Industrial Marketing and the Internet: Frameworks for Assessing Communication Strategies

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ABSTRACT

This paper discusses the role of the Web as a strategic communication tool for industrial marketers and its position in the business-to-business communication mix. Using the concepts of purchasing decision processes and hierarchy of effects models, the paper adapts the framework for the measurement of consumer web site efficiency developed by Berthon et al. (1996) to the industrial marketing setting. Examples are given of both large and small industrial organisations that are currently using their Web sites to achieve these objectives. The strategic implications of the framework and model are discussed. [PUBLICATION ABSTRACT]

FULL TEXT

Headnote

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Introduction

The Internet has attracted a great deal of attention over the past decade. However, both marketing practitioners and academics are aware that more systematic research is required to reveal the true efficacy of commerce on the Web. This is especially true from an industrial marketing perspective, for until recently most of the attention has been devoted to spectacular Web achievements in consumer markets. Yet, recent studies suggest that that although the first wave of growth was in the business-to-consumer markets, business-to-business transactions are expected to be in the range of US$800 billion by 2003 - five times as much as business-to-consumer transactions (Sharma 2002). Whereas a few years ago industrial companies would question whether the Internet enhances business performance, evidence (e.g. Avlonitis and Karayianni 2000) is now unequivocal: a business-to-business organization cannot exist without somehow being on the Internet (Lichtenthal and Eliaz 2003).

In its first stages the Internet was seen as a medium that provides opportunities for cost-reduction in exchanges in the domains of information, customer support and transactions (Honeycatt et al. 1998). Nowadays, the focus of industrial marketers is on the management of the total online communication process with a view to enhancing the effectiveness of transactions, adding value and increasing customer involvement (Berthon et al 2003; Sharma 2002). In this context an important area that needs to be addressed is the way in which business firms utilize the Internet for communicating with their customers. More importantly, how should industrial marketing managers

manage the online communicating process?

Although the potential of the Internet as a marketing communication tool has been widely documented (Wise 2000; Segal 2000), to date little systematic research has been conducted into the nature and effectiveness of this medium - especially as an industrial communications tool - in that no identifiable serious attempts have so far appeared that methodically clarify its anticipated role and performance. As with most new phenomena, much of what has been written so far has been descriptive in nature - the Internet's role in the promotional mix (Lichtenthal and Eliaz 2003), "what the medium is", (e.g., Ellsworth and Ellsworth 1995), using such surrogate measures as the size of the Web audience to indicate its potential (e.g., Glossbrenner and Glossbrenner 1995; Denison 1995). These descriptions may aid our general understanding, but they do not address more specific issues of concern: what are the objectives that industrial marketers might have; how might they expect Web sites to contribute toward the attainment of these objectives? Also, although online promotional campaign management continues to gather importance and to evolve rapidly in business-to-business contexts (Lichtenthal and Eliaz 2003), most studies also do not assess the effectiveness of this new medium from the perspectives of the recipient of the message, i.e., the buyer.

This deficiency probably stems from the fact that few organisations or industrial managers have even begun to spell out their communication objectives in operating a Web site, let alone quantify them. This is not entirely unexpected-unlike expenditure on broadcast advertising, or the long-term financial commitment to a sales force, the establishment of a Web site is a relatively inexpensive venture, from which retraction is easy and rapid (Honeycutt et al 1998). It is not unlikely that many industrial marketers are on the Web simply because it is relatively quick and easy, and because they fear that the consequences of not having a presence will outweigh whatever might be the outcomes of a hastily ill-conceived presence. Yet, according to the empirical study of Avlonitis and Karayianni (2000), "In business-to-business organizations the mere presence on the Internet (i.e., the Web) has no effect, for the time being" (p.456). The authors note that the Internet should be embraced into the strategic marketing plans of business-to-business organizations and used to emphasize its personal and interactive nature. This lack of clear and quantified objectives, understanding, and the absence of a unified framework for managing and evaluating online performance, may have compelled decision-makers to rely on intuition, imitation, and experience when conceptualising, developing, designing and implementing Web sites.

These three concerns - the lack of clear or consistent objectives, the relationship of those objectives to the variables under the control of the firm and the need for assessing the effectiveness of an industrial web site - are the central focus of this paper. We argue that the Web is not an overnight sensation; it warrants the industrial marketer's serious attention. Business-to-business marketers will need to set objectives for their use of the medium as a corporate communications tool, and measure their progress towards the attainment of these. Using cases of industrial marketers currently exploiting the potential of the Web, we identify areas in the industrial purchasing decision-making process where the Internet can be an effective tool. We propose a more direct assessment of industrial Web site performance using multiple indices such that different Web site objectives can be directly translated into tactical variables under the control of the industrial marketer. We then explicitly link these tactical activities to performance measures and present a conceptual framework for assessing industrial web site communication strategies that relates several of the most frequently-mentioned objectives of Web site participation to measures of performance associated with Web site traffic flow.

