Business Use of The World Wide Web: A Report on Further Investigations

HOOI-IM NG, YING JIE PAN AND T D WILSON

As a continuation of previous study¹ this paper reports on a series of studies into business use of the World Wide Web and, more generally the Internet. The use of the World Wide Web as a business tool has increased rapidly for the past three years, and the benefits of the World Wide Web to business and customers are discussed, together with the barriers that hold back future development of electronic commerce. As with the previous study, we report on a desk survey of 300 randomly selected business web sites and on the results of an electronic mail questionnaire sent to the sample companies. © 1998 Elsevier Science Ltd. All rights reserved.

Introduction

Before the introduction into the world of the Internet of the World Wide Web, the purpose of the network was widely perceived as that of serving the scientific research and education communities. Any attempt to use electronic mail or newsgroups for selling or advertising business products would have received poor or zero response other than requests to desist. However, the introduction of the World Wide Web has opened up a previously unknown means of gaining access to a global market. The ‘World Wide Web’, which is currently accessible by perhaps 20–30 million consumers around the world is changing the way companies do business and, since the introduction of the World Wide Web, nearly 200 000 business corporations have established web sites.

This study is a follow-up to the paper by Cockburn and Wilson¹ which takes into account previously unpublished research by Pan³ and by Ng.⁴ The surveys were carried out in 1995, 1996, and 1997 and, therefore, provide a useful series of snapshots of business activity over this period and, having been carried out over a three year period, provide useful information on trends.

An Overview of Business and the World Wide Web

Business became interested in the Web almost as soon as it appeared. According to Hoffman et al.,⁵ apart from the user-friendly, consumer-oriented homepages, the present popularity of the World Wide Web as

a commercial medium is due to

'its ability to facilitate global sharing of information and resources, and its potential to provide companies and firms with an efficient channel for advertising, marketing, and even for direct distribution of certain goods and information services'.

while, on the other hand,

'...the Web frees customers from their traditionally passive role as receivers of marketing communications, gives them much greater control over the information search and acquisition process, and allows them to become active participants in the marketing process'.

Today, commercial activity on the Web has increased to the point where hundreds of new companies are adding Web pages daily. In 1995, more than $83 million was spent world-wide on web site development, and by 1998, the total web expenditures are expected to increase to nearly $2.6 billion.6 One study prepared on behalf of the WebSite consultancy concluded that the main reasons for companies setting up a Web site were their concern about "being left behind and a strong feeling that companies cannot be perceived as market leaders if they do not have a web presence".7 The Internet has already connected 50 to 60 million of the world's population and, according to some, could grow to 550 million, or 10% of the world's population by the year 2000.8 At that point, if a store is placed anywhere on the World Wide Web, it will have, potentially, a global market.

Despite the current lack of security and infrastructure to ensure the safety of large-scale financial transactions on the Internet, hundreds of companies are creating web sites. However, some writers suggest that industry has defined electronic commerce too narrowly. Most analysts include only transactions actually carried out on the web; but many consumers research their purchases on-line and then buy in some other way. A survey by CommerceNet/Nielsen concluded that 53% of Internet users in the US and Canada had used the Internet to reach a decision on a purchase, although only 15% carried out the final transaction electronically.8 The survey also indicates that the majority of users are males and that they are more likely to search for product information on-line, while females are most likely actually to make purchases. The most popular purchases made via the Internet were of computers and software.

In terms of absolute growth, Byles suggests that business-to-business commerce will grow faster in 1997 than business-to-consumer commerce (quoted by Wilder9). Similarly, in a survey by The Economist it was found that, at this stage,

'...the great profit is not in consumer shopping but in business-to-business commerce, since most business transactions were already done at a distance, whether by fax, telephone, post, or private electronic links'.8

Although on-line selling is growing only slowly, some virtual stores are already making money on the Web. For instance, Cisco Systems, a network-equipment maker, sells products from its web site at the rate of $1 billion a year, and Dell Computer is selling $1 million-worth of PCs a day on the web.8 A study by Forrester Research shows that the best-sellers are music CDs, airline tickets, books, and other commodities that consumers do not need to sample before buying,10 although, in fact, music CDs can be sampled on-line. Also, the best consumer products to sell on-line are those that can be investigated, purchased, and delivered over the Net, for instance, services such as finance and travel.8, 9, 11
Generally, the effects of electronic commerce are being felt most keenly in financial services, the sex industry, travel, retailing, music and books, and advertising.\textsuperscript{12,13}

The benefits to business users of Web

The benefits to business of using and selling over the Internet are largely unexplored, but the following are apparent on an a priori basis:

1. Global presence: 'The boundaries of businesses on the Web are not defined by geography or national boundaries, but rather by the coverage of computer networks'.\textsuperscript{14}

2. Establishing and maintaining a competitive edge: The main advantage of the Web for marketers is not money it currently generates or saves, but the ability of successfully establishing a presence on the web, which 'can secure their marketing strategies to be used when the web becomes a major commercial tool for everyone'.\textsuperscript{15}

3. Shortening or eradication of supply chains: Particularly with regard to products and services that can be delivered electronically such as software and financial services.

4. Substantial cost savings: One of the major contributions of the web is the reduction in transaction costs.\textsuperscript{15} This is because buyers and sellers can access and contact each other directly, potentially eliminating some of the marketing costs and constraints imposed by such interactions in the terrestrial world.\textsuperscript{14} In addition, 'sellers also can gain operation benefits by reduced errors, time and overhead costs in information processing. This may also have the effect of shrinking the channel and making distribution much more efficient'.\textsuperscript{5}

5. Research advantage: Although the demographics of the Internet user group are narrow, from a market research perspective, one of the strengths of using the Web is the ability to gather information about individuals who visit a web site or click on an advertisement on a web page.

