYOUT	Shapiro-Wilk		
		Statistic	df	Sig.
IMPBUDGE	1,00	,884	40	,010**
	2,00	,952	40	,144
	3,00	,905	40	,010**

** This is an upper bound of the true significance.

D.6. Anova tests

D.6.1. Perceived Usefulness

Descriptives

PU

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1,00	40	4,0913	1,4077	,2226	3,6410	4,5415	1,33	6,00
2,00	40	4,8288	1,0647	,1683	4,4883	5,1692	2,50	6,83
3,00	40	3,5713	1,5079	,2384	3,0890	4,0535	1,00	6,17
Total	120	4,1637	1,4264	,1302	3,9059	4,4216	1,00	6,83

ANOVA

PU

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	31,942	2	15,971	8,891	,000
Within Groups	210,172	117	1,796		
Total	242,113	119			

Multiple Comparisons

Dependent Variable: PU

Tukey HSD

(I) LAYOUT	(J) LAYOUT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1,00	2,00	-,7375*	,300	,040	-1,4490	-2,6049E-02
	3,00	,5200	,300	,197	-,1915	1,2315
2,00	1,00	,7375*	,300	,040	2,605E-02	1,4490
	3,00	1,2575*	,300	,000	,5460	1,9690
3,00	1,00	-,5200	,300	,197	-1,2315	,1915
	2,00	-1,2575*	,300	,000	-1,9690	-,5460

* The mean difference is significant at the .05 level.

D.6.2. Ease of Use

Descriptives

EOU

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1,00	40	5,7288	,7321	,1158	5,4946	5,9629	4,50	7,00
2,00	40	5,0920	1,1026	,1743	4,7394	5,4446	2,00	6,83
3,00	40	4,2455	1,4088	,2228	3,7949	4,6961	1,00	7,00
Total	120	5,0221	1,2636	,1154	4,7937	5,2505	1,00	7,00

ANOVA

EOU

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	44,294	2	22,147	17,782	,000
Within Groups	145,724	117	1,246		
Total	190,018	119			

Multiple Comparisons

Dependent Variable: EOU

Tukey HSD

(I) LAYOUT	(J) LAYOUT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1,00	2,00	,6368*	,250	,032	4,434E-02	1,2292
	3,00	1,4833*	,250	,000	,8908	2,0757
2,00	1,00	-,6368*	,250	,032	-1,2292	-4,4339E-02
	3,00	,8465*	,250	,003	,2541	1,4389
3,00	1,00	-1,4833*	,250	,000	-2,0757	-,8908
	2,00	-,8465*	,250	,003	-1,4389	-,2541

* The mean difference is significant at the .05 level.

D.6.3. Entertainment

Descriptives

ENT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1,00	40	3,6188	1,4005	,2214	3,1708	4,0667	1,25	6,00
2,00	40	4,3500	1,2310	,1946	3,9563	4,7437	2,25	6,75
3,00	40	3,4313	1,4232	,2250	2,9761	3,8864	1,00	5,75
Total	120	3,8000	1,4006	,1279	3,5468	4,0532	1,00	6,75

ANOVA

ENT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18,853	2	9,427	5,139	,007
Within Groups	214,597	117	1,834		
Total	233,450	119			

Multiple Comparisons

Dependent Variable: ENT

Tukey HSD

(I) LAYOUT	(J) LAYOUT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1,00	2,00	-,7312*	,303	,045	-1,4502	-1,2348E-02
	3,00	,1875	,303	,810	-,5314	,9064
2,00	1,00	,7312*	,303	,045	1,235E-02	1,4502
	3,00	,9187*	,303	,008	,1998	1,6377
3,00	1,00	-,1875	,303	,810	-,9064	,5314
	2,00	-,9187*	,303	,008	-1,6377	-,1998

* The mean difference is significant at the .05 level.

D.6.4. Time

Descriptives

TIME

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1,00	40	747,5250	252,3330	39,8974	666,8250	828,2250	345,00	1362,00
2,00	40	817,8750	322,2000	50,9443	714,8304	920,9196	310,00	1752,00
3,00	40	971,3750	373,8437	59,1099	851,8140	1090,9360	365,00	1755,00
Total	120	845,5917	330,9114	30,2079	785,7769	905,4064	310,00	1755,00

ANOVA

TIME

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1048269,267	2	524134,633	5,118	,007
Within Groups	11982511,725	117	102414,630		
Total	13030780,992	119			

Multiple Comparisons

Dependent Variable: TIME

Tukey HSD

(I) LAYOUT	(J) LAYOUT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1,00	2,00	-70,3500	71,559	,589	-240,2258	99,5258
	3,00	-223,8500*	71,559	,006	-393,7258	-53,9742
2,00	1,00	70,3500	71,559	,589	-99,5258	240,2258
	3,00	-153,5000	71,559	,085	-323,3758	16,3758
3,00	1,00	223,8500*	71,559	,006	53,9742	393,7258
	2,00	153,5000	71,559	,085	-16,3758	323,3758

* The mean difference is significant at the .05 level.

D.7. Kruskal-Wallis tests

D.7.1. Promotion Effectiveness

D.7.1.1. Items

Ranks

LAYOUT		N	Mean Rank
PROMITEM	1,00	40	60,40
	2,00	40	56,05
	3,00	40	65,05
	Total	120	

Test Statistics[a,b]

	PROMITEM
Chi-Square	3,476
Df	2
Asymp. Sig.	,176

[a] Kruskal Wallis Test
[b] Grouping Variable: LAYOUT

D.7.1.2. Budget

Ranks

	LAYOUT	N	Mean Rank
PROMBUDG	1,00	40	60,58
	2,00	40	55,92
	3,00	40	65,00
	Total	120	

Test Statistics[a,b]

	PROMBUDG
Chi-Square	3,528
Df	2
Asymp. Sig.	,171

[a] Kruskal Wallis Test
[b] Grouping Variable: LAYOUT

D.7.2. Impulse Purchases

D.7.2.1. Items

Ranks

	LAYOUT	N	Mean Rank
IMPUITEM	1,00	40	55,29
	2,00	40	68,40
	3,00	40	57,81
	Total	120	

Test Statistics [a,b]

	IMPUITEM
Chi-Square	3,314
df	2
Asymp. Sig.	,191

[a] Kruskal Wallis Test
[b] Grouping Variable: LAYOUT

D.7.2.2. Budget

Ranks

	LAYOUT	N	Mean Rank
IMPBUDGE	1,00	40	57,13
	2,00	40	64,66
	3,00	40	59,71
	Total	120	

Test Statistics [a,b]

	IMPBUDGE
Chi-Square	,976
df	2
Asymp. Sig.	,614

[a] Kruskal Wallis Test
[b] Grouping Variable: LAYOUT

D.8. Factor Analysis

D.8.1. Factor Analysis Results

Correlation Matrix

		ATTR1	ATTR2	ATTR3	ATTR4	ATTR5	ATTR6	ATTR7	ATTR8	ATTR9	ATTR10	ATTR11	ATTR12
Correlation	ATTR1	1,000	,302	,351	,028	,067	,063	,315	,052	,101	,180	,124	,229
	ATTR2	,302	1,000	,206	,007	,241	,137	,109	,173	-,075	,095	,202	,148
	ATTR3	,351	,206	1,000	,262	,186	,100	,236	,217	,043	,145	,139	,296
	ATTR4	,028	,007	,262	1,000	,337	,322	,163	,157	,095	,143	,135	,183
	ATTR5	,067	,241	,186	,337	1,000	,318	,227	,334	,028	,260	,198	,111
	ATTR6	,063	,137	,100	,322	,318	1,000	,245	,358	,227	,104	,154	,197
	ATTR7	,315	,109	,236	,163	,227	,245	1,000	,385	,225	,078	,204	,161
	ATTR8	,052	,173	,217	,157	,334	,358	,385	1,000	,181	,132	,229	,136
	ATTR9	,101	-,075	,043	,095	,028	,227	,225	,181	1,000	,181	,056	-,017
	ATTR10	,180	,095	,145	,143	,260	,104	,078	,132	,181	1,000	,441	,165
	ATTR11	,124	,202	,139	,135	,198	,154	,204	,229	,056	,441	1,000	,175
	ATTR12	,229	,148	,296	,183	,111	,197	,161	,136	-,017	,165	,175	1,000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	,689	
Bartlett's Test of Sphericity	Approx. Chi-Square	223,639
	df	66
	Sig.	,000