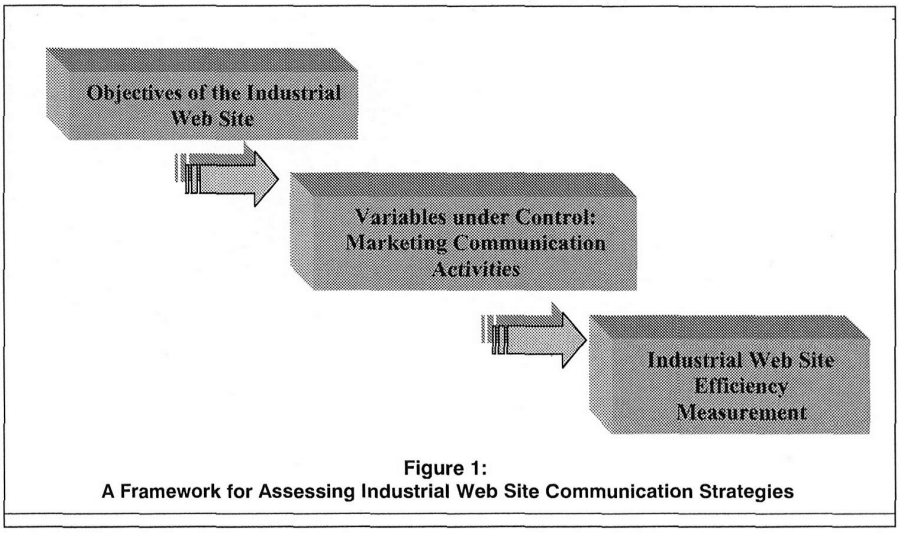

Figure 1:
A Framework for Assessing Industrial Web Site Communication Strategies

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Understanding the Web Site as an Electronic Trade Show

For some years marketing practitioners and academics have recognised the differences between the communication mixes for industrial products and services, and consumer goods. A promotional mix that works effectively with industrial products and services is likely to be quite different from the appropriate mix for most consumer goods. This is due to the technical nature of industrial products, the smaller relative number of potential buyers, the geographical dispersion of customers and the complex nature and length of the organisational buying process. Thus, a strong personal sales effort is a vital ingredient in successfully communicating the technical merits of the vendor's product or service. Tools such as advertising, sales promotion, and publicity generally fill supporting roles in the industrial promotional mix, for on their own, none of these promotional devices is usually sufficient to actually accomplish a sale. Rather, they support the general sales effort by generating customer interest, influencing customer attitudes, and reinforcing the customer after the sale.

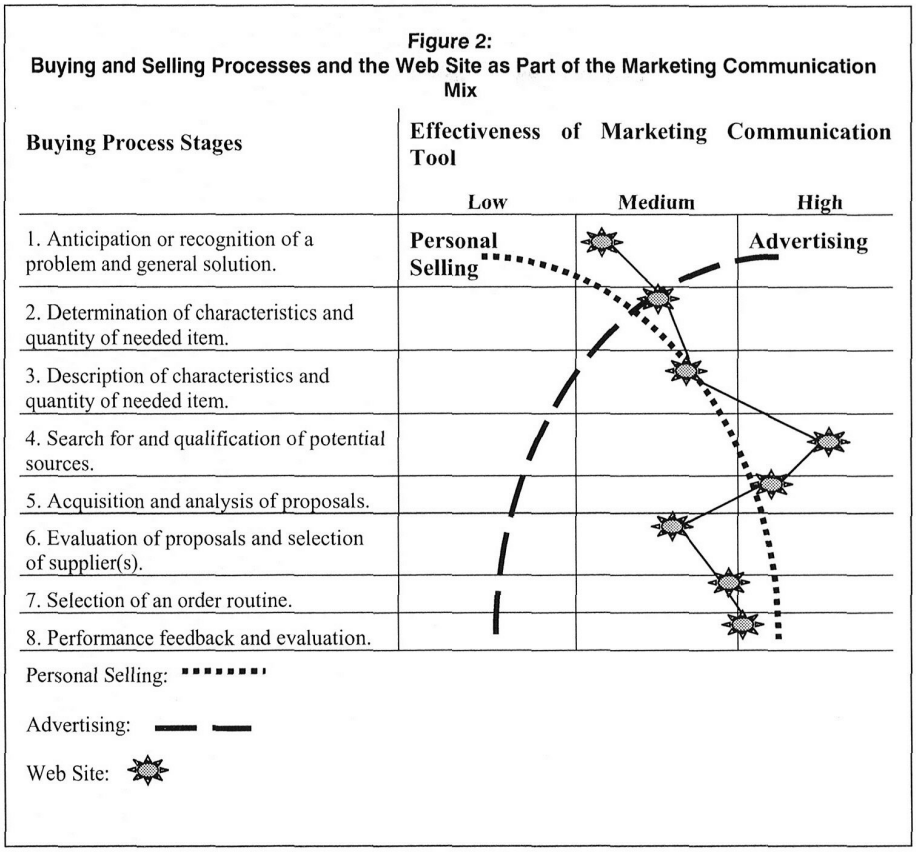
The Internet in many ways combines the best of all worlds, because it creates a unique, interactive selling opportunity that costs the least per thousand and is available 24/7 (Lichtenthal et al 2002). It has been characterized as a tool for communicating information, reaching new markets and facilitating sales force efforts (Samli et al. 1997; Anderson 1996) In this sense, the Internet falls somewhere inbetween selling and advertising in the industrial communications mix, yet combines elements of both.