Meanwhile, the consumer can benefit from global choice, personalised products and services, price reductions, and the ability to increase choice through exposure to wider advertising.

Barriers to the business use of the World Wide Web

The problem of barriers to business use of the web has been discussed by many writers, and Hoffman\textsuperscript{7} concludes that, 'accumulated industrial experience and evidence strongly support the contention that the primary barrier to consumer adoption of the web as a commercial medium is ease of access'. Even when access is gained, some users worry about information overload:

'When logging on to the Web, users see themselves surfing a sea of random facts, and are faced with a bewildering choice of thousands of on-line stores, each one being inadequate in its own way'.\textsuperscript{16}

Furthermore, according to Tesco, a United Kingdom supermarket chain, even if the technology was adequate, some failures might be caused by a lack of support infrastructure, such as having enough people to deliver on-line shopping.\textsuperscript{17}

A study of Newdom,\textsuperscript{18} indicates that one of the main barriers to use of the web is consumer fear of unknown retailers: on the web, an unknown retailer can appear as a well-established retailer because of the stylish

\textsuperscript{5}Economist. The shape of nets to come – there could be one, or many. (http://www.economist.com/surveys/) Economist. Site accessed: 5/3/97.
design of his Web site. Without the confidence and trust of consumers, on
some occasions it is hard for merchants, particularly the small companies,
to develop their business on the web. Also, there is a great deal of concern
regarding the security of financial information transmitted over the Inter-
et and its impact on consumer willingness to buy or sell products.\(^{19}\)

Although Web users represent a higher than average income group,
they do not match the majority of people in retailers’ target markets. Most
of the users are college students and teachers, computer professionals
and some government workers. However, the totality of consumers includes
elderly people, housewives with young families, persons with disabilities
that prevent Internet use, and many others who have poor representation
on the Internet.\(^{18}\)

Finally, consumers still prefer to see and feel a product before they buy
it. Moreover, shopping is a more leisure activity that fulfills many needs,
while virtual shopping is not.\(^{15}\)

As pointed out by Rebello, Armstrong and Cortese,\(^{10}\) ‘all the multibil-
dion-dollar makers in cyberspace are only a speculative gleam in fore-
casters’ eyes’. Before they become reality, the web has to continue to
evolve. The growth of electronic commerce will depend on better payment
systems and most importantly, the confidence of consumers in the web’s
security. The average level of educational and computer literacy will also
need to be improved, otherwise the huge potential markets of the develop-
ing world will be particularly difficult to exploit.

The surveys

Methods

As with the previous studies, this survey had two parts: observation of web
sites and the electronic mail survey of sample companies. Three hundred
companies were chosen from those listed in the Yahoo! Directory to have
their websites observed in detail. A systematic, stratified sampling strategy
was used to select the companies. However, as the number of business sites
has been increasing rapidly during the past two years (from 20,000 in 1995
to more than 277,000 in 1997), the process of selection has also become
more difficult, necessitating the production of a carefully structured sam-
ple to ensure representation across the whole field of business activity.

Following the selection of companies, and to enable comparison with
the previous studies, the company websites were classified in the following
way:

- A web presence with basic information about the company but no
  further details on specific products or services.

- A web presence with company information and some information about
  products or services.

- A web presence with company information and products or services infor-
  mation together with some price details but with facilities for conven-
tional purchasing only.

- A web presence with company information and products or services infor-
  mation with price details and the ability to order products or ser-
  vices via electronic mail (but with billing occurring conventionally).

- A web presence with company information and products or services infor-
  mation (including price details) with the ability to cope with on-line
  ordering and payment.

\(^{19}\) Information Infrastructure Technology
and Applications Task Group. Electronic
Commerce and NII, Washington, DC:
National Coordination Office for High
Performance Computing and Communi-
A web presence with company information and products or services information (including price details) with pre-registration of credit card details by conventional means to gain account number which may be used to order goods on-line.

A web presence with company information and providing free products or services.

The following categories were applied to examine the use of multimedia on the company’s web pages: text only; text and graphics; text and graphics and photographs; text and graphics or photographs with sound or video clips.

To gain further insight into the trends and latest development of the application of the World Wide Web for business purposes, an electronic mail questionnaire was sent to the 300 randomly selected sample companies. Out of the 300 selected companies, 10 of them could not be contacted because of the lack of contact email addresses, whilst the remaining 290 were sent questionnaires. Fifteen delivery failures were recorded due to unknown addresses or technical problems. The reply rate of 37.5% (i.e. 103 out of 275) was achieved, However, five were irrelevant and were excluded, leaving 98 completed questionnaires, equating to a relevant response rate of 36%. The result is analysed and compared with the results from the previous two years.

The questionnaire design was kept similar to that of the last two years to facilitate comparison of results. However, new questions were added because of changes in the situation. The questionnaire was designed in order to obtain the following information:

- **Internet access**: To find out how the business use of both the Internet and World Wide Web has grown over the past four years and also to establish if the companies tend to gain access to the Internet some time before they set up web pages.
- **Purpose of setting up web sites**: To ascertain to what extent business on the World Wide Web has developed in the past three years and to discover the perceived effectiveness of the World Wide Web in relation to other media.
- **Direct transaction and payment method on the web pages**: To investigate the preferred method of electronic payment by the companies.
- **Effect of web sites on turnover**: To discover the impact of electronic commerce on company profits.
- **Size of the companies**: To investigate the distribution of on-line companies based on the size of the companies on the World Wide Web and the impact of World Wide Web on the turnover of these companies.
- **Cost of setting up web sites**: To compare the investment on web sites with the development in profitability resulting from using web sites.
- **The future of web sites**: To establish how businessmen and women see the future of their companies’ web sites.
- **Problems faced by electronic commerce**.