Anti-image Matrices

		ATTR1	ATTR2	ATTR3	ATTR4	ATTR5	ATTR6	ATTR7	ATTR8	ATTR9	ATTR10	ATTR11	ATTR12
Anti-image Covariance	ATTR1	,713	-,198	-,188	5,888E-02	4,600E-02	6,182E-03	-,201	,106	-5,331E-02	-9,760E-02	3,069E-02	-8,491E-02
	ATTR2	-,198	,799	-5,937E-02	9,248E-02	-,141	-5,765E-02	5,674E-02	-6,130E-02	9,574E-02	4,524E-02	-,108	-2,479E-02
	ATTR3	-,188	-5,937E-02	,746	-,164	-2,160E-02	7,250E-02	-3,380E-02	-9,939E-02	1,104E-02	-1,171E-02	5,182E-03	-,145
	ATTR4	5,888E-02	9,248E-02	-,164	,768	-,177	-,167	-2,679E-02	5,130E-02	-2,238E-02	-1,513E-02	-2,825E-02	-6,332E-02
	ATTR5	4,600E-02	-,141	-2,160E-02	-,177	,709	-,108	-7,012E-02	-,123	8,530E-02	-,150	1,863E-02	4,410E-02
	ATTR6	6,182E-03	-5,765E-02	7,250E-02	-,167	-,108	,729	-3,446E-02	-,151	-,146	3,988E-02	-2,025E-02	-,109
	ATTR7	-,201	5,674E-02	-3,380E-02	-2,679E-02	-7,012E-02	-3,446E-02	,710	-,194	-,118	9,392E-02	-9,313E-02	-2,631E-02
	ATTR8	,106	-6,130E-02	-9,939E-02	5,130E-02	-,123	-,151	-,194	,700	-7,251E-02	3,906E-03	-7,025E-02	-1,073E-02
	ATTR9	-5,331E-02	9,574E-02	1,104E-02	-2,238E-02	8,530E-02	-,146	-,118	-7,251E-02	,847	-,149	5,092E-02	8,940E-02
	ATTR10	-9,760E-02	4,524E-02	-1,171E-02	-1,513E-02	-,150	3,988E-02	9,392E-02	3,906E-03	-,149	,716	-,296	-6,378E-02
	ATTR11	3,069E-02	-,108	5,182E-03	-2,825E-02	1,863E-02	-2,025E-02	-9,313E-02	-7,025E-02	5,092E-02	-,296	,737	-4,493E-02
	ATTR12	-8,491E-02	-2,479E-02	-,145	-6,332E-02	4,410E-02	-,109	-2,631E-02	-1,073E-02	8,940E-02	-6,378E-02	-4,493E-02	,838
Anti-image Correlation	ATTR1	,604[a]	-,262	-,258	7,954E-02	6,466E-02	8,571E-03	-,283	,150	-6,859E-02	-,137	4,234E-02	-,110
	ATTR2	-,262	,647[a]	-7,688E-02	,118	-,188	-7,551E-02	7,535E-02	-8,193E-02	,116	5,982E-02	-,141	-3,030E-02
	ATTR3	-,258	-7,688E-02	,734[a]	-,217	-2,969E-02	9,827E-02	-4,644E-02	-,137	1,389E-02	-1,602E-02	6,989E-03	-,183
	ATTR4	7,954E-02	,118	-,217	,688[a]	-,240	-,224	-3,628E-02	6,993E-02	-2,775E-02	-2,041E-02	-3,756E-02	-7,894E-02
	ATTR5	6,466E-02	-,188	-2,969E-02	-,240	,729[a]	-,151	-9,883E-02	-,175	,110	-,210	2,578E-02	5,722E-02
	ATTR6	8,571E-03	-7,551E-02	9,827E-02	-,224	-,151	,740[a]	-4,790E-02	-,211	-,186	5,520E-02	-2,763E-02	-,140
	ATTR7	-,283	7,535E-02	-4,644E-02	-3,628E-02	-9,883E-02	-4,790E-02	,711[a]	-,275	-,153	,132	-,129	-3,413E-02
	ATTR8	,150	-8,193E-02	-,137	6,993E-02	-,175	-,211	-,275	,734[a]	-9,414E-02	5,517E-03	-9,780E-02	-1,401E-02
	ATTR9	-6,859E-02	,116	1,389E-02	-2,775E-02	,110	-,186	-,153	-9,414E-02	,569[a]	-,192	6,447E-02	,106
	ATTR10	-,137	5,982E-02	-1,602E-02	-2,041E-02	-,210	5,520E-02	,132	5,517E-03	-,192	,596[a]	-,408	-8,238E-02
	ATTR11	4,234E-02	-,141	6,989E-03	-3,756E-02	2,578E-02	-2,763E-02	-,129	-9,780E-02	6,447E-02	-,408	,681[a]	-5,720E-02
	ATTR12	-,110	-3,030E-02	-,183	-7,894E-02	5,722E-02	-,140	-3,413E-02	-1,401E-02	,106	-8,238E-02	-5,720E-02	,781[a]

[a] Measures of Sampling Adequacy(MSA)

Communalities

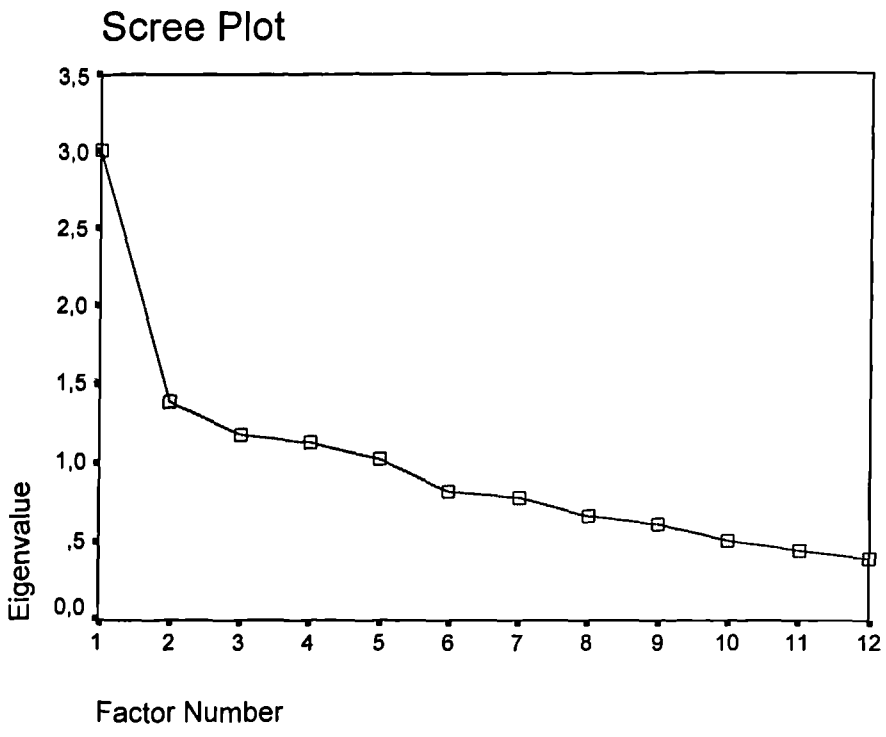
	Initial	Extraction
ATTR1	,287	,626
ATTR2	,201	,316
ATTR3	,254	,323
ATTR4	,232	,654
ATTR5	,291	,369
ATTR6	,271	,334
ATTR7	,290	,387
ATTR8	,300	,499
ATTR9	,153	,352
ATTR10	,284	,870
ATTR11	,263	,290
ATTR12	,162	,183

Extraction Method: Principal Axis Factoring.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,015	25,122	25,122	2,459	20,492	20,492	1,302	10,846	10,846
2	1,391	11,594	36,716	,878	7,315	27,807	1,292	10,768	21,614
3	1,179	9,826	46,542	,824	6,869	34,676	1,157	9,646	31,259
4	1,138	9,483	56,025	,572	4,771	39,446	,871	7,257	38,516
5	1,025	8,539	64,564	,471	3,928	43,374	,583	4,858	43,374
6	,818	6,821	71,385						
7	,786	6,554	77,939						
8	,663	5,527	83,466						
9	,618	5,152	88,618						
10	,521	4,342	92,960						
11	,447	3,728	96,688						
12	,397	3,312	100,000						

Extraction Method: Principal Axis Factoring.



Factor Matrix

	Factor				
	1	2	3	4	5
ATTR8	,541				
ATTR5	,516				
ATTR7	,507				
ATTR6	,475	-,322			
ATTR4	,473	-,400		-,428	
ATTR3	,461				
ATTR11	,445				
ATTR12	,369				
ATTR2	,347				-,321
ATTR1	,431	,511	,372		
ATTR10	,527	,358	-,679		
ATTR9				,402	,324

Extraction Method: Principal Axis Factoring.

Rotated Factor Matrix

	Factor				
	1	2	3	4	5
ATTR8	,679				
ATTR6	,475				
ATTR5	,460				
ATTR7	,422	,348			
ATTR1		,771			
ATTR3		,497			
ATTR2		,373			
ATTR12		,343			
ATTR10			,911		
ATTR11			,451		
ATTR4				,778	
ATTR9					,563

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Transformation Matrix

Factor	1	2	3	4	5
1	,601	,535	,448	,352	,168
2	-,475	,576	,404	-,507	-,150
3	,167	,573	-,790	-,112	-,078
4	,327	-,138	-,002	-,661	,660
5	-,528	,186	-,104	,411	,712

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

D.8.2. Reliability tests (Cronbach alpha coefficient)

D.8.2.1. Factor 1: Customer Care

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	ATTR5	ATTR6	ATTR7	ATTR8
ATTR5	1,0000			
ATTR6	,3180	1,0000		
ATTR7	,2266	,2452	1,0000	
ATTR8	,3337	,3580	,3854	1,0000

N of Cases = 120,0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	13,7083	7,9394	2,8177	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ATTR5	9,4167	5,6401	,3958	,1630	,5973
ATTR6	10,9917	4,9663	,4161	,1812	,5804
ATTR7	10,1250	5,1859	,3914	,1681	,5970
ATTR8	10,5917	4,1932	,5045	,2566	,5130

Reliability Coefficients 4 items

Alpha = ,6437 Standardized item alpha = ,6437

D.8.2.2. Factor 2: Merchandise and Security

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	ATTR1	ATTR2	ATTR3	ATTR12
ATTR1	1,0000			
ATTR2	,3037	1,0000		
ATTR3	,3863	,2429	1,0000	
ATTR12	,2193	,1554	,3518	1,0000

N of Cases = 120,0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	17,6500	3,9941	1,9985	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ATTR1	13,3917	2,0890	,4397	,2013	,4942
ATTR2	13,1750	2,8851	,3276	,1136	,5748
ATTR3	13,5500	2,1487	,4701	,2355	,4624
ATTR12	12,8333	3,0476	,3356	,1347	,5747

Reliability Coefficients 4 items

Alpha = ,6049 Standardized item alpha = ,6046

D.8.2.2. Factor 3: Effective Shopping

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	ATTR10	ATTR11
ATTR10	1,0000	
ATTR11	,4410	1,0000

N of Cases = 120,0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	8,4000	1,8723	1,3683	2

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ATTR10	4,0750	,6750	,4410	,1945	.
ATTR11	4,3250	,6246	,4410	,1945	.