From an industrial marketing perspective, the Web has a lot in common with a trade show, for it can be thought of as a very large international exhibition hall where potential buyers can enter at will and visit exhibitors and prospective sellers. Within the context of the discrete elements of a promotional mix a trade show is thought to contribute across the board through public relations, personal selling, and sales promotions (Blythe 2002). Like trade show visitors, internet visitors, may visit the web site passively, by simply wandering around, enjoying the sights and sounds, pausing to pick up a pamphlet or brochure here, and a sticker, key ring, or sample there. On the other hand, they may become vigorously interactive in their search for information and problem-solution, by talking to fellow attendees, actively seeking the booths of particular exhibitors, carefully examining products, soliciting richer information, and even engaging in sales transactions with the exhibitor. The basic ingredients are still the same. The central and fundamental problem facing a conventional trade show marketer is how to convert visitors, casually strolling around the exhibition centre, into customers at best, or sales leads at least (Blythe 2000). Similarly, a central dilemma confronting the Web marketer is how to turn visitors (those who browse the Web) into interactors (attracting the surfers to the extent that they become interested; ultimately purchasers; and, staying interactive, repeat purchasers).

Gopalakrishna and his colleagues (Gopalakrishna and Lilien 1995; Gopalakrishna et al. 1995) have comprehensively augmented the knowledge concerning trade shows as promotional tools in the business-to-

business environment. We have adapted and extended their approach to the possible role of the Web site as an industrial marketing promotional tool as shown in Figure 2. Both the buying and selling process stages receive attention. In their well-known Buy-Grid framework, Robinson et al. (1967) suggest that the industrial buying process can be thought of as a series of stages (left hand side of Figure 2). The buyer's information needs differ at each stage, and therefore, so do the communication tasks of the industrial marketer. The relative effectiveness (low, medium and high) of a particular marketing communication tool is shown on the right hand side of Figure 2. So for example, generating awareness of a new industrial product might be most effectively achieved through advertising in trade journals, whilst closing a sale would best be achieved face-to-face, in a selling transaction. Industrial marketers as outlined in the introductory paragraph, employ a mix of communication tools to achieve various objectives in the marketing communication process, judiciously combining advertising and personal selling, although leaning most heavily towards the latter in the majority of cases. Gopalakrishna and Lilien (1995) posit that the profile of a trade show on Figure 2 would be somewhere "down the middle" - that is, less effective than broadcast advertising at achieving awareness, but more effective than personal selling; less proficient at closing sales than personal selling, but much more so than broadcast advertising. Similarly, we suggest that a Web site would play a role of complementing both advertising and personal selling efforts for the industrial marketer. Personal selling is usually the largest single item in the industrial marketing communications mix (Lilien 1979; Lilien and Weinstein 1983), while broadcast advertising is typically the dominant way used to reach consumers by consumer marketers (Dickson 1994). Kotler (1991) asserts that the relative cost-effectiveness of advertising and personal selling in performing marketing communication tasks depends on the stage of the buying process, with personal selling becoming more cost effective the closer the buyer gets to the latter phases in the purchasing sequence-this is shown in column 2. A central question then is where does a Web site fit in terms of communication effectiveness? - a tentative plot for the Web site is shown in Figure 2. The Web site is something of a mix between direct selling (it can engage the visitor in a dialogue) and advertising (it can be designed to generate awareness, explain/demonstrate the product, and provide information-without interactive involvement). It can play a cost-effective role in the communication mix, in the early stages of the process-need recognition, development of product specifications and supplier search, but can also be useful as the buying process progresses toward evaluation and selection. Finally, the site is also cost-effective in providing feedback on product/service performance. Web sites might typically be viewed as complementary to the direct selling activity by industrial marketers, and as supplementary to advertising.