**Results**

*A typology of business users of the World Wide Web*

The classification scheme used to create a typology of business is based on the Standard Industrial Classification but some modifications had been
made to overcome ambiguity and Healthcare has been added as a category. The categories are as follows:

- Financial intermediation
- Real estate, renting and business activities and services
- Computer related
- Internet related
- Transport, travel, storage and communications
- Utilities and energy related
- Construction
- Education
- Retailing
- Mining and quarrying
- Agriculture, hunting and forestry
- Publishing and printing related
- Entertainment, sport and leisure
- Food related
- Engineering and manufacturing
- Scientific
- Miscellaneous
- Shopping centres
- Healthcare.

The number of companies in the Yahoo! Directory

As shown in Figure 1, the number of companies registered with the Yahoo! Directory has been expanding exponentially between August 1995 and 1997. The rapid growth indicates the increased awareness amongst the business community of the business potential of the World Wide Web.

Companies in the Yahoo! Directory categorised by the Standard Industrial Classification

The Standard Industrial Classification (SIC) was used to classify the companies in the Yahoo! Directory. The breakdown of the companies according to the above mentioned standards is illustrated in shown, together with the 1995 figures and the percentage change, in Table 1. The table shows that the companies in the Yahoo! Directory are predominantly related to real estate, business services and retailing; this is followed by manufacturing and personal services. None of the companies selected belong to the ‘fishing’ or ‘Private’ classes.
Table 1 Changes in percentage of companies in SIC group, 1995–1997 (all figures rounded)

<table>
<thead>
<tr>
<th>SIC industry classification</th>
<th>1995 %</th>
<th>1997 %</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, hunting and forestry</td>
<td>1.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Fishing</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>0.7</td>
<td>0.2</td>
<td>-0.5</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>31.0</td>
<td>10.1</td>
<td>-20.9</td>
</tr>
<tr>
<td>Utilities</td>
<td>1.0</td>
<td>0.7</td>
<td>-0.3</td>
</tr>
<tr>
<td>Construction</td>
<td>0.7</td>
<td>2.5</td>
<td>+1.8</td>
</tr>
<tr>
<td>Wholesale and retail trade</td>
<td>22.0</td>
<td>20.4</td>
<td>-1.6</td>
</tr>
<tr>
<td>Hotels and restaurants</td>
<td>2.0</td>
<td>0.3</td>
<td>-1.7</td>
</tr>
<tr>
<td>Transport and communication</td>
<td>9.3</td>
<td>6.4</td>
<td>-2.9</td>
</tr>
<tr>
<td>Financial intermediation</td>
<td>2.7</td>
<td>4.5</td>
<td>+1.8</td>
</tr>
<tr>
<td>Real estate and business activities</td>
<td>26.3</td>
<td>36.6</td>
<td>+10.3</td>
</tr>
<tr>
<td>Public administration</td>
<td>0.0</td>
<td>0.2</td>
<td>+0.1</td>
</tr>
<tr>
<td>Education</td>
<td>0.7</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Health</td>
<td>0.7</td>
<td>4.4</td>
<td>+3.7</td>
</tr>
<tr>
<td>Community and personal services</td>
<td>2.0</td>
<td>12.1</td>
<td>+10.1</td>
</tr>
<tr>
<td>Private</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Extra-territorial organisation</td>
<td>0.0</td>
<td>0.02</td>
<td>+0.02</td>
</tr>
</tbody>
</table>

Table 1 also shows that, since 1995, there have been only slight changes in percentage for most of the classes. However, companies under ‘manufacturing’ have fallen from 31% in 1995 to 10.1% in 1997. On the other hand, the number of companies under ‘business activities’ and ‘personal services’ has increased about 10% over the same period.

Size of the companies
In general, it would be expected that the size (in terms of number of personnel) of a company would affect its business strategies. It was not possible to discover the size of a company from its web site alone and, therefore, the e-mail questionnaire (discussed later) was used to collect information on company size, measured by the number of employees. The result is shown in Figure 2.

As may be seen, a large proportion of businesses sites (67.3%) belong to companies that employ fewer than 50 employees. Only about 18.4% of the sample companies are distributed over the groups covering 50–299

Figure 2 Size of the companies on the World Wide Web
employees. However, the ‘more than 300’ category includes a significant number of very large international companies with more than 100,000 employees (about 15.3% of companies can be considered ‘large’).

These results suggest that businesses are distributed in cyberspace in much the same way as they are geographically within countries, i.e. there is a very large majority of small and medium size enterprises (SMEs). This ought to encourage such companies in all sectors to consider the possibility of a Web presence since it may indicate that SMEs find a favourable benefit/cost ratio in the investment.

Categorisation of business users according to the Typology of Business Use

The Yahoo! Directory recorded 205,596 companies under ‘Business and Economy’ on the 9th of June 1997. Figure 2 shows that very diverse types of businesses are using the World Wide Web. ‘Computer related’ is the most common sector on the web (16.33%). The major reasons are: first, the services and products involved are closely linked to the Internet applications; and second they are easily demonstrated and transported to the customer through the Internet (e.g. software). In addition, most Internet users, who are the prospective customers targeted by the computer companies are computer literate.

‘Entertainment’ is another strong sector (14.1%) due to the inclusion of sports and the rapid growth in the presence of the music industry. ‘Engineering and manufacturing’ also features heavily at 11.95%, mainly due to the fast growing automotive-related industries. Lower percentages are found for ‘transport, travel, storage and communication’ (6.25%) and ‘health’ (5.11%). The rest of the classes contain small percentages of companies.