Reliability Coefficients 2 items

Alpha = ,6118 Standardized item alpha = ,6121

D.9. Multiple Regression Analysis

D.9.1. Purpose of Internet Use

D.9.1.1. Grid Layout

D.9.1.1.1. Perceived Usefulness

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,328[a]	,108	,006	1,4035

a. Predictors: (Constant), H, EC, IS, SC
b. Dependent Variable: PUGRID

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,340	4	2,085	1,058	,392[a]
	Residual	68,945	35	1,970		
	Total	77,285	39			

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: PUGRID

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4,974	1,242		4,005	,000
	SC	-,342	,376	-,185	-,909	,369
	EC	-,441	,303	-,242	-1,456	,154
	IS	7,000E-02	,269	,044	,260	,796
	H	2,936E-02	,375	,016	,078	,938

a Dependent Variable: PUGRID

D.9.1.1.2. Ease of Use

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,285 [a]	,081	-,024	,7408

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: EOU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,693	4	,423	,771	,551 [a]
	Residual	19,208	35	,549		
	Total	20,902	39			

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: EOU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6,155	,656		9,390	,000
	SC	5,071E-02	,198	,053	,256	,800
	EC	-,119	,160	-,125	-,742	,463
	IS	-,220	,142	-,267	-1,549	,130
	H	,156	,198	,159	,786	,437

a Dependent Variable: EOU

D.9.1.1.3. Entertainment

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,281 [a]	,079	-,026	1,4188

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: ENT

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6,041	4	1,510	,750	,565 [a]
	Residual	70,458	35	2,013		
	Total	76,498	39			

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: ENT

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,648	1,255		1,313	,198
	SC	-,113	,380	-,061	-,298	,768
	EC	,233	,306	,129	,761	,451
	IS	,380	,272	,241	1,395	,172
	H	,134	,379	,071	,353	,726

a Dependent Variable: ENT

D.9.1.1.4. Time

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,246 [a]	,060	-,047	258,2072

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: TIME

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	149723,171	4	37430,793	,561	,692 [a]
	Residual	2333482,804	35	66670,937		
	Total	2483205,975	39			

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: TIME

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	811,042	228,482		3,550	,001
	SC	-35,312	69,137	-,106	-,511	,613
	EC	-69,349	55,722	-,212	-1,245	,222
	IS	12,888	49,529	,045	,260	,796
	H	16,028	68,993	,047	,232	,818

a Dependent Variable: TIME

D.9.1.2. Free-form Layout

D.9.1.2.1. Perceived Usefulness

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,531 [a]	,281	,199	,9526

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: PU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12,444	4	3,111	3,428	,018 [a]
	Residual	31,763	35	,908		
	Total	44,207	39			

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: PU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5,061	,843		6,007	,000
	SC	-,350	,241	-,254	-1,451	,156
	EC	-,555	,234	-,367	-2,377	,023
	IS	-7,737E-02	,168	-,068	-,460	,649
	H	,498	,224	,371	2,219	,033

a Dependent Variable: PU

D.9.1.2.2. Ease of Use

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,244 [a]	,060	-,048	1,1287

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: EOU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,830	4	,708	,555	,696 [a]
	Residual	44,587	35	1,274		
	Total	47,417	39			

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: EOU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5,691	,998		5,701	,000
	SC	-,321	,286	-,225	-1,123	,269
	EC	-,135	,277	-,086	-,487	,629
	IS	-6,340E-02	,199	-,054	-,318	,752
	H	,143	,266	,103	,538	,594

a Dependent Variable: EOU

D.9.1.2.3. Entertainment

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,379 [a]	,143	,046	1,2027

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: ENT

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,477	4	2,119	1,465	,234 [a]
	Residual	50,623	35	1,446		
	Total	59,100	39			

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: ENT

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,882	1,064		4,590	,000
	SC	-,618	,305	-,388	-2,028	,050
	EC	-,138	,295	-,079	-,469	,642
	IS	-,105	,212	-,080	-,495	,623
	H	,395	,283	,255	1,396	,171

a Dependent Variable: ENT

D.9.1.2.4. Time

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,268	,072	-,034	327,6973

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: TIME

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	290207,951	4	72551,988	,676	,613 [a]
	Residual	3758492,424	35	107385,49		
	Total	4048700,375	39	8		

a Predictors: (Constant), H, EC, IS, SC
b Dependent Variable: TIME

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	771,170	289,826		2,661	,012
	SC	15,225	83,017	,036	,183	,856
	EC	81,854	80,326	,179	1,019	,315
	IS	37,310	57,882	,108	,645	,523
	H	-78,912	77,185	-,194	-1,022	,314

a Dependent Variable: TIME

D.9.1.3. Racetrack Layout

D.9.1.3.1. Perceived Usefulness

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,132 [a]	,017	-,095	1,5778

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: PU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,543	4	,386	,155	,959 [a]
	Residual	87,136	35	2,490		
	Total	88,679	39			

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: PU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,059	1,583		1,933	,061
	SC	2,519E-02	,408	,013	,062	,951
	EC	,175	,458	,074	,382	,705
	IS	,198	,323	,106	,612	,545
	H	-,185	,363	-,101	-,510	,613

a Dependent Variable: PU

D.9.1.3.2. Ease of Use

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,166 [a]	,027	-,084	1,4666

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: EOU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,122	4	,530	,247	,910 [a]
	Residual	75,283	35	2,151		
	Total	77,405	39			

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: EOU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,030	1,471		2,740	,010
	SC	-,143	,379	-,080	-,376	,709
	EC	-,105	,426	-,047	-,245	,808
	IS	,186	,300	,107	,620	,539
	H	-2,156E-02	,337	-,013	-,064	,949

a Dependent Variable: EOU

D.9.1.3.3. Entertainment

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,151[a]	,023	-,089	1,4851

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: ENT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,808	4	,452	,205	,934[a]
	Residual	77,191	35	2,205		
	Total	78,998	39			

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: ENT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,444	1,489		2,312	,027
	SC	-4,875E-02	,384	-,027	-,127	,900
	EC	-,172	,431	-,077	-,399	,692
	IS	,152	,304	,087	,502	,619
	H	-8,397E-02	,341	-,048	-,246	,807

a Dependent Variable: ENT

D.9.1.3.4. Time

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,118[a]	,014	-,099	391,8503

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: TIME

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76471,749	4	19117,937	,125	,973[a]
	Residual	5374133,626	35	153546,675		
	Total	5450605,375	39			

a Predictors: (Constant), H, IS, EC, SC
b Dependent Variable: TIME

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1187,861	393,012		3,022	,005
	SC	3,379	101,364	,007	,033	,974
	EC	-66,164	113,847	-,112	-,581	,565
	IS	-32,484	80,212	-,071	-,405	,688
	H	-,572	90,078	-,001	-,006	,995

a Dependent Variable: TIME

D.9.2. Virtual Retail Store Selection Attributes

D.9.2.1 Grid Layout

D.9.2.1.1. Perceived Usefulness

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,260 [a]	,067	-,070	1,4559

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: PU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5,216	5	1,043	,492	,780 [a]
	Residual	72,069	34	2,120		
	Total	77,285	39			

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: PU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,313	2,537		,912	,368
	CC	-8,390E-02	,411	-,039	-,204	,839
	MS	3,521E-02	,448	,014	,079	,938
	ES	5,724E-02	,340	,028	,168	,867
	VSA	2,549E-02	,224	,020	,114	,910
	VSR	,414	,266	,265	1,553	,130

a Dependent Variable: PU

D.9.2.1.2. Ease of Use

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,315 [a]	,099	-,033	,7442

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: EOU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,071	5	,414	,748	,593 [a]
	Residual	18,831	34	,554		
	Total	20,902	39			

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: EOU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,852	1,297		3,741	,001
	CC	,169	,210	,150	,806	,426
	MS	-,185	,229	-,140	-,810	,423
	ES	9,277E-02	,174	,088	,534	,597
	VSA	5,734E-03	,115	,009	,050	,960
	VSR	,182	,136	,224	1,336	,190

a Dependent Variable: EOU

D.9.2.1.3. Entertainment

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,539 [a]	,290	,186	1,2637

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: ENT

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22,206	5	4,441	2,781	,033 [a]
	Residual	54,292	34	1,597		
	Total	76,498	39			

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: ENT

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,262	2,202		1,935	,061
	CC	-,342	,357	-,159	-,960	,344
	MS	,742	,389	,294	1,909	,065
	ES	-,762	,295	-,379	-2,582	,014
	VSA	,377	,195	,302	1,934	,061
	VSR	-,194	,231	-,125	-,838	,408

a Dependent Variable: ENT

D.9.2.1.4. Time

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,498 [a]	,248	,137	234,3547

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: TIME

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	615853,412	5	123170,682	2,243	,072 [a]
	Residual	1867352,563	34	54922,134		
	Total	2483205,975	39			

a Predictors: (Constant), VSR, VSA, ES, MS, CC
b Dependent Variable: TIME

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	175,189	408,439		,429	,671
	CC	28,698	66,134	,074	,434	,667
	MS	195,392	72,063	,429	2,711	,010
	ES	-17,654	54,730	-,049	-,323	,749
	VSA	-71,031	36,136	-,316	-1,966	,058
	VSR	-13,293	42,897	-,048	-,310	,759

a Dependent Variable: TIME

D.9.2.2. Free-form Layout

D.9.2.2.1. Perceived Usefulness

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,582[a]	,339	,241	,9274

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: PU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14,965	5	2,993	3,480	,012[a]
	Residual	29,242	34	,860		
	Total	44,207	39			

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,127	1,573		2,624	,013
	CC	,995	,265	,672	3,750	,001
	MS	,299	,402	,136	,743	,463
	ES	-,608	,302	-,371	-2,016	,052
	VSA	-,287	,186	-,263	-1,538	,133
	VSR	-,170	,158	-,158	-1,078	,289

a Dependent Variable: PU

D.9.2.2.2. Ease of Use

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,222 [a]	,049	-,091	1,1515

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: EOU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,332	5	,466	,352	,878 [a]
	Residual	45,085	34	1,326		
	Total	47,417	39			

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: EOU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6,115	1,953		3,132	,004
	CC	9,206E-02	,329	,060	,279	,782
	MS	-,221	,499	-,097	-,442	,661
	ES	-7,848E-02	,374	-,046	-,210	,835
	VSA	,187	,231	,165	,807	,425
	VSR	-,167	,196	-,150	-,854	,399

a Dependent Variable: EOU

D.9.2.2.3. Entertainment

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,373 [a]	,139	,013	1,2232

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: ENT

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,231	5	1,646	1,100	,378 [a]
	Residual	50,869	34	1,496		
	Total	59,100	39			

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: ENT

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4,082	2,074		1,968	,057
	CC	,322	,350	,188	,921	,364
	MS	,375	,530	,148	,708	,484
	ES	-,713	,398	-,376	-1,792	,082
	VSA	,172	,246	,136	,700	,489
	VSR	-3,309E-02	,208	-,026	-,159	,875

a Dependent Variable: ENT

D.9.2.2.4. Time

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,266 [a]	,071	-,066	332,6878