Figure 2:
Buying and Selling Processes and the Web Site as Part of the Marketing Communication Mix



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We posit that the Web excels in the search phase (stage 4)-which is born out by the fact that the 'search engine' has become to personify the Web, becoming the medium's own distinctive format (e.g. Martin, 1995). It is likely that as the web medium is developed and enhanced, it will increasingly excel in each and every phase of the buying process.

Objectives of Industrial Web Sites

While it is clear that the Web enjoys tremendous commercial potential, the case may well be that without a clear idea of what the strategy behind a web site is, its full potential may never be reached. From a strategic perspective therefore, it is of critical importance to develop an explicit understanding of the role of the industrial web site and a clearly defined set of objectives. Depending on the industrial firm's purpose for establishing web presence and the stage of the buying process, these objectives can range from simply reinforcing corporate awareness to complementing, or even substituting, the selling function. Traditional response hierarchy theory suggests the main communication objectives involve: creating awareness, providing knowledge, encouraging liking, build preference, build conviction and stimulating purchase. According to Lichtenthal and Eliaz (2003) the Internet is the only medium that can meet all communication objectives. We discuss this range of objectives at each stage of the buying process and the communication activities practised by industrial marketers, by way of cases of industrial web sites currently exploiting the Web.

Creating Awareness and Liking: The Promega and Raytheon Web Sites

At a very basic level an industrial web site may aim to build corporate awareness, by providing information about the firm, i.e., a type of a corporate brochure. An example of a corporate brochure (which can be instantly updated), which would function to alert industrial buyers of the range of products and solutions a company has to offer, is that of Promega1. The Promega corporation is an international company applying biochemistry and molecular biology to the development of innovative, high-value products for the life sciences (e.g. molecular biology; cell biology (signal transduction and cellular regulation); genetic identity; neuroscience; clinical research and industrial applications (diagnostics and pharmaceutical processes and materials); bioluminescence and non-isotopic

reporter systems; immunology reagent systems). Their Web site displays a copy of their mission statement, as well as information pertaining to the extent and location of their international operations, and information on joint venture with other companies. Facts on distribution, contact names and numbers, and general information on the company are also provided.

Another example of a corporate brochure is provided by Raytheon2. The Company, headquartered in Lexington, Massachusetts is a $12 billion international, high technology corporation which operates in four businesses: commercial and defence electronics, engineering and construction, aviation, and major appliances. The brochure provides an overview of the company, its international operations, describes its key business areas and provides shareholder information. Summaries of latest press releases and news related to the company and products are provided. A history of the company is recounted, along with information on site locations and employment opportunities.

Providing Product Knowledge and Information: The Millipore and GE Plastics Web Sites

Moving on in the buying process, the Web site offers business-to-business marketers the ability to provide detailed information about products by functioning as a comprehensive on-line catalogue. One such example is that of Millipore3, an international company that focuses on applying "purification technology" to critical research and manufacturing problems. Millipore employs 3,500 people world-wide, markets 10,000 products and systems, and has 40 years of expertise in applications ranging from bacteria testing of water, to sterilisation of biopharmaceutical proteins, to eliminating contamination from gases used in manufacturing the latest and hottest semiconductor devices. The Millipore on-line catalogue was initially built at Johns Hopkins University as a bioinformatics experiment with the premise that there are a number of different types of data that are valuable to scientists. The analytical products catalogue provides information on Millipore's analytical and small scaleup process membrane products for life sciences, water and wastewater microbiology, and environmental testing. Pharmaceutical products and microelectronics catalogues are also provided.

A further extension of the on-line catalogue concept is demonstrated by GE Plastics4. Their Web-site supplies detailed product information augmented by an on-line downloadable database. The site provides a general introduction to GE Plastics and its range of manufactured products. Value is added through "Tech Tip Of The Week" (tips and helpful hints for working with GE's engineering thermoplastics) and a summary of GE's latest press releases and announcements. A detailed on-line guide to their family of engineering thermoplastics is provided, complimented by a 'Properties Guide' - which gives detailed profiles of the typical property values for each material. To help the buyer select the best material for a particular job, GE Plastics offers an information resource called GE Select - a comprehensive database software covering the family of GE polymers. This database, available in different formats (Mac and Windows), provides complete properties and engineering data on all commercially available resin grades. Using the GE Engineering Design Database, the buyer simply determines the mechanical, thermal, electrical and other performance criteria they require and the most appropriate material/compound is selected. These features are augmented by a Design Guide (General guidance and recommendations for designing applications using GE Engineering Materials) and a Processing Guide (General guidance and recommendations for injection moulding applications). Finally, using a Technical Support Resource the industrial buyer can get answers to any questions about GE materials they may have.