Table 2 shows that only five of the 19 classes have increased since 1996, particularly in the ‘miscellaneous’ class, which contains a wide variety of companies. Year on year, the increases are small—the highest increase in

![Figure 3 Industry classification of Yahoo! Directory companies in 1997](image-url)
### Table 2 Changes in percentage of companies in Yahoo! Directory

<table>
<thead>
<tr>
<th>Industry classification</th>
<th>1995 %</th>
<th>1996 %</th>
<th>Change %</th>
<th>1997 %</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial services</td>
<td>3.9</td>
<td>4.6</td>
<td>+0.8</td>
<td>4.5</td>
<td>−0.1</td>
</tr>
<tr>
<td>Real estate, renting and business activities</td>
<td>14.2</td>
<td>15.6</td>
<td>+1.4</td>
<td>10.4</td>
<td>−5.2</td>
</tr>
<tr>
<td>Computer related</td>
<td>22.5</td>
<td>21.6</td>
<td>−0.9</td>
<td>16.3</td>
<td>−5.3</td>
</tr>
<tr>
<td>Internet related</td>
<td>13.9</td>
<td>6.0</td>
<td>−7.9</td>
<td>1.7</td>
<td>−4.3</td>
</tr>
<tr>
<td>Transport, travel, storage and communication</td>
<td>10.4</td>
<td>10.5</td>
<td>+0.1</td>
<td>6.2</td>
<td>−4.3</td>
</tr>
<tr>
<td>Utilities</td>
<td>0.4</td>
<td>0.7</td>
<td>+0.3</td>
<td>0.4</td>
<td>−0.3</td>
</tr>
<tr>
<td>Construction</td>
<td>0.4</td>
<td>1.5</td>
<td>+1.1</td>
<td>3.2</td>
<td>+1.7</td>
</tr>
<tr>
<td>Education</td>
<td>1.0</td>
<td>1.8</td>
<td>+0.8</td>
<td>0.7</td>
<td>−1.1</td>
</tr>
<tr>
<td>Retailing</td>
<td>6.4</td>
<td>5.1</td>
<td>−1.2</td>
<td>3.5</td>
<td>−1.6</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>0.2</td>
<td>0.1</td>
<td>−0.1</td>
<td>0.2</td>
<td>+0.1</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.1</td>
<td>0.4</td>
<td>+0.3</td>
<td>0.8</td>
<td>+0.6</td>
</tr>
<tr>
<td>Publishing</td>
<td>6.6</td>
<td>5.6</td>
<td>−1.0</td>
<td>4.5</td>
<td>−1.1</td>
</tr>
<tr>
<td>Entertainment</td>
<td>9.8</td>
<td>11.0</td>
<td>+1.2</td>
<td>14.1</td>
<td>+3.1</td>
</tr>
<tr>
<td>Food</td>
<td>1.6</td>
<td>1.6</td>
<td>0.0</td>
<td>3.4</td>
<td>+1.8</td>
</tr>
<tr>
<td>Engineering and manufacturing</td>
<td>3.4</td>
<td>7.2</td>
<td>+3.8</td>
<td>12.0</td>
<td>+4.8</td>
</tr>
<tr>
<td><strong>Scientific and environmental</strong></td>
<td>1.2</td>
<td>3.0</td>
<td>+1.8</td>
<td>1.3</td>
<td>−1.7</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>2.6</td>
<td>2.7</td>
<td>+0.1</td>
<td>10.9</td>
<td>+8.2</td>
</tr>
<tr>
<td>Shopping centres</td>
<td>1.4</td>
<td>0.8</td>
<td>−0.6</td>
<td>0.6</td>
<td>−0.2</td>
</tr>
<tr>
<td>Health</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>5.1</td>
<td></td>
</tr>
</tbody>
</table>

1997 is +8.2% (Miscellaneous) and the biggest decrease is −5.3%. It should be borne in mind that changes as small as those shown could well be a result of changes in the sampling procedures.

**Internet access and WWW presence**

The use of Internet for business purposes has increased dramatically, since it is widely recognised as an efficient and cost-effective way for business world to communicate among themselves. In the e-mail survey the companies were asked to state how long they had had access to the Internet in general and the results compared with those from previous years. About 14% of the companies surveyed have had access to the Internet over a 3-year period while only a small percentage (7%) have had access for six months and less. Figure 4 compares the data over time and shows that the majority of companies in this survey have had an internet presence for more than one year, and that a significant minority of this year’s sample has had a presence virtually since the early days of the World Wide Web.

On the other hand, the percentage of business having had access to the Internet for less than six months is falling, suggesting that the increase in the number of new entrants is not great as was experienced two years ago. For the period between six months to one year, although there was a slight growth in 1996, there was a fall to 15% from 26% in 1996.

The emergence of World Wide Web has speeded up the development of electronic commerce and promises to revolutionise the way companies do business. The sample companies were questioned about how long they have had a web presence and the results were compared with previous years. Figure 5 shows a close relationship to the figure illustrating Internet access, suggesting that the World Wide Web has been the main factor
attracting business. Given the Web’s much greater flexibility in demonstrating the characteristics of products and services, this is not surprising. The figure also shows that the largest distribution of length of Web presence for this year’s sample is between six months and two years (61%). This result illustrates the rapid growth of the World Wide Web during the past two years. Only about 25% of the companies said that they have had web presence for more than two years. In addition, there is quite a large percentage of companies that have had their Web sites for three to six months, showing the steady growth of World Wide Web.