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: TIME

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	285540,907	5	57108,181	,516	,762 [a]
	Residual	3763159,468	34	110681,161		
	Total	4048700,375	39			

a Predictors: (Constant), VSR, CC, MS, VSA, ES
b Dependent Variable: TIME

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	359,487	564,167		,637	,528
	CC	-117,303	95,178	-,262	-1,232	,226
	MS	76,858	144,216	,116	,533	,598
	ES	83,934	108,173	,169	,776	,443
	VSA	24,478	66,873	,074	,366	,717
	VSR	25,097	56,639	,077	,443	,660

a Dependent Variable: TIME

D.9.2.3. Racetrack

D.9.2.3.1. Perceived Usefulness

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,285 [a]	,081	-,054	1,5479

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: PU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,213	5	1,443	,602	,699 [a]
	Residual	81,466	34	2,396		
	Total	88,679	39			

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: PU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,928	2,591		,358	,722
	CC	,515	,406	,250	1,268	,213
	MS	,383	,557	,119	,688	,496
	ES	8,815E-02	,398	,042	,221	,826
	VSA	-6,956E-02	,257	-,046	-,270	,789
	VSR	-,243	,287	-,159	-,848	,402

a Dependent Variable: PU

D.9.2.3.2. Ease of Use

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,330 [a]	,109	-,022	1,4245

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: EOU

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,407	5	1,681	,829	,538 [a]
	Residual	68,998	34	2,029		
	Total	77,405	39			

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: EOU

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,200	2,385		,503	,618
	CC	,549	,374	,285	1,468	,151
	MS	,320	,513	,106	,624	,537
	ES	-,109	,367	-,056	-,298	,768
	VSA	5,525E-03	,237	,004	,023	,982
	VSR	6,078E-02	,264	,042	,230	,819

a Dependent Variable: EOU

D.9.2.3.3. Entertainment

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,454 [a]	,206	,089	1,3582

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: ENT

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16,277	5	3,255	1,765	,147 [a]
	Residual	62,722	34	1,845		
	Total	78,998	39			

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: ENT

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,789	2,274		,787	,437
	CC	,983	,357	,505	2,758	,009
	MS	-,184	,489	-,060	-,375	,710
	ES	-1,330E-02	,350	-,007	-,038	,970
	VSA	-9,040E-02	,226	-,063	-,400	,692
	VSR	-,129	,252	-,089	-,512	,612

a Dependent Variable: ENT

D.9.2.3.4. Time

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,285 [a]	,081	-,054	383,8335

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: TIME

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	441448,004	5	88289,601	,599	,701 [a]
	Residual	5009157,371	34	147328,158		
	Total	5450605,375	39			

a Predictors: (Constant), VSR, VSA, MS, ES, CC
b Dependent Variable: TIME

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	416,376	642,580		,648	,521
	CC	-14,454	100,777	-,028	-,143	,887
	MS	23,063	138,214	,029	,167	,868
	ES	-1,048	98,787	-,002	-,011	,992
	VSA	51,278	63,838	,137	,803	,427
	VSR	90,911	71,081	,239	1,279	,210

a Dependent Variable: TIME

LIST OF REFERENCES

Aaker, D.A. (1998) *Strategic Market Management*, 5th edition, New York, John Wiley & Sons, Inc.

Active Project (2000) Advertising and Commerce through the Internet in the context of the Virtual Enterprise, *ESPRIT Programme (Framework IV)* - EP 27046, Commission of the European Union.

Adams, D.A., Nelson, R.R. and Todd, P.A. (1992) Perceived usefulness, ease of use, and usage of information technology: a replication, *MIS Quarterly,* 16, 3, pp. 227-247.

Ainscough, L.T. and Luckett, G.M. (1996) The Internet for the rest of us: marketing on the World Wide Web, *Journal of Consumer Marketing,* 13, 2, pp. 36-47.

Alben, L. (1996) Quality of experience defining the criteria for effective interaction design, *Interactions*, 3, 4, pp.11- 15.

Aldridge, D. (1998) Purchasing on the net – the new opportunities for Electronic Commerce, *International Journal of Electronic Markets*, 8, 1, pp. 34-37.

Angehrn, A. A. (1997a) Designing Mature Internet Strategies: The ICDI Model, *European Management Journal*, 15, 4, pp. 361-369.

Angehrn, Albert A. (1997b) The Strategic Implications of the Internet, *Proceedings of the 5th European Conference on Information Systems*, 3, pp. 1163-1173. Accessed at:
http://www.insead.fr/CALT/Publication/ICDT/strategicImplication.htm

Areni, C.S., and Kim, D. (1994) The Influence of In-Store Lighting on Consumers' Examination of Merchandise in a Wine Store, *International Journal of Research in Marketing*, 11, 1, pp. 117-125.

Arnold, S.J., Ma, S., and Tigert, D.J. (1977) A comparative analysis of determinant attributes in retail store selection, *Advances in Consumer Research*, Association of Consumer Research, 5, pp. 663-667.

Arnold, S.J., Tae, H.O., and Tigert, D.J. (1983) Determinant attributes in retail patronage: seasonal, temporal, regional, and international comparisons, *Journal of Marketing Research,* 20, 2, pp. 149-157.

Baecker, R.M., Grudin, J., Buxton, W.A.S. and Greenberg, S. (1995) *Readings in Human-Computer Interaction: Toward the Year 2000*, Morgan Kaufmann Publishers, Inc., San Francisco, California, pp. 73-91.

Bakos, Y.J. (1991) A Strategic Analysis of Electronic Marketplaces, *MIS Quarterly*, 15, 3, pp. 295-310.

Bakos, Y.J. (1997) Reducing Buyer Search Costs: Implications for Electronic Marketplaces, *Management Science*, 43, 12, pp. 1676-1692.

Bakos Y.J. (1998) The Emerging Role of Electronic Marketplaces on the Internet., *Communications of the ACM,* 41, 8, pp. 35-42.

Batty, J.B.II. and Lee, R.M. (1995) Intershop: Enhancing the vendor/customer dialectic in electronic shopping, *Journal of Management Information Systems*, 11, 4, pp. 9-31.

Bellizzi, J.A. and Hite, R.E. (1992) Environmental Color, Consumer Feelings, and Purchase Likelihood, *Psychology & Marketing*, 9, 5, pp. 347-363.

Bellman, S., Lohse, G.L. and Johnson, E.J. (1999) Predictors of Online Buying Behaviour, *Communications of the ACM,* 12, 42, pp. 32-37.

Benjamin, R. and Wigand R. (1995) Electronic Markets and Virtual Value Chains on the Information Superhighway, *Sloan Management Review*, 36, 2, pp. 62-72.

Berthon, P., Pitt, L.F. and Watson, R.T. (1996a) The World Wide Web as an Advertising Medium: Towards an Understanding of Conversion Efficiency, *Journal of Advertising Research*, 36, 1, pp. 43-54.

Berthon, P., Pitt, L.F. & Watson, R.T. (1996b) Marketing communication and the World Wide Web, *Business Horizons, 39, 5, pp. 24-32.*

Bettman, J. (1979) *An Information Processing Theory of the Consumer Choice*, Reading, MA: Addison-Wesley.

Bezjian-Avery, A., Calder, B. and Iacobucci, D. (1998) New Media Interactive Advertising vs. Traditional Advertising, *Journal of Advertising Research,* 35, 4, pp. 23-32.

Bhatnagar, A., Sanjoc, M. and Rao, R.H. (2000) On Risk, Convenience and Internet Shopping Behaviour, *Communications of the ACM,* 43, 11, pp. 98-105.

Biocca, F. and Levy, M.R. (1995) Virtual Reality as a communication system. In Biocca, F. and Levy, M.R. (Eds.), *Communication in the Age of Virtual Reality,* Lawrence Erlbraum Associates, Hillsdale, NJ, pp. 15-32.

Bloch, M., Pigneur, Y. and Segev, A. (1996) On the Road of Electronic Commerce – a Business Value Framework, Gaining Competitive Advantage and Some Research Issues, *An extended version of a publication in the Proceedings of the Ninth International EDI-IOS Conference*, Bled, Slovenia.

Accessed at: http://www.stern.nyu.edu/~mbloch/docs/roadtoec/ec.htm

Boston Consulting Group (2000), The State of Online Retailing in the UK, *Boston Consulting Group Report* (February).

Bovee, C., Houston, M.J. and Thill, J.V. (1995) *Marketing*, 2nd edition. New York: McGraw-Hill, Inc.

Breitenbach, S.G. and Van Doren (1998) Value-added marketing in the digital domain: enhancing the utility of the Internet, *Journal of Consumer Marketing,* 15, 6, pp. 558-575.

Briggs R. and Hollis N. (1997) Advertising on the Web: Is there Response before Click-Through?, *Journal of Advertising Research,* March, 37, 2, pp. 33-45.

Brown, R. (1992) Managing the "S" curves of innovation, *Journal of Consumer Marketing,* 9 1, pp. 61-72.

Bruner, II. and Gordon, C. (1990) Music, Mood, and Marketing, *Journal of Marketing,* 54, 4, pp. 94-104.

Bruner II, G.C. and Kumar, A. (2000) Web Commercials and Advertising Hierarchy-of-Effects, *Journal of Advertising Research,* 40, 1&2, pp.35-42.

Bucy, E.P., Lang, A., Potter, R.F., and Grabe, M.E. (1999) Formal features of cyberspace: relationships between Web page complexity and site traffic, *Journal of the American Society for Information Science,* 50, 13, pp. 1246-1256.

Burke M.C. and Berry, L.L. (1974-1975) Do Social Actions of a Corporation Influence Store Image and Profits, *Journal of Retailing,* 50, 4, pp. 62-72.

Burke, R.R. (1996) Virtual Shoping: Breakthrough in Marketing Research, *Harvard Business Review,* 74, 2, pp. 120-133.

Burstein, D. and Kline, D. (1995) *Road Warriors,* New York: Dutton.

Bush, A.J., Bush, V. and Harris, S. (1998) Advertiser Perceptions of the Internet as a Marketing Communication Tool, *Journal of Advertising Research,* 38, 2, pp. 17-27.

Business Week (1998) The Meat and Potatoes of Online Shopping?, December 7, pp. 45.

Centry, J.W. and Burns, A.C. (1977-1978) How "Important" Are Evaluative Criteria in Shopping Center Patronage?, *Journal of Retailing,* 53, 4, pp. 73-86.