Building Preference: Providing Product Specifications and Introducing New Products- The DuPont and PEG-IT Web Sites

According to Kotler (1991) the target audience might like a product but not prefer it compared to others. The role of the website is to build consumer preference by promoting the products' quality, value, performance and other features. For example, detailed product information and specification are provided by the DuPont5 site on Performance Lubricants. DuPont make advanced lubricants and coatings for demanding applications in the aerospace, automotive, semiconductor industries, as well as general purpose lubricants for use on almost anything that moves. The site provides a comprehensive overview and technical information on each Dupont Product. Information on new products is also given, coupled with news of high profile sponsored events.

A good example of a new product introduction is that of Ellipsoid Fasteners, manufactured by PEG-IT6. The site explains the concept/mechanics behind the operations of ellipsoid fasteners and provides a range of examples of their uses. The site also explains the philosophy/business practices of the company (Our primary purpose is to engage in research, development and expression of ellipsoid patents. In certain limited instances, we are involved in manufacturing and distribution. We offer design and application engineering assistance in the ellipsoid technology field.), and gives information on how to obtain more information on the company.

Building Conviction through Interacting with Customers and Building a Customer Database: The 3M Web Site

The 3M7 homepage, recently voted a top 5% of the Web site, provides information on new products and offers free samples. Value is added through software which gives technical and compatibility information, helps the buyer select the right product, and answers any other questions relating to 3M office products. Finally the 3M site allows the building of a customer database through their "Candy Jar" - before leaving the site you are requested to fill out a survey and to select a free product sample.

Stimulating Purchase and Distributing Products: The BESTESTIMATE Web Site

An example of the use of the Web as a delivery medium for both samples and complete products is that of BEST ESTIMATE8. This company provides software to help estimate the cost of various industrial construction jobs. This enables jobs to be priced without call-outs, using database costs and stock products, enabling contractors to rapidly turn around proposals and designers to make cost a true design parameter. A range of estimating tools are provided including: (1) a check list - which identifies cost components step by step through the construction process. (2) an organiser - which calculates costs and quotes costs from subs and suppliers. (3) a calculator - which crunches the numbers. (4) a '2nd opinion' routine - which tests cost perceptions and those of subs and suppliers. (5) a data bank - which keeps records of 300 standard building component costs. (6) a further program automatically writes the quotation. Demonstration samples of the various programmes are downloadable directly from the site.

Selling Products: The Caterpillar Web Site

Caterpillar made its first attempt at serious on-line purchasing on 24 June 1997, when it invited pre-approved suppliers to bid on a $2.4M order for hydraulic fittings - simple plastic parts which cost less than a dollar but which can bring a $2m dollar bulldozer to a standstill when they go wrong. Twenty-three suppliers elected to make bids in an on-line process on Caterpillar's Web site (Woolley, 1998). The first bids came in high, but by lunchtime only nine were still left revising offers. By the time the session closed at the end of the day, the low bid was 22 cents. The previous low price paid on the component by Caterpillar had been 30 cents. Caterpillar now attains an average saving of 6% through its Web site supplier bidding system. GE (www.ge.com) were one of the first major firms to exploit the web's potential in purchasing-in 1996 the firm purchased $1Bn worth of goods from 1400 suppliers over internet (Woolley, 1998). As a result the company reports that the bidding process has been cut from 21 days to 10, and that the cost of goods has declined between 5 and 20%. Previously, GE had no foreign suppliers - now 15% of the company's suppliers are from outside of North America. The company also now encourages suppliers to put their web pages on GE site, and this has been found to effectively attract other business.

In summary, different organisations may have different marketing objectives for establishing and maintaining a Web presence. One organisation might wish to use the Web as a means of introducing itself and its new products to a potentially wide, international audience. Its objectives could be to create corporate and product awareness, and inform the market. In this instance the Web site can be used to expedite the buyer's progress down phases 1 and 2 in Figure 2. On the other hand, if the surfer knows of the firm and its products, then net dialogue can be used to propel this customer down the lower phases in the buying progression. Another firm may be marketing well-known existing products, and its Web site objectives could be to solicit feedback from current customers as well as informing new customers.