The purpose of web sites

The web sites of the sample companies were categorised according to the typology described above, to identify the nature of the web activity. The
results are shown in Figure 6, from which it has been seen that the majority of the sample companies use their Web sites to publish information about their companies and their products or services, though without any price information. An example of this class is ‘Matilda Fresh Foods’ (http://www.peg.apc.org/~matilda/). This site contains some background information on the company and some details of its products. Another example is ‘Electric Communities’ (http://www.communities.com/), a large Internet-related company. The web site of this company is more extensive and more detailed, with many features to interest the user.

The next ranked categories of use are: to provide price information (15.3%), on-line shopping (15.3%) and e-mail order (12%). The first of these is similar to basic web presence, but encouraging the potential customer to consume by including price information alongside products or services details. However, the customers have to order the products or services by conventional means. Examples of this class included Robinson Travel (http://www.robinsontravel.com/) and Beacon Press (http://www.uua.org/beacon/). Beacon Press does not sell on-line but their books are available through the links to on-line booksellers such as Amazon.com.

Examples of companies involved in on-line selling with credit card details being sent over the Internet are ‘Main Street Exeter’ (http://www.mainst-exeter.com/), a dealer in fashion accessories, and A. S. Wallace Enterprises, a jeweller (http://www.diaman.com/). In spite of the issue of payment security, most of the companies observed have operated without sophisticated security measures. E-mail ordering refers to companies that allow customers to send the order via e-mail but the payment is still carried out using conventional methods, such as credit cards. ‘Chronicle Books’ (http://www.chronbooks.com/) is an example of a business site that provides e-mail ordering, but the service is limited to the United States.

Only a small percentage of the sample companies use registration schemes to provide their customers with account identity numbers (protected by user-defined passwords) for direct purchase (4.3%).
Table 3  Changes in use of web sites, 1995-1997

<table>
<thead>
<tr>
<th>Use of web sites</th>
<th>1995 %</th>
<th>1996 %</th>
<th>Change %</th>
<th>1997 %</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic web presence</td>
<td>3.0</td>
<td>6.0</td>
<td>+3.0</td>
<td>4.0</td>
<td>-2.0</td>
</tr>
<tr>
<td>Prod. information</td>
<td>59.3</td>
<td>48.0</td>
<td>-11.3</td>
<td>48.3</td>
<td>+0.3</td>
</tr>
<tr>
<td>Reg. of cc details</td>
<td>0.3</td>
<td>1.0</td>
<td>+0.7</td>
<td>4.3</td>
<td>+3.3</td>
</tr>
<tr>
<td>Price information</td>
<td>12.0</td>
<td>21.0</td>
<td>+9.0</td>
<td>15.3</td>
<td>-5.7</td>
</tr>
<tr>
<td>E-mail ordering</td>
<td>10.7</td>
<td>8.0</td>
<td>-2.7</td>
<td>12.0</td>
<td>+4.0</td>
</tr>
<tr>
<td>On-line shopping</td>
<td>11.7</td>
<td>12.0</td>
<td>+0.3</td>
<td>15.3</td>
<td>+3.3</td>
</tr>
<tr>
<td>Free products</td>
<td>3.0</td>
<td>4.0</td>
<td>+1.0</td>
<td>0.7</td>
<td>-3.3</td>
</tr>
</tbody>
</table>

Table 3 shows the details of changes of the use of web sites over the past three years.

The results of the observation of web sites were borne out by the responses to the e-mail survey, in which the sample companies were asked to state the purpose of their web sites in terms of the categories shown in Table 4 (respondents were allowed to select one or more classes of business purpose).

Table 4  E-mail responses on the purpose of web sites

<table>
<thead>
<tr>
<th>Purpose</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>General publicity</td>
<td>71.4%</td>
</tr>
<tr>
<td>Advertising of specific products and services</td>
<td>67.3%</td>
</tr>
<tr>
<td>On-line selling of products and services</td>
<td>38.8%</td>
</tr>
<tr>
<td>Customer support and liaison</td>
<td>36.7%</td>
</tr>
</tbody>
</table>

Cost of setting up web site

It is known that one of the reasons of the rapid growth of the World Wide Web is the low cost of setting up a web site. The companies were asked about both the costs of setting up and maintaining a web site (Figures 7 and 8).

The distribution of percentage both on the setting up cost and maintaining cost are very similar. Over 72.4 and 76.5% of responded companies stated that the cost of setting up and maintaining are not more than $10,000 per annum. It is a relatively cheap way of selling the companies to the public compared to other means such as advertising on television or in magazines, or in sponsoring sports. As the World Wide Web is part of the Internet, companies do not have to make huge investment to develop and maintain their web sites because of the higher standardisation of web technologies in recent years.

Figure 7  Cost of setting up a web site
One of the main attractions of the World Wide Web for the business community is the ability to develop web pages containing graphics, photographs, sound and video or animation together with texts. The sample companies were investigated to find out how many of them have adopted multimedia into their web sites. Figure 9 shows the categorisation of sites according to the classification scheme described earlier.

Forty-two percent of the sample companies use text, graphics and photographs in their web pages and 27% use sound or video, in addition to text, graphics and photographs. This is followed by about 24.7% using text and graphics. Only 6.3% of companies are making no attempt at all to produce visually interesting web sites. Thus, the majority of the samples are making use of multimedia in order to attract users, as well as to give potential customers a clearer picture of their products.

An example of a company making good use of multimedia capabilities is PolyGram Records (http://spider.media.philips.com/polygram/PolyGram.html). This web site allows the user to download music videos or audio recordings of new songs. The most interesting attraction is the interactive 3D music gallery, which allows visitors to view music posters, and listen to songs of their choice. Another interactive site is ‘Nissan’
Figure 10 Comparison of use of multimedia

(http://www.nissan.co.jp/), which allows the potential customer to view the details of a car and change the colour of car as they wish.