Chartrand, G. (1985) *Introductory Graph Theory,* Dover.

Child, J. (1987) Information technology, organization, and the response to strategic challenges, *California Management Review,* 30, 1, pp. 33-50.

Choudrie, J., Hlupic, V. and O'Keefe, R. M. (1998). A Framework for Using Information Technology Within the Grocery Retail Sector. In Doukidis, G. and Gricar, J., Novak, J. (Eds), *Proceedings of 11th International Conference on Electronic Commerce: Electronic Commerce in the Information Society,* Bled Slovenia, June 8-10, pp.372-386.

Churchill, A.G.Jr. (1999) *Marketing Research: Methodological Foundation,* 7th edition, The Dryden Press.

Coakes, S.J. and Steed, L.G. (1999) *SPSS Analysis without Anguish,* John Wiley & Sons Australia, Ltd.

Cobb, C.J. and Hoyer, W.D. (1986) Planned versus Unplanned Purchase Behaviour, *Journal of Retailing,* 62, 4, pp. 384-409.

Cohen, W. A. (1995) *The Marketing Plan.* New York: John Wiley & Sons, Inc.

Cole, M. and O'Keefe, R.M. (2000) Conceptualising the dynamics of globalisation and culture in electronic commerce, *Journal of Global Information Technology Management,* 3, 4, pp. 4-17.

Cox, R. and Brittain, P. (1996) *Retail Management,* 3rd edition. London: Pitman Publishing.

Coyne, K. (1989) Beyond service fads – meaningful strategies for the real world, *Sloan Management Review,* 30, 4, pp. 69-76.

Crisp, B.C., Jarvenpaa, S.L. and Todd, P.A. (1997) Individual Differences and Internet Shopping Attitudes and Intentions. Accessed at:

http://ccwf.cc.utexas.edu/~crisp/Indiv_Shop.htm

Currie, W.L. (1999) Meeting the challenges of Internet commerce: key issues and concerns. In Despotis, D.K. and Zopounidis, C. (Eds.), *Proceedings of the 5th International Conference of the Decision Sciences Institute,* Athens, Greece, July 4-7, pp. 355-357.

Davis, F.D. (1989) Perceived usefulness, perceived ease of use and user acceptance of information technology, *MIS Quarterly,* 13, 2, pp. 319-339

Day, G.S. (1998) Organizing for Interactivity, *Journal of Interactive Marketing,* 12, 1, pp. 47-53.

December, J. and Randall, N. (1994) *The World Wide Web Unleashed,* Indiana: Sams Publishing.

Deighton, J. (1997) Commentary on exploratory the implications of the Internet for consumer marketing. *Journal of the Academy of Marketing Science,* 25, 4, pp. 347-351.

Dellaert B.G.C. and Kahn, B. (1999) How tolerable is delay?: Consumers'evaluations of Internet Web Sites after waiting, *Journal of Interactive Marketing,* 13, 1, pp. 41-54.

Dickson, J. and Albaum, G. (1977) A Method for Developing Tailormade Semantic Differentials for Specific Marketing Content Areas, *Journal of Marketing Research,* XIV, February, pp. 87-91.

Dix, A., Finlay, J., Abowd, G., and Beale, R. (1998) *Human Computer Interaction,* 2nd edition. Prentice Hall Europe.

Doherty, N.F., Ellis – Chadwick, F. and Hart, C.A. (1999) Cyber Retailing in the UK: The Potential of the Internet as a Retail Channel, *International Journal of Retail & Distribution Management*, 27, 1, pp. 22-36.

Dohlakia U.M. and Rego, L.L. (1998) What makes commercial Web pages popular? An empirical investigation of Web page effectiveness, *European Journal of Marketing*, 32, 7/8, pp. 724-736.

Donovan, R.J., and Rossiter, J.R. (1982) Store Atmosphere: An Environmental Psychology Approach, *Journal of Retailing*, 58, 1, pp. 34-57.

Donthu, N. and Garcia, A. (1999) The Internet Shopper, *Journal of Advertising Research*, May-June, 39, 3, pp. 52-58.

Doyle, S.A., and Broadbridge, A. (1999) Differentiation by Design: The Importance of Design in Retailer Repositioning and Differentiation, *International Journal of Retail & Distribution Management*, 27, 2, pp. 72-82.

Dreze, X. and Zufryden, F. (1997) Testing Web Site Design and Promotional Content, *Journal of Advertising Research*, 37, 2, pp.77-91.

Earl, M.J. (1989) *Management Strategies for Information Technology*, Business Information Technology Series, Prentice Hall International (UK) Ltd.

Eastlick, M.A. and Lotz, S. (1999), Profiling potential adopters and non-adopters of an interactive electronic shopping medium, *International Journal of Retail and Distribution Management*, 27, 6, pp.209-223.

Eberts, R.E (1994) *User Interface Design*, Prentice Hall, Inc.

ECR Report (1996) Category Management Report-Enhancing Consumer Value in the Grocery Industry", Joint Industry Project on Efficient Consumer Response.

ECR Europe Report (1999) How to create consumer enthusiasm – Roadmap to growth, *ECR Europe*.

Elliot, S. and Fowell, S. (2000) Expectations versus reality: a snapshot of consumer experiences with Internet retailing, *International Journal of Information Management*, 20, 5, pp.323-336.

eMarketer (1999) News from the world's largest Web Survey. *eMarketer Newsletter*, 49 (December 7). Accessed at: http://www.emarketer.com/estats/113099_idc.html

eMarketer (2001) Comparative Estimates: Worldwide B2C eCommerce Revenues Accessed at: http://www.emarketer.com

Engel, J.F., Blackwell, R.D. and Miniard, P.W. (1990) *Consumer Behavior*, Chicago: Dryden.

Ernst & Young (2000) Global Online Retailing: *An Ernst & Young Special Report*.

Eroglu, S.A. and Machleit, K.A. (1999) Evaluating the Shopping Experience: The Influence of Perceived Retailing Crowding, *AMA Winter Marketing Educators'*

Conference: Eemerging Issues in Marketing and the Academy, Tradewinds Resort, St. Petesburg, FL., February 20-23.

Eroglu, S.A., Machleit A.K. and Davis, L. M. (2000) Online Retail Atmospherics: Empirical test of a cue typology, *Proccedings of the Sixth Triennial National retailing Conference presented by the Academy of Marketing Science and the American Collegiate Retailing Association*, Columbus, Ohio, November 2-5.

Eroglu, S.A., Machleit, A.K. and Davis, L.M. (2001) Atmospheric Qualities of Online Retailing: A conceptual model and implications, *Journal of Business Research, forthcoming.*

Erskine, L.E., Carter-Tod, D.R.N. and Burton, J.K. (1997) Dialogical Techniques for the Design of Web Sites, *Proceedings of 3rd Conference on Human Factors & the Web, Designing for the Web: Practices & Reflections,* Denver, Colorado, USA, June 12.

Falkou, X., Lytras, G., Pramataris, K.C. and Vrechopoulos, A.P. (1999) Putting the Consumer on "TOP": Traditional Online Products Store. In Pries-Heje, J., Ciborra, C., Kautz, K, Valor, J., Christiaanse, E., Avison, D. and Heje, C. (Eds.), *Proceedings of the 7th European Conference on Information Systems*, Copenhagen Business School, Copenhagen, Denmark, June 23-25, pp.142-155.

Field, C. (1996) Retaling on the Internet - The future for on-line commerce, *Financial Times, Retail & Consumer Publishing*, Pearson Professional Ltd, pp. 1-7.

Field, C. (1997) Data goes to market – utilizing information obtained from loyalty cards," *Computer Weekly*, 16 January , pp. 44-46.

Forrester Research (1998) World Wide Internet Commerce Will Reach as High as $3.2 Trillion in 2003, Accessed at: http://www.forrester.com

Galliers, R. D. (1992) Choosing Information Systems Research Approaches. In Galliers R.D. (Ed.), *Information Systems Research: Issues, Methods and Practical Guidelines,* Blackwell Scientific Publications, pp. 144-162.

Gardner, M.P. (1985) Mood States and Consumer Behavior: A Critical Review, *Journal of Consumer Research*, 12, December, pp. 281-300.

Gardner, M.P. and Siomkos, G. (1986) Toward a Methodology for Assesing Effects of In-Store Atmospherics. In Lutz R. (Ed.) *Advances in Consumer Research,* 13, pp. 27-31.

Gates B. (1995) The Grocery Cart in Your PC, *Business Week,* September 11, pp. 63.

Gatignon, H. and Robertson, T.S. (1991) Innovative Decision Processes. In Robertson, T.S. and Kassarjian, H.H. (Eds.) *Handbook of Consumer Behavior,* Englewood Cliffs, NJ: Prentice Hall, pp. 316-348.

Gefen, D., Straub, D.W. and Boudreau, M-C. (2000) Structural Equation Modeling and Regression: Guidelines for Research Practice, *Communications of the Association for Information Systems,* 4, Article 7, (October).

Accessed at http://cais.isworld.org/articles/4-7/article.htm

Gehrke, D., Turban, E., and Lee, O.K.M. (1999) Consumer and literature survey results of the relative importance of Website design categories. In Despotis, D.K. and Zopounidis, C. (Eds.), *Proceedings of the 5th International Conference of the Decision Sciences Institute,* Athens, Greece, July 4-7, pp. 887-889.

Ghosh, A. (1994) *Retail Management,* 2nd edition, New York: The Dryden Press.

Gillenson, M.L., Sherrell, D.L. and Chen, L. (2000) A Taxonomy of Web Site Traversal Patterns and Structures, *Communications of the Association for Information Systems,* Vol. 3, Article 17, June 2000. Accessed at:

http://cais.isworld.org/articles/3-17/article.htm

Gogan J. I. (1996-7) The Web's Impact on Selling Techniques: Historical Perspectives and Early Observations, *International Journal of Electronic Commerce,* 1, 2, pp. 89-108.

Gordon, I.H. (1998) *Relationship Marketing,* Canada: John Wiley & Sons, Ltd.

Granitz, N.A., and Ward, J.C. (1996) Virtual Community: A Sociocognitive Analysis. In Corfman, K.P. and Lynch, J.G.Jr. (Eds.), *Advances in Consumer Research,* 23, Provo, UT: Association for Consumer Research, pp.161-166.