Thus, Web sites can be used to move customers and prospects through successive phases of the buying process. They do this by first attracting net surfers, making contact with interested surfers (among those attracted), qualifying/converting a portion of the interested contacts into interactive customers, and keeping these interactive

customers interactive. More importantly, Web sites can achieve all the different objectives in the buying process in the most cost/effective way compared to other media. "There are no reasonable limits on variety and quantity of information as long as the Website is easy to navigate for all steps of the buying process. As well, it is perhaps the lowest cost tool that can bring a buyer through all stages" (Lichtenthal and Eliaz 2003, p.10). Different tactical variables, both directly related to the Web site, as well as to other elements of the promotional mix will have a particular impact at different phases of this conversion process: For example, hot links (electronic links which link a particular site to and from other relevant and related sites) may be critical in attracting surfers. However, once attracted, it may be the level of interactivity on the site that will be critical to making these surfers interactive.
In order to move the customer from being a passive Internet surfer to an interactive user and purchaser of products, an industrial firm's web communication strategy must be designed so that the web site objectives are well integrated with corresponding tactical activities. Moreover, it is of critical importance that industrial marketers are able to assess the effectiveness of the Web site as a marketing communication tool at every stage of the conversion process. In Table 1 we present the objectives that industrial marketers may have through the phases of the buying process, how web site tactical activities can contribute toward the attainment of these objectives and what the corresponding measures to assess the effectiveness of the web site are.

Table 1: Stages in Assessing Industrial Web Site Communication Strategies

Objectives of the Industrial Web Site	Web Site Marketing Communication Activities	Web Site Efficiency Measurement
Generate Web site awareness	Include web site address in all broadcast advertising and publicity; on product packaging; and other corporate communication material.	Awareness efficiency measure
Attract target surfers to the Web site.	For Passives: Use 'hot links', sponsored Web sites, sponsored Web engines. For Actives: Maximize hit rate through multiple sites and names; server speed; bandwidth.	Locatability/Attractability efficiency measure
Promote company and/or product by providing corporate/product information.	Make the hit a worthwhile visit, through readability of material; visual appeal – graphics, sound, video and friendliness of use.	Contact efficiency measure.
Establish interaction with potential/current customers; build a customer database; handle customer complaints.	Ensure ease and simplicity of establishing a dialogue in the site; offer product samples; provide quality and speed of response.	Interactivity efficiency measurement
Facilitate on-line purchase and/or bidding.	Initiate/ respond to dialogue; simplify the ordering process; ensure security of ordering; offer alternative ways of ordering.	Conversion efficiency measurement
Retain the on-line customers.	Update and refresh the Web site; exploit transaction database; solicit purchase satisfaction and feedback; keep customers informed on order status and product/site updates.	Retention efficiency measure

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Web Site Efficiency Measurement

In Table 1 we propose a set of performance measures directly linked to tactical marketing activities that can be used to estimate web site effectiveness. We model the flow of surfer activity on a Web site as a six-stage process, which is shown in Figure 3. The variables and measures shown in Figure 3 are defined in Table 2.
All surfers on the Web are not in the relevant target audience for a given firm. Using the notation of Gopalakrishna and Lilien (1995), surfers could be in one of two groups: those potentially interested in the organisation (0), and those not interested (1-0).

Figure 3: A Model of the Conversion Process on the Web

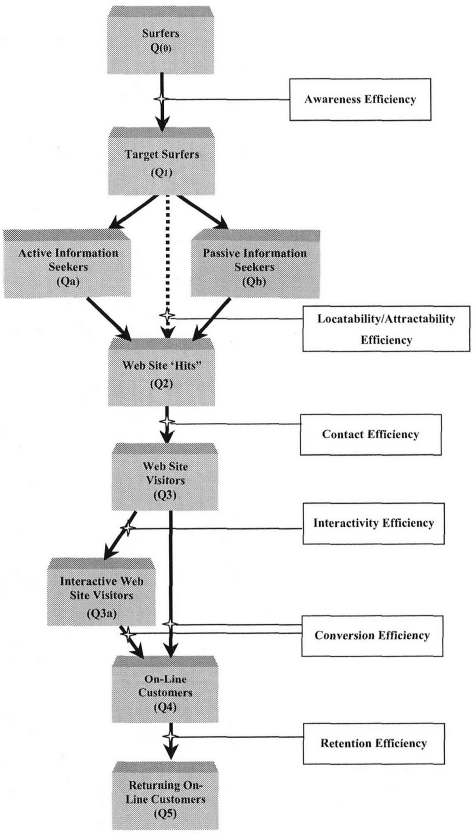

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Table 2: Variables and Measures

Web Site Efficiency Measure	*Formula*
Awareness Efficiency	$\eta_0 = \frac{\text{target surfers}}{\text{surfers}} = \frac{Q_1}{Q_0}$
Locatability/Attractability Efficiency	$\eta_1 = \frac{\text{number of hits}}{\text{number of seekers}} = \frac{Q_2}{Q_1}$
Contact Efficiency	$\eta_2 = \frac{\text{number of active visitors}}{\text{number of hits}} = \frac{Q_3}{Q_2}$
Interactivity Efficiency	$\eta_{2a} = \frac{\text{number of interactive visitors}}{\text{number of contacts}} = \frac{Q_{3a}}{Q_3}$
Conversion Efficiency	$\eta_3 = \frac{\text{number of purchases}}{\text{number of active visitors}} = \frac{Q_4}{Q_3}$
Retention Efficiency	$\eta_4 = \frac{\text{number of repurchases}}{\text{number of purchases}} = \frac{Q_5}{Q_4}$
Q_0: Surfers **Q_1: Target surfers** **Q_2: Hits** **Q_3: Active visitors** **Q_4: Interactive visitors** **Q_5: Purchases** **Q_6: Repurchases**	