From Figure 10, it is obvious the use of text, graphics and photographs remain the most common forms of multimedia used on the World Wide Web, though these forms fell from 55% in 1996 to 42% in 1997. The most significant change of this figure is the increase in the use of sound and video, which is mainly due to the advancement of web technologies particularly Java, the programming language which facilitates a more interactive mode on the web, and RealAudio which enables real-time transmission of sound from web sites.

The use of electronic mail

Electronic mail is the most widely used application on the Internet. The sample sites were examined to determine how they were making use of electronic mail, using the following categories:

- No e-mail address advertised on the web site.
- E-mail enquiries encouraged only about the web pages themselves.
- E-mail enquiries encouraged in relation to information about the company or its products or services.
- Orders for products or services sent via e-mail.
- Credit card information sent over the Internet via e-mail.

As Figure 11 shows, a large percentage of the companies surveyed encourage users to mail them with enquiries regarding the company itself, product information including price details, problems they might be experiencing or any other general questions. In addition, comments about the content of the web pages are commonly welcomed. About 31% of the companies have contact e-mail addresses attached to their web site which are meant for users who encounter technical difficulties or problems in the company’s web sites. Only a small percentage of companies do not have any e-mail addresses advertised on their web sites. Approximately, 35% of the companies have more than one e-mail address on their web pages, for instance ‘Thunderbird’ (http://www.autopro.com/tbirdcenter/) has two e-mail addresses advertised on their pages, one for information enquiries...
and the other for the Webmaster, usually to comment on page design or on other aspects relating to the pages themselves.

Figure 12 shows that the use of e-mail increased in 1997, particularly in the percentage of the page queries (31%) and information enquiries (85%). This is mainly due to the fact that more than one address has been advertised on the web pages compared to 1995 and 1996, when only one e-mail address tended to be advertised on each company’s web sites. In addition, most companies have recognised e-mail as an effective way to communicate, as well as to build up closer relationships with potential customers.

Other features
Apart from the factors discussed above, there are other interesting features of web site that point to trends in web development. From the observation, it was noticed that the features such as recruitment, advertising, survey and search facilities have appeared to become a common feature on the web pages.

Figure 13 shows that about 20% of sample companies provide search facilities to the users. Most of the searching facilities are used for searching information for particular products of services, but some are the common search engines on the World Wide Web, for instance Yahoo!, Excite,
and HotBot, etc. The web is also used as a tool for recruiting potential employees (15%). About 14% of sample companies have allocated specific columns for advertisement on their sites. The majority of these advertisements are to Link Exchange (which provides automatic links to other member sites of the system without charge) although some of the advertisements are commercial. A small percentage of companies (4.7%) have on-line questionnaires for visitors to complete. This information will be used for marketing purposes and to gain ideas on how to improve the web pages.

**Virtual shopping centres**

The virtual shopping mall section in the Yahoo! Directory was used to select a sample and, because of the rapid increase in the number of virtual shopping centres (from 250 in 1995 to 1238, in June 1997), the sample was increased from 20 to 25. Each shopping centre was investigated to establish:

- The number of shops contained within the centre.
- The types of shops sited at shopping centres.
- The extent to which multimedia were being utilised (same categories as above).
- Payment methods. The following scheme was used:
  1. Conventional methods of ordering and payment used.
  2. Ordering on-line but with conventional payment.
  3. Submission of credit card details to obtain membership ID which is used to order on-line.
  4. Credit card details sent over the Internet to order on-line.
  5. Others (e.g. electronic money).
- Search availability.
- Other features.

The number of virtual shopping centres, 1995–1997. The number of shops within each virtual shopping centre varies widely from one centre to another. Over the three years of these studies, Figure 14 shows a decline in the number of smaller malls, and an increase in those with 50 to 100 shops and with more than 100 shops. The details of changes are shown in Table 5. The greater proportion of centres (72%) have a wide variety of stores,
while about 16% are devoted to similar kinds of products. Figure 14 shows that, probably because of issues of security and payment, the growth in the number of virtual shopping centres is much lower than it was in 1996.

**Payment methods**
Most of the virtual shopping centres on the World Wide Web have been set up specifically to conduct business. Hence, it is likely that more forms of on-line business transactions will be undertaken within the shopping centres than they are in individual business sites. The shopping centres surveyed were classified according to the following:

- Conventional methods of ordering and payment used.
- Ordering on-line but conventional payment.
- Submission of credit card details to obtain membership ID which is used to order on-line.
- Credit card details sent over the Internet to order on-line.

Of the 25 virtual shopping centres surveyed, 76% accepted customer credit card details over the Internet; however, only a few secure sites. About 52% of the centres accepted on-line ordering via e-mail. A further 40% of the virtual shopping centres made no attempt to encourage on-line ordering or payment, but preferred conventional methods instead. Only 16% of the centres surveyed ran membership schemes that allowed users to order safely on the web.