Gross, J.L. and J. Yellen, J. (1998) *Graph Theory and Its Applications,* CRC Press, Accessed at: http://www.graphtheory.com

GVU (1998) WWW User Survey, conducted by the *Graphic, Visualization & Usability Center (GVU) of Georgia Tech Research Corporation,* from October 10, 1998 through December 15, 1998. Available online at: http://www.gvu.gatech.edu/user_surveys/survey-1998-10/

Gupta, S. (1995) HERMES: *A Research Project on the Commercial Uses of the World Wide Web.* Accessed at: http://www.umich.edu/sgupta/hermes

Haeckel, S.H. (1998) About the Nature and Future of Interactive Marketing, *Journal of Interactive Marketing,* 12, 1, pp. 63-71.

Hair, J.F.Jr., Anderson, R.E., Tatham, R.L. and Black, W.C. (1992) *Multivariate Analysis with Proceedings,* 3rd edition, Macmillan Publishing Company New York, Maxwell Macmillan Toronto, Maxwell Macmillan International .

Hair J.F.Jr, Bush, R.P., and Ortinau, D.J. (2000) *Marketing Research: A Practical Approach for the New Millenium,* Irwin McGraw-Hill

Hamill, J., and Gregory, K. (1997) Internet marketing in the Internationalisation of UK SMEs, *Journal of Marketing Management,* 13, 1-3, pp.9-28.

Hansen, R.A. and Deutscher, T. (1977-1978) An Empirical Investigation of Attribute Importance in Retail Store Selection, *Journal of Retailing,* 53, 4, pp. 59-72.

Hawkins, D.I., Best, R.J. and Coney, K.A. (1998) *Consumer Behavior-Building Marketing Strategy,* 7th edition, Mc Graw Hill.

Heijden, H.V.D. (2000) The Impact of Perceived Website Characteristics on Website Traffic. In Klein, S., O' Keefe, B., Gricar, J. and Podlogar, M. (Eds.), *Proceedings of the 13th Bled Electronic Commerce Conference: The End of the Beginning,* Bled, Slovenia, June 19-21, p. 414-425.

Heikkila, J., Kallio, J., Saarinen T. and Tuunaimen, V.K. (1998) Diffusion of Electronic Grocery Shopping: Expectations of current suppliers and potential service providers in Finland. In Doukidis, G. and Gricar, J., Novak, J. (Eds), *Proceedings of 11th International Conference on Electronic Commerce: Electronic Commerce in the Information Society,* Bled Slovenia, June 8-10, pp. 424-438.

Hendrickson, A.R., Massey, P.D., and Cronan, T.P. (1993) On the Test-retest Reliability of Perceived Usefulness and Perceived Ease of Use Scales, *MIS Quarterly,* 17, 3, pp. 227-230.

Henninger, S. (1997) Creating Organization-Specific Usability Guidelines, *CHI 97 Electronic Publications: Late-Breaking/Short Talks,* ACM Press. Accessed at: http://www.acm.org/sigs/sigchi/chi97/proceedings/short-talk/she.htm

Herbig, B.A. and Day, R.L. (1992) Customer acceptance: the key to successful introduction of innovations, *Marketing Intelligence and Planning,* 10, 1, pp. 4-15.

Herbig, P. and Hale, B. (1997) Internet: the marketing challenge of the twentieth century, *Internet Research: Electronic Networking Applications and Policy,* 7, 2, pp. 95-100.

Herrington, D.J. and Capella, L.M. (1995) Shopper reactions to perceived time pressure, *International Journal of Retail & Distribution Management,* 23, 12, pp. 13-20.

Hewitt, P. (1998) *Evolution of Corporate Web Sites.* Accessed at: http://www.contentious.com/articles/1-3/guest1-3.html

Hirschman, E.C., Greenberg, B. and Robertson, D.H. (1978) The Intermarket Reliability of Retail Image Research: An Empirical Examination, *Journal of Retailing,* 54, 1, pp. 3-12.

Hofacker, C.F. and Murphy, J. (1998) World Wide Web banner advertising copy testing, *European Journal of Marketing,* 32, 7/8, pp. 703-712.

Hoffman, D.L., Novak, T.P. and Chatterjee, P. (1995) Commercial Scenarios for the Web: Opportunities and Challenges, *Journal of Computer-Mediated Communication,* 1, 3. Accessed at: http://jcmc.huji.ac.il/vol1/issue3/hoffman.html

Hoffman, D.L. and Novak, T.P. (1996) Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations, *Journal of Marketing*, 60, 3, pp. 50-68.

Hoffman, D.L. and Novak, T.P. (1997) A new marketing paradigm for Electronic Commerce, *Information Society*, 13, 1, pp. 43-54.

Horgan, T. (1996) Finding the Way. *Web Master Magazine*, May/June.

Hoque, A.Y. and Lohse G.L. (1999) An Information Search Cost Perspective for Designin Interfaces for Electronic Commerce, *Journal of Marketing Research,* XXXVI, August, pp. 387-394.

Howard, J.A. (1989) *Consumer Behavior in Marketing Strategy*, Englewood Cliffs, NJ: Prentice-Hall.

Jarvenpaa, S.L. and Todd, P.A. (1997) Consumer Reactions to electronic shopping on the World Wide Web, *International Journal of Electronic Commerce,* 1, 2, pp. 59-88.

Jarvenpaa, S.L., Tractinsky, N. and Vitale, M. (2000) Consumer trust in an Internet store, *Information Technology and Management,* 1, 1-2, pp. 45-71.

Jones, J.M. and Vijayasarathy, L.R. (1998) Internet Consumer Catalogue shopping: findings from an exploratory study and directions for future research, *Internet Research: Electronic Networking Applications and Policy,* 8, 4, pp. 322-330.

Isakowitz, T., Stohr, E.A. and Balasubranian, P. (1995) *RMM: A Methodology for Strucured Hypermedia Design, Communications of the ACM,* 38, 8, pp 34-44.

Isakowitz, T., Kamis, A. and Koufaris, M. (1997) Extending the capabilities of RMM: Russian Dolls and Hypertext, *Proceedings of the 30th Hawaii International Conference On Systems Sciences (HICSS),* Maui, Hawai, pp 148-157.

Kalakota, R., and Whinston, A. (1996) *Frontiers of Electronic Commerce*, Reading, Massachusetts: Addison Wesley.

Kambil, A. (1997) Doing Business in the Wired World, *IEEE Computer*, 30, 5, pp. 56-61.

Kannan, P.K., Chang, A-M. and Whinston, A.B. (1998) Marketing Information on the I-Way, *Communications of the ACM,* 41, 3, pp. 35-43.

Kardaras, D. and Papathanassiou, E. (2000) The development of B2C e-commerce in Greece: current situation and future potential, *Internet Research: Electronic Networking Applications and Policy,* 10, 4, pp. 284-294.

Keen, P.G.W. (1991) *Shaping the Future: Business Design through Information Technology*, Harvard Business School Press.

Kerlinger, F.N., Holt, Rinehart and Winston (1986) *Foundations of Behavioural Research,* 3rd edition, The Dryden Press.

Kerne, A. (1998) Cultural representation in interface ecosystems: amendments to the ACM/interactions design awards criteria, *Interactions*, 5, 2, pp. 37-43.

Kinnear, T.C. and Taylor, J.R. (1996) *Marketing Research: An Applied Approach,* 5th edition, McGraw-Hill, Inc.

Kiountouzis, E. (1997) *Methodologies of Analysis and Design of Information Systems,* Benos editions, Athens (in Greek).

Kling, A. (1994) The economic consequences of the World Wide Web, *Paper presented at the Second World Wide Web Conference: Mosaic and the Web,* Geneva, Switzerland, May, pp. 27-29.
http://www.acm.org/pubs/articles/proceedings/ir/312624/p332-kocz/p332-kocz.pdf

Koelemeijer, K. and Oppewal H. (1999) Assessing the Effects of Assortment and Ambience: A Choice Experimetal Approach, *Journal of Retailing,* 75, 3, pp. 319-345.

Kotler, P. (1973-4) Atmospherics as a Marketing Tool, *Journal of Retailing,* 49, 4, pp. 48-64.

Kotler, P. (1997) *Marketing Management: Analysis, Planning, Implementation and Control,* 9th edition, Prentice-Hall, Inc.

Kyungae, P. and Dyer, C.L. (1995) Consumer use innovative behaviour: an approach toward its causes. In Kardes, F.R. and Sujan, M. (Eds.), *Advances in Consumer Research,* 22, Provo, UT: Association for Consumer Research, pp. 566-572.

Lee, H., Lee, C., and Yoo C. (1999) A scenario-based object-oriented hypermedia design methodology, *Information & Management,* 36, 3, pp.121-138.

Lehmann, D.R. (1989) *Market Research and Analysis,* 3rd edition, Boston, MA: Irwin.

Leventhal, L., Teasley, B., Instone, K. and Stone, D. (1995) Searching without a keyboard in a multimedia environment. In Nordby, K., Helmersen, P.H., Gilmore, D.J. and Arnessen, S.A. (Eds.), *Human Computer Interaction – Interact '95,* Chapman & Hall on behalf of the International Federation for Information Processing (IFIP), pp. 241-246.

Levy, M. and Weitz, B.A. (1998) *Retailing Management,* 3rd edition. Chicago: IRWIN.

Lewison, D.M. (1994) *Retailing,* 5th edition. New York, NY: Macmillan College Pulishing Company.

Li, H., Kuo, C. and Russel, M.G. (1999) The impact of perceived channel utilities, shopping orientations, and demographics on the consumer's online buying behaviour, *Journal of Computer-mediated Communication,* 5, 2.

Accessed at : http://www.ascusc.org/jcmc/vol5/issue2/hairong.html

Lif, M. (1999) User-Interface modeling - adding usability to use cases, *International Journal of Human-Computer Studies*, 50, 3, pp. 243-262.

Lilien, G.L., Kotler, P. and Moorthy, K.S. (1992) *Marketing Models*, Prentice Hall.

Lindquist, J.D. (1974-75) Meaning of image, *Journal of Retailing*, 50, 4, pp. 29-38.

Lohse, L.G. and Spiller, P. (1998) Electronic Shopping: How do customer interfaces produce sales on the Internet, *Communications of the ACM*, 41, 7, pp. 81-87.