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The attractiveness of having a Web site for the organisation depends on $Q_{0\eta 0}$, the number of *potentially interested* surfers on the net (where Q_0 is the net size measured in terms of surfers). The first stage of the model represents the flow of surfers on the net to land on the firm's Web site, and it is acknowledged that only a fraction of the target surfers ($Q_{0\eta 0}$) visits a firm's Web site. This describes the *awareness efficiency* (η_0) of the Web site. The awareness efficiency measures how effectively the organisation is able to make target surfers aware of its Web site. Industrial marketers can employ reasonably common and well-known awareness generating techniques to affect this, such as including the Web site address in all advertising and publicity, on product packaging and other corporate communication materials, such as letterheads, business cards and brochures. We summarise the awareness efficiency index as:

$$\text{awareness efficiency} = \eta_0 = \frac{\text{target surfers}}{\text{surfers}} = \frac{Q_1}{Q_0}$$

where *target surfers* refers to the number of surfers who are potentially interested in the organisation's products or services.

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The second stage of the model concerns attempts to get target surfers to find the Web site. We distinguish between active and passive information seekers. Active seekers (Q^sub 1a^) are those who intentionally seek to hit the Web site, whereas passive seekers (Q^sub 1b^) are those target surfers whose primary purpose in surfing was not necessarily to hit the Web site. Only a fraction of the target surfers (Q^sub 00^) visit the firm's Web site. The second stage of the model thus represents the locatability/attractability efficiency (^sub 1^) of the Web site. This measures how effectively the organisation is able to convert target surfers into Web site hits, either by facilitating active seeking behaviour (surfers who actively look for the Web site), or by attracting passive seekers (not actively looking for the Web site, but not against finding it).

Enabling active seekers to hit the Web site easily can be achieved by maximising the locatability of the site - i.e. maximising the probability that a site can be found. Strategies to facilitate this include: using multiple sites (e.g., Web servers in the US, Europe, and Asia); using names for the site that can be easily guessed (e.g., www.ibm.com) or using 'doorway sites' with simple names, pointing to a main site address with a complex name; enhancing server speed and bandwidth (the number of visits which can be handled concurrently) - one way of doing this is to use "mirror sites", servers with essentially the same information, but which distribute processing evenly between themselves. Tools to attract passive seekers include using a large number of relevant hot links (e.g., Prentice Hall has a link from ISWorld,[9] the Web site for information systems academics, to its Web site), embedding hot links in sponsored Web sites (e.g., Digital sponsored the Thrust SSC Web site[10]), and sponsored search engines linked to Web sites (e.g., Netsearch is sponsored by such varied firms as Sprint, Sun MicroSystems and Cathay Pacific Airlines). We summarise the locatability/attractability index as:

$$\text{locability / attractability} = \eta_1 = \frac{\text{number of hits}}{\text{number of seekers}} = \frac{Q_2}{Q_1}$$

where hits refers to the number of surfers who alight on the Web site.

At this stage, it should be apparent that there is a difference between a *hit* and a *visit*. Merely *hitting* or landing on a site does not mean that the surfer did anything with the information to be found there—the surfer might simply hit and move on. A visit, as compared to a hit, implies greater interaction between the surfer and the Web page. It may mean spending appreciable time (i.e., >x minutes) reading the page. Alternatively, it could be completing a form or querying a database. Although, the operational definition of a visit is to some extent dependent on the content and detail on the page, the overriding distinctive feature of a visit is some interaction between the surfer and the Web page.