<table>
<thead>
<tr>
<th>Number of shops</th>
<th>1995 %</th>
<th>1996 %</th>
<th>Changes %</th>
<th>1997 %</th>
<th>Changes %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>50.0</td>
<td>35.0</td>
<td>-15.0</td>
<td>16.0</td>
<td>-19.0</td>
</tr>
<tr>
<td>11-20</td>
<td>20.0</td>
<td>15.0</td>
<td>-5.0</td>
<td>4.0</td>
<td>-11.0</td>
</tr>
<tr>
<td>21-50</td>
<td>5.0</td>
<td>25.0</td>
<td>+20.0</td>
<td>48.0</td>
<td>+23.0</td>
</tr>
<tr>
<td>51-100</td>
<td>20.0</td>
<td>20.0</td>
<td>0.0</td>
<td>12.0</td>
<td>-8.0</td>
</tr>
<tr>
<td>&gt;100</td>
<td>5.0</td>
<td>5.0</td>
<td>0.0</td>
<td>20.0</td>
<td>+15.0</td>
</tr>
</tbody>
</table>
Figure 15 shows that all the payment methods increased in 1997, particularly payment by credit card.

Design of sites

The categorisation used for the sample companies was also applied in the investigation of virtual shopping centres. The results are shown in Figure 16, from which it can be seen that none of the sites surveyed presented their web sites in pure text. On the other hand, the percentage of sites using text, graphics, photos, and sound or video was higher than that of the sample companies (60%). The result suggests that the virtual shopping centres put considerable effort into designing their web sites. Approximately, 68% contained search facilities to help visitors find out what they wanted easily and quickly. Most of the sites observed also contained features designed to make them more attractive to the potential customers. A good example of this is ‘Cyber Market’ (http://www.cyberplanets.com/cybermarket/), which provided a virtual post office for visitors to send electronic greeting cards, as well as ‘cyber comics’ and games.

Table 6 shows a trend towards equipping web sites with text, graphics and photographs, and sound or video, suggesting that most of the virtual shopping centres believe that the adoption of multimedia will provide a more attractive and entertaining site which will attract more customers to visit their sites and to buy their goods or services.
### Table 6 Changes of design of sites

<table>
<thead>
<tr>
<th>Media used</th>
<th>1995 %</th>
<th>1996 %</th>
<th>Changes %</th>
<th>1997 %</th>
<th>Changes %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text only</td>
<td>5.0</td>
<td>5.0</td>
<td>0.0</td>
<td>0.0</td>
<td>-5.0</td>
</tr>
<tr>
<td>Text and graphics</td>
<td>15.0</td>
<td>5.0</td>
<td>-10.0</td>
<td>12.0</td>
<td>+7.0</td>
</tr>
<tr>
<td>Text, graphics and photos</td>
<td>65.0</td>
<td>70.0</td>
<td>+5.0</td>
<td>28.0</td>
<td>-42.0</td>
</tr>
<tr>
<td>Text, graphics and photos and sound or video</td>
<td>15.0</td>
<td>20.0</td>
<td>+5.0</td>
<td>60.0</td>
<td>+40.0</td>
</tr>
</tbody>
</table>

---

**The impact**

**Effectiveness of World Wide Web**

It is an undisputed fact that the popularity of the World Wide Web among the business community has grown rapidly. However, how companies rate the effectiveness of the web for various purposes is not generally known. In the e-mail questionnaire, therefore, companies were asked to rate the effectiveness of the World Wide Web for typical commercial applications such as publicity, advertising, online selling and customer service as compared to other media. The results are shown in Figure 17.

The results show that companies view positively their use of the World Wide Web, as most rated all of the surveyed areas on the upper bands of scale. The web is seen as an effective mean of enhancing publicity and advertising the purpose and characteristics of products and service, but quite a large percentage (approximately 20%) of companies do not have any experience in the areas of on-line selling and customer support. This is mainly due to immature payment and security systems and it can be expected that commercial activities will increase as soon as these technologies become inexpensive. This is clearly indicated by the expectations and confidence expressed by the companies on the future of World Wide Web (Figure 18) when they were asked about the prospect of such applications.

**Direct transactions**

Another survey question is aimed to establish the extent of direct business transaction in the World Wide Web and the payment methods currently employed by the sampled companies. The survey result showed that 37% of the companies carry out direct business transactions on the web, with

---

![Figure 17 Perceived effectiveness of web site for particular purposes](image-url)
credit card payment schemes being most widely accepted as the most secure and well-established method of payment. Just over 30% of companies used this method: the other payment schemes included E-cash, customer ID account, cheque and money order.

**Effect of web site on turnover**

To find out if owning a web site is currently making any difference to business, companies were asked about the effect of their site on turnover. A majority (56%) indicated that their presence on the World Wide Web did not produce any noticeable change in their turnover, whilst 13% did not know of any effect. This may be due to some of the respondents having had their web presence only for a few months and it being too early to determine the effect. In some cases, it may be impossible to tell if the presence on the web has had any effect, as, at this stage of development, most of the companies are still trying to find the right strategy for conducting business on the web. On the other hand, about 31% of the companies stated that their web sites did make a difference to their turnover. The companies who claimed that their web sites had had a positive effect on turnover were from many different industry sectors, but approximately 30% of them are computer-related companies and booksellers.

From Figure 19 the percentage of respondents stating that the web has enhanced their turnover is quite similar in 1995, 1996 and 1997. However, there is an increase of about 20% in the percentage of companies saying...
that the presence of their company on the web does not produce an improvement in their turnover. It may be, of course, that companies are actually unable to determine what is the impact of web publicity and advertising, since they may not have in place the systems and mechanisms to separate the impact of this medium from those of the media they normally use. This would be particularly the case for those companies that do not engage in on-line selling.

Problems facing electronic commerce

Electronic commerce must overcome a number of problems before it can emerge as a dominant form of business. The companies were asked what they believed to be the main hurdles to the success of electronic commerce by selecting one or more of the following categories (see Figures 20 and 21):

- Development of secure sites
- Development of suitable payment systems (e.g. e-cash)
- Faster connection times
- Wider access
- Information overload for potential customers
- The unattractiveness of on-line shopping
- Others.