Lohse, L.G. and Spiller, P. (1999) Internet retail store design: How the user interface influences traffic and sales. *Journal of Computer-Mediated Communication*, 5, 2. Accessed at: http://www.ascusc.org/jcmc/vol5/issue2/lohse.htm

Luck, D.J. and Rubin, R.S. (1987) *Marketing Research*, 7th edition, Prentice-Hall, Inc., Englewood Cliffs, NJ.

Lumpkin, J.R., Greenberg, B.A. and Goldstucker, J.L. (1985), Marketplace Needs of the Elderly: Determinant Attributes and Store Choice, *Journal of Retailing*, 61, 2, pp. 75-105.

Machleit, K.A., Kellaris, J.J. and Eroglu, S.A. (1994) Human Versus Spatial Dimensions of Crowding Perceptions in Retail Environments: A Note on their Measurement and Effect on Shopper Satisfaction, *Marketing Letters*, 5, 2, pp. 183-194.

Malhotra, N.K. and Birks, D.F. (2000) *Marketing Research: An Applied Approach*, European Edition, Financial Times, Prentice Hall.

Malone, T.W., Yates, J. and Benjamin, R.I. (1987) Electronic Markets and Electronic Hierarchies, *Communication of the ACM*, 30, 6, pp. 484-497.

Malone, T.W., Yates, J. and Benjamin, R.I. (1989) The Logic of Electronic Markets, *Harvard Business Review*, 89, 3, pp. 166-170.

Markham, J.E. (1998) *The Future of Shopping: Traditional Patterns @nd net Effects*, Macmillan Press Ltd.

Martineau, P. (1958) The Personality of the Retail Store, *Harvard Business Review*, January – February, pp. 47-55.

Mason, B.J., Mayer, M.L. and Ezell, H.F. (1991) *Retailing*, 4th edition, IRWIN, Homewood, Boston.

Mazursky, D. and Jacoby, J. (1986) Exploring the Development of Store Images, *Journal of Retailing*, 62, 2, pp. 145-165.

McDougall, G.H.G. and Fry, J.N. (1974-1975) Combining Two Methods of Image Measurement, *Journal of Retailing*, 50, 4, pp. 53-61.

McGoldrick, P.J. (1998) *Retail Marketing*, Mcgraw-Hill.

Miles, G.E., Howes, A. and Davies, A. (1999) A framework for understanding Human Factors in Web-based electronic commerce, *International Journal of Human-Computer Studies*, 52, 1, pp.131-163.

Miller , T. (1995) New markets for information, *American Demographics*, April. Accessed at: http://www.demographics.com/publications/ad/95_ad/9504_ad/9504AF04.htm

Mills, K.H. and Paul, J.E. (1974) Create distinctive displays, Englewood Cliffs, NJ: Prentice Hall.

Morgan and Stanley (1997) *The Internet Retailing Report*, Morgan Stanley.

Mountford, S.J. (1995) Tools and Techniques for Creative Design. In Baecker, M.R., Grudin, J., Buxton, A.S.W. and Greenberg S. (Eds.), *Readings in Human-Computer Interaction: Toward the Year 2000*, Morgan Kaufmann Publishers, Inc., San Francisco, California, pp. 128-141.

Mowen, J.C. and Minor, M. (1998) *Consumer Behavior,* 5th edition, Upper Saddle River, New Jersey: Prentice –Hall.

Mulhern, F.J. (1997) Retail Marketing: From Distribution to Integration, *International Journal of Research in Marketing*, 14, 2, pp. 103-124.

Needel, S.P. (1998) Understanding Consumer Response to Category Management Through Virtual Reality, *Journal of Advertising Research,* 38, 4, pp.61-67.

Nielsen, J. (1989) Evaluating hypertext usability. In Jonassen, D.H. and Mandl, H. (Eds.), *Designing Hypermedia for Learning*, New York: Springer-Verlag, pp. 147-168.

Nielsen J. (1992) The Usability Engineering Life Cycle, *IEEE Computer Magazine*, March.

Nielsen, J. (1994) Report From a 1994 Web Usability Study. Useit.com. Papers and Essays. Accessed at: http://www.useit.com/papers/1994_Web_usability_report.html

Nielsen, J. (1995) Guidelines for Multimedia on the Web. Accessed at: http://www.useit.com/alertbox/9512.html

Nielsen, J. (1996a). Top ten mistakes in Web design. Accessed at: www.useit.com/alertbox/9605.html

Nielsen, J. (1996b) The Rise of the Sub-Site. Accessed at: http://www.useit.com/alertbox/9609.html

Nielsen, J. (1997a) Changes in Web Usability since 1994. Accessed at: http://www.useit.com/alertbox/9712a.html

Nielsen, J. (1997b) Effective Use of Style Sheets. Accessed at: http://www.useit.com/alertbox/9707a.html

Nielsen, J. (1997c) The Need for Speed. Accessed at: http://www.useit.com/alertbox/9703a.html

Nielsen, J. (1997d) Be Succinct! – Writing for the Web.

Accessed at: http://www.useit.com/alertbox/9703b.html

Nielsen, J. (1997e) The Difference between Web Design and GUI Design. Accessed at: http://www.useit.com/alertbox/9705a.html

Nielsen, J. (1998) Personalization is Over-Rated. Accessed at: http://www.useit.com/alertbox/981004.html

Nielsen, J. (1999a) User Interface Directions for the Web, *Communications of the ACM,* 42, 1, pp. 65-72.

Nielsen, J. (1999b). Do Interface Standards Stifle Design Creativity? Accessed at: http://www.useit.com/alertbox/990822.html

Obermiller, C., and Bitner, M. (1984) Store Atmosphere: Peripheral Cue for Product Evaluation, *Proceedings of Annual Conference, American Psychological Association, Consumer Psychology Division.*

O'Connor, J. and Galvin, E. (1997) *Marketing & Information Technology: the strategy, application and implementation of IT in Marketing,* Pitman Publishing.

O'Keefe, R.M. and McEachern, T. (1998) Web-based customer decision support systems, *Communications of the ACM,* 41, 3, pp. 71-78.

O'Keefe, R.M., Cole, M., Chau, P.Y.K., Massey, A., Montoya-Weiss, M. and Perry, M. (2000) From the User Interface to the Consumer Interface: results from a Global Experiment, *International Journal of Human Computer Studies,* 53, 4, pp. 611-628.

Olson, G.M., Olson, J.S. (1997) Research on Computer Supported Work. In Helander, M.G., Landauer, T.K. and Prabhu, P.V. (Eds.), *Handbook of Human-Computer Interaction,* second revised edition, North-Holland, Chapter 59, pp. 1435-1436.

Oppewal, H., Louviere, J.J. and Timmermans, H.J.P. (2000) Modifying Conjoint Methods to Model Managers' Reactions to Business Environmental Trends: An Application to Modeling Retailer Reactions to Sales Trends, *Journal of Business Research,* 50, pp. 245-257.

Palmer, J.W., Griffith, D.A. (1998) An Emerging model of Web Site Design for Marketing, *Communications of the ACM,* 41, 3, pp 45-51.

Palmer, J., Kallio, J., Saarinen, T., Tinnila, M., Tuunainen K.V. and Heck, E. (2000) Online Grocery Shopping around the world: examples of key business models, *Communications of the Association for Information Systems,* 4, Article 3, September. Accessed at: http://cais.isworld.org/articles/4-3/article.htm

Park, W.C., Easwar, S. Iyer, E.S. and Smith, D.C. (1989) The Effects of Situational Factors on In-Store Grocery Shopping Behavior: The Role of Store Environment and Time Available for Shopping, *Journal of Consumer Research,* 15, 4, pp. 422-433.

Parsons, A., Zeisser, M. and Waitman, R. (1998) Organizing today for the digital marketing of tomorrow, *Journal of Interactive Marketing*, 12, 1, pp. 31-46.

Paul, P. (1996) Marketing on the Internet, *Journal of Consumer Marketing*, 13, 4, pp. 27-39.

Pawar, S.B. and Sharda, R. (1997) Obtaining Business Intelligence on the Internet, *Long Range Planning*, 30, 1, pp. 110-121.

Perlman, G.D., Egan, K., Ehrlich, G., Marchionini, J., Nielsen, and B. Shneiderman (1990), Evaluating hypermedia systems, *Proceedings of Human Factors in Computing CHI'90 Conference*, New York: ACM Press, pp. 387-390.

Petrison, L., Blattberg, R.C., and Wang, P. (1997) Database Marketing – Past, Present and Fututre, *Journal of Direct Marketing*, 11, 4, pp. 109-125.

Poon, S. and Jevons, C. (1997) Internet-Enabled International Marketing: A Small Business Network Perspective, *Journal of Marketing Management*, 13, 1-3, pp. 29-41.

Porter, M.E. (1980) *Competitive Strategy*, New York: The Free Press.

Porter, M.E. (1985) Competitive Advantage, New York: The Free Press.

Porter, M.E. and Millar, V.E. (1985) How Information Gives You Competitive Advantage, *Harvard Business Review*, 85, 4, pp. 149-160.

Pramataris, K.C., Vrechopoulos, A.P. and Doukidis, G.I. (2000a) The Transformation of the Promotion Mix in the Virtual Retail Environment: An Initial Framework and Comparative Study, *International Journal of New Product Development and Innovation Management*, 2, 2, pp. 163-178.

Pramataris, K.C., Vrechopoulos, A.P., Mylonopoulos, N., Papamichail, G. and Poylymenakou, A. (2000b) Personalised Services and Promotions in Internet Retailing. In Stanford-Smith, B. and Kidd, P.T. (Eds.), *E-business: Key Issues, Applications, Technologies*, IOS Press, pp. 796-802.

Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S. and Carey, T. (1996) *Human Computer Interaction*, 3rd edition, Addison-Wesley.

Quelch, J.A. and Klein, L.R. (1996) Opinion: The Internet and International Marketing, *Sloan Management Review*, 37, 3, pp. 60-75.

Ram, S. and Jung, H.S. (1994) Innovativeness in product usage: a comparison of early adopters and early majority, *Psychology and Marketing*, 11, 1, pp. 57-67.

Randal, D. (1997) Consumer Strategies for the Internet: Four Sceanrios, *Long Range Planning*, 30, 2, pp. 157-168.

Rayport, J.F. and Sviokla, J.J. (1994) Managing in the Marketspace, *Harvard Business Review*, 72, 6, pp. 141-150.