The next phase of the model concerns the efficiency and ability of the Web site in converting the hit to a visit. Only a fraction of the target hits ($Q_{1\eta 1}$) visit the firm's Web site, so the third stage of our model represents the *contact efficiency* (η_2) of the Web site. This measures how effectively the organisation transforms Web site hits into visits. The efforts of the industrial marketer at this stage should be focused on turning a hit into a worthwhile visit. Thus, the visit should be interesting, powerful enough to hold the visitor's attention, and persuade the visitor that staying awhile to browse. The material should be readable—the concept of readability is well-established in marketing communication. Visual effects should be appealing—sound and video can hold interest as well as inform. The possibility of gaining something such as information, a product sample, or simply some sort of prize,

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may be effective. The interface should be easy and intuitive to use. We summarise the contact efficiency index as:

$$\text{contact efficiency} = \eta_2 = \frac{\text{number of active visitors}}{\text{number of hits}} = \frac{Q_3}{Q_2}$$

Once the visitor is virtual, that is, engaged—in real time—in a visit at the Web site, he or she should be able to interact with the firm. Establishing a dialogue with current or potential customers may be quite important for building customer databases, handling customer complaints and queries or inviting customer suggestions. At the simplest level, establishing some form of interaction may be signing an electronic Visitor's Book; at higher levels this may entail e-mail requests for information or the completion of a questionnaire. For example Yesterday's Tractors[11], a family business specialising in new and used parts for older tractors, invites visitors to drop them a line via e-mail with suggestions, comments etc. In any case it is important to establish the dialogue in a way that elicits quite detailed information from the visitor. This may be achieved for example, by offering the visitor the opportunity to participate in a competition in exchange for information in the form of an electronic survey, or by promising a reward for interaction in the form of free product samples. Ease and simplicity of establishing a dialogue in the site and quality and speed of response are of major importance. This ability of turning visitors to interactive contacts we define interactivity efficiency:

$$\text{interactive efficiency} = \eta_{2a} = \frac{\text{number of interactive visitors}}{\text{number of contacts}} = \frac{Q_{3a}}{Q_3}$$

The next phase in the model relates to the capability of the Web site to convert a visitor – active or interactive – to a customer. Placing an order may be facilitated by ensuring simplicity of the ordering process, providing a secure means of payment, as well as options on mode of payment (e.g., credit card, check, electronic transfer of funds). Alternative ordering methods might also be provided (e.g., telephone, e-mail, or a postal order form that can be downloaded and printed). Digital[12] was the first computer industry vendor to offer online ordering of its full product line over the Internet. Customers can obtain descriptions of hardware, software, and services, read Digital's announcements, configure systems, generate price quotations, and place orders. Although the service was initially offered to educational institutions and research laboratories, but by the summer of 1994, it was available to a broader community of U.S. customers, with plans for world-wide release. Digital also used the channel to deliver software patches. Potential customers could also test run their applications in the new Alpha AXP environment - a computer that was sold as a server for use with the Web and other internet applications.

This capability to convert visitors into purchasers, we term conversion efficiency, and summarise it in the form of an index as follows:

$$\text{conversion efficiency} = \eta_3 = \frac{\text{number of purchases}}{\text{number of active visitors}} = \frac{Q_4}{Q_3}$$

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The final stage in the process entails converting purchases into re-purchases. The advertiser should consider the proficiency of the Web site not only to create purchases, but also to turn these customers into loyal customers who re-visit the site and purchase on an on-going basis. Variables that the marketer can influence include:

* regular updating and refreshing of the Web site. It is more likely that customers will revisit a Web site that is regularly refreshed and updated. Indeed, web sites can include the option of automatic notification of interested users when information on the site changes;
* soliciting purchase satisfaction and feedback to improve the product specifically, and interaction generally;
* regular updating and exploiting of the transaction database to establish an ongoing dialogue:

Once captured, customer data becomes a strategic asset (Blattberg and Deighton 1991), which can be used to further refine and retarget electronic marketing efforts. This can take a number of forms: buyers can be reminded electronically to repurchase (e.g., an e-mail to a purchasing manager to replenish stocks of spare parts); they can be alerted to special offers and product changes; customers can be invited to collaborate with the marketer (e.g., loyal customers can be rewarded for referrals by supplying the e-mail addresses of organisations or colleagues who may be leads).

This capability to turn purchasers into repurchases, we term retention efficiency, and summarise it in the form of an index as follows:

$$\text{retention efficiency} = \eta_4 = \frac{\text{number of repurchases}}{\text{number of purchases}} = \frac{Q_5}{Q_4}$$

Finally we define a sixth, or overall average Web site efficiency index (η_{av}), which can be thought of as a summary of the process outlined in Figure 3:

$$\text{Website efficiency} = \eta_{Av} = \frac{1}{6}\sum_{1}^{6}\frac{Q_n}{Q_{n-1}}$$

This can be an effective way to establish the extent to which Web site advertising and marketing objectives have been met. The measure is particularly relevant for a Web direct mail order operation where the main objective is to generate purchases and repeat purchases. However, a simple average may in other cases be misleading, and a more refined and appropriate measure might be a weighted average. A weighted average index is defined below:

$$\eta_{WAv} = \frac{1}{6}\sum_{1}^{6}\frac{Q_n}{Q_{n-1}} \cdot \mu_{n-1}$$

where η_{WAv} is the weighting accorded to each of the five efficiency