Many respondents believe that the most important problems facing the future of electronic commerce are security (57.1%) and connection time (49%). The priority given to security is not surprising, since it has been perceived to be a problem since electronic commerce was first mooted and the business community believes that the general public will not be comfortable in carrying out business transactions on the World Wide Web until they are convinced of its security. Regarding the other technical difficulties of connection time, it is believed that unless the connection time becomes faster, the web will put off many frustrated users. Of course, with developments under way, these issues may be resolved in the near future although, in the UK, the position is linked to the issue of charges for local telephone calls.

The issue of payment is viewed as the next important problem (37.8%). Although electronic payment schemes such as E-cheque and digital-cash are being introduced, they remain embryonic and much needs to be done

![Figure 20 Problems faced by electronic commerce](image-url)
before they can receive a wider acceptance. The issue of access also is considered as an important problem, with a percentage slightly lower than payment issue (36.7%). In general, many businesses feel that it is necessary for more potential customers to gain access to the web. From the viewpoint of companies, information overload is not seen as a great problem (23.5%). The issue of unattractiveness of business sites (14.3%) is also rated by companies to be trivial.

Almost ten percent (9.7%) of respondents thought that there were other important problems facing electronic commerce. Several respondents were concerned that the business community and general public will not accept the World Wide Web as a valid commercial medium and others with the difficulty in searching for the right products.

In comparison with the previous two years, opinion on the problems of electronic commerce is much the same. The security and connection issues are significant problems, but the problem of means of payment appears to have declined in perceived importance by about 20%.

**Future of web sites**

The companies were asked to describe how they see the future development of their web site. The ideas given varied widely. For consistency, the classification scheme created for the earlier study is used to group these comments. However, two new classes are added, that is, search facility and the web site being frequently updated. The classes and number of entries (out of 80 replies to this question) are given in the Table 7.

From Table 7, the wide distribution of ideas for future improvement of the respondents’ web sites can be served as a pointer for the future trend of the web sites.

It is anticipated that the marketing strategies based on interactive approaches and addition of more product and service information in a more exciting format will become more common. The following are some of the opinions quoted from respondents’ replies on the future of web site:

‘Developing into an electronic catalogue which in turn develops a mailing list of potential customers that we can e-mail special promotions to keep ourselves in their minds.’
Table 7 Future enhancements to web sites

<table>
<thead>
<tr>
<th>Enhancement</th>
<th>No. of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>More interaction with users</td>
<td>17</td>
</tr>
<tr>
<td>More general content to be added</td>
<td>9</td>
</tr>
<tr>
<td>The addition of more products and services</td>
<td>15</td>
</tr>
<tr>
<td>More business</td>
<td>8</td>
</tr>
<tr>
<td>The inclusion of ‘fun pages’</td>
<td>2</td>
</tr>
<tr>
<td>The addition of links to and from the page</td>
<td>2</td>
</tr>
<tr>
<td>Sharing of information and building a community</td>
<td>7</td>
</tr>
<tr>
<td>On-line ordering and shopping</td>
<td>12</td>
</tr>
<tr>
<td>Uncertain of future direction</td>
<td>7</td>
</tr>
<tr>
<td>More advertising</td>
<td>3</td>
</tr>
<tr>
<td>The inclusion of forms</td>
<td>0</td>
</tr>
<tr>
<td>The site will remain as it is</td>
<td>3</td>
</tr>
<tr>
<td>Search facility</td>
<td>5</td>
</tr>
<tr>
<td>Frequent updated</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
</tr>
</tbody>
</table>

‘It will expand to include new products and services, which includes customer access to their information so they can make desired changes to their data’.

Some of the respondents stated that there is a need to promote their web sites to the general public, quote:

‘I have to invest the money in many advertisements throughout selected shopping malls.’

‘Better marketing and promotion of the web site to drive prospective customers to the site.’

‘Our response via Internet has been poor. This is due to several factors including poor promotion of the site and the limited interest by management in creating an enjoyable, content updated web site.’

Conclusions

Apart from the increasing number of businesses involved in making use of the Internet and the World Wide Web, this survey reveals an increasing sophistication in use as well as increasing diversity of business sectors. In 1995, the dominant sector, by a large margin, was the computer sector: today, other sectors such as business services, financial intermediation, and entertainment have shown significant growth. Among these companies, the development of multimedia is gaining force and becoming accepted by business as a way of increasing the impact of their publicity or of increasing sales. It is likely, as technology progresses, that the design of web sites will become more interesting and attractive. In this survey, it was also noticed that the virtual shopping centres have adopted this technology more quickly than individual businesses on the web. Electronic mail is widely used at most of the sites observed and will remain an important tool for communication, particularly between businesses and users.

This survey clearly indicates that electronic commerce is still in its infancy, but has great potential. Of the 300 companies surveyed, only 15.3% of companies were engaged in on-line transaction. In addition, the number of the secure transaction sites is still low. This may well be a barrier to the visitor considering buying products or services over the Internet.
The results obtained from the electronic mail questionnaire made a useful supplement to the observational findings. Most of the respondent companies have had access to the Internet for less than three years and had their presence on the web for under two years. The majority of companies are using their web sites for publicity and advertising purposes. Most companies looked to the potential of World Wide Web as a marketing tool. For the sites with direct transaction facility, credit cards appear to be the most popular payment mode. From this survey, in spite of the problem of the security, the opinions given by the respondents suggest that businesses will continue to adopt the Internet as a means of enlarging their markets and, indeed, that in some sectors, the World Wide Web will enable small and medium-sized companies to tap into a global market that would otherwise be out of their reach.