Rayport, J.F. and Sviokla, J.J. (1995) Exploiting the Virtual Value Chain, *Harvard Business Review*, 73, 12, pp. 75-87.

Ricciuti, M. (1995) Database Vendors Hawk Wares on Internet, *InfoWorld*, 17, 2, pp. 9-10.

Rockart, J.F. and Short, J.E. (1989) IT in the 1990s: managing organizational interdependence, *Sloan Management Review*, 30, 2, pp. 7-17.

Rogers, E.M. (1983) *Diffusion of Innovations*, 3rd edition, New York: The Free Press.

Roh, J.H., Romano, C. and Ratner, J. (1997) Roles, organization, and support: building usability into the design process, *Proceedings of 3rd Conference on Human Factors & the Web, Designing for the Web: Practices & Reflections*, Denver, Colorado, USA, June 12.

Rowley, J. (1996) Retailing and shopping on the Internet, *International Journal of Retail & Distribution Management*, 24, 3, pp. 26-37.

Rowley, J. (1999) Loyalty, the Internet and the weather: the changing nature of marketing information systems?, *Management Decision*, 37, 6. Accessed at: http://www.emerald-library.com/brev/00137fel.htm

Samli, A.C. (1989) *Retail Marketing Strategy: Planning Implementation and Control*, Quorum, New York, NY.

Schiffman, L. and Kanuk, L.L. (2000) *Consumer Behavior*, 7th edition, Englewood Cliffs, NJ: Prentice Hall International, Inc.

Schlosser, A.E. (1998) Applying the Functional Theory of Attitudes to Understanding the Influence of Store Atmosphere on Store Inferences, *Journal of Consumer Psychology* 7, 4, pp. 345-369.

Schlosser, A.E., Shavitt, S. and Kanfer, A. (1999) Survey of Internet Users' attitudes toward Internet advertising, *Journal of Interactive Marketing*, 13, 3, pp. 34-54.

Schneider, F. (1994) Virtual Retailing, *International Trends in Retailing*, Arthur Andersen and Andersen Consulting Report, July, pp. 35-45.

Schultz, D.E. and Bailey, S. (2000) Customer/Brand Loyalty in an Interactive Marketplace, *Journal of Advertising Research*, 40, 3, pp. 41-52.

Schwabe, D. and Rossi, G. (1995) The Object-Oriented Hypermedia Design Model, *Communications of the ACM*, 38, 8, pp. 45-46

Scribbins, K. (1999) Consumers @nd shopping: an international comparative study of Electronic Commerce, *Consumers International, Programme for Developed Economies and Economies in Transition*, September.

Segars, A.H. and Grover, V. (1993) Re-examining perceived ease of use and usefulness: a confirmatory factor analysis, *MIS Quarterly*, 17, 4, pp. 517-525.

Sen, S., Padmanabhan B., Tuzhilin, A., White, N.H. and Stein R. (1998) The identification and satisfaction of consumer analysis-driven information needs of marketers on the WWW, *European Journal of Marketing,* 32, 7/8, pp. 688-702.

Serco.com (1999). Accessed at: http://www.usability.serco.com/msexplorer/mainpage/shopex.html

Shackel, B. (1984) Information technology – A challenge to ergonomics and design. *Behaviour & Information Technology,* 3, 4, pp. 263-275.

Sieber, P. (1999) Consumers in Swiss online grocery shops. In Klein, S., Gricar, J. and Pucihar, A. (Eds.), *Proceedings of the 12th International Bled Electronic Commerce Conference,* Bled, Slovenia, June 7-9, pp. 581-597.

Singson, R.L. (1975) Multidimensional Scaling Analysis of Store Image and Shopping Behaviour, *Journal of Retailing,* 51, 2, pp. 38-52.

Siomkos, G.J. (1994) *Consumer Behaviour and Marketing Strategy"*, 1st edition, 1st volume, Stamoulis Publishing, Athens-Piraeus (in Greek).

Siomkos, G.J. and Vrechopoulos, A.P. (2001) Strategic Marketing Planning for Competitive Advantage in Electronic Commerce, *International Journal of Services Technology Management, forthcoming.*

Smith, P. and Burns, D.J. (1996) Atmospherics and retail environments, *International Journal of Retail and Distribution Management,* 24, 1, pp. 7-14.

Spence R. (1999) A framework for navigation, *International Journal of Human-Computer Studies,* 51, 5, pp. 919-945.

Spies K., Hesse, F., Loesch, K. (1997) Store atmosphere, mood and purchasing behavior, *International Journal of Research in Marketing,* 14, 1, pp.1-17.

Spiller, P. and Lohse, G.L. (1998) A classification of Internet retail stores, *International Journal of Electronic Commerce,* 2, 2, pp. 29-56.

Spool, J.M., Pool, J., Scanlon, T., Snyder, C., DeAngelo, T. and Schroeder, W. (1998) *Web Site Usability: A Designer's Guide,* 1st edition, Morgan Kaufmann Publishers.

Srivastava, R.K., Alpert , M.I. and Shocker, A.D. (1984) A Consumer Oriented Approach for Determining Market Structures, *Journal of Marketing,* 48, 2, pp. 32-45.

Stevenson, J.C., Bruner II, G.C. and Kumar, A. (2000) Webpage Background and Viewer Attitudes, *Journal of Advertising Research,* 40, 1&2, pp. 29-34.

Stil, A. and Zimmerman, R.-J. (1996). *Direct marketing through the Internet.* Accessed at: http://www.home.pi.net/~rzimmer/chap1.html

Strausak, N. (1998) Use of the Internet to Support Sales and Marketing. In Bjorn-Andersen, N., Bartoli, J.A., Le Moigne, J.L. (Eds.), *Proceedings of the 6th*

European Conference on Information Systems, Aix-En-Provence, 4, pp. 1561-1568.

Talvinen, M.J. and Saarinen, T. (1995) MkIS support for the marketing management process: perceived improvements for marketing management, *Marketing Intelligence and Planning,* 13, 1, pp. 18-27.

Turaif, M.A. and O'Keefe, R.M. (1998) Autonomous Learning Agents for Consumer-Oriented Electronic Commerce. In Doukidis, G. and Gricar, J. (Eds), *Proceedings of 11th International Conference on Electronic Commerce*, Bled Slovenia. June 8-10, pp. 340-355.

Turban, E., Mclean, E. and Wetherbe, J. (1999) *Information Technology for Management – Making Connections for Strategic Advantage*, 2nd edition, John Wiley & Sons, Inc.

Veen, J. (1998) Aesthetics for the Web, *Web Monkey,* Accessed at: http://www.hotwired.com/Webmonkey/98/07/index1a.html

Vijayasarathy, L.R. and Jones, J.M. (2001) Do Internet Shopping Aids Make a Difference? An Empirical Investigation, *Electronic Markets,* 11, 1, pp. 75-83.

Vora, R.P. and Helander, G.M. (1997) Hypertext and its Implications for the Internet. In Helander, G.M., Landauer, K.T. and Prabhu, V.P. (Eds.), *Handbook of Human-Computer Interaction*, Elsevier (North-Holland), 2nd Completely Revised Edition, pp. 877-914.

Vora, P. (1997) *Human factors methodology for designing Web sites*, Human Factors and Web Development: Erlbaum Publishers.

Vrechopoulos, A.P., Pramataris, K.C. and Doukidis, G.I. (1999a) Utilizing Information Technology for Enhancing Value: Towards a Model for Supporting Business and Consumers within an Internet Retailing Environment. In Klein, S., Gricar, J. and Pucihar, A. (Eds.), *Proceedings of the 12th International Bled Electronic Commerce Conference,* Bled, Slovenia, June 7-9, pp. 424-438.

Vrechopoulos, A.P., Siomkos, G.J. and Doukidis, G.I. (1999b), Electronic Marketing: Information requirements and implications for retail management in the new millennium. In Agorastos, K. (Ed.), *Proceedings of the International Conference Preparing the Manager of the 21st Century,* Thessaloniki 16-18, Greece, pp. 55-66.

Vrechopoulos, A.P., Doukidis, G.I. and O'Keefe, R.M. (2000) Virtual Store Atmosphere in Internet Retailing. In Klein, S., O' Keefe, B., Gricar, J. and Podlogar, M. (Eds.), *Proceedings of the 13th Bled Electronic Commerce Conference: The End of the Beginning,* Bled, Slovenia, June 19-21, p. 445-458.

Vrechopoulos, A.P., Siomkos, G.J. and Doukidis, G.I. (2001a), Internet shopping adoption by Greek Consumers, *European Journal of Innovation Management,* 4, 3, 142-152.

Vrechopoulos, A.P., Papamichail, G. and Doukidis, G.I. (2001b) Identifying Patterns in Internet Retail Store Layouts, Kluwer Academic Publishers, *forthcoming.*

Walters, D. and Knee, D. (1989) Competitive Strategies in Retailing, *Long Range Planning*, 22/6, 118, pp. 74-84.

Wang, H., Lee, M.K.O. and Wang, C. (1998) Consumer Privacy Concerns about Internet Marketing, *Communications of the ACM,* 41, 3, pp. 63-70.

Watson, R., Akselen, S. and Pitt, L. (1998), Attractors: Building Mountains in the Flat Landscape of the World Wide Web, *California Management Review*, 40, 2, pp. 36-56.

Webster, F.Jr. (1998) Interactivity and Marketing Paradigm Shifts, *Journal of Interactive Marketing*, 12, 1, pp. 54-55.

Webster, A.L. (1998) *Applied Statistics for Business and Economics*, 3rd edition, Irwin Mc Graw-Hill

Weiber, R. and Kollmann T. (1998) Competitive Advantages in Virtual Markets – Perspectives of "Information–Based Marketing" in Cyberspace, *European Journal of Marketing*, 32, 7/8, pp. 603-615.

West, D. (1996) *Introduction to Graph Theory*, Prentice Hall.

Wilson, R.J. (1987) *Introduction to Graph Theory*, 3rd edition, New York: Longman Scientific & Technical.

Wortzel, L.H. (1987) Retailing Strategies for Today's Mature Marketplace, *The Journal of Business Strategy*, 8, 4, pp. 45-57.

Yalch, R. and Spangenberg, E. (1990) Effects of Store Music on Shopping Behavior, *Journal of Services Marketing,* 4, 1, pp. 31-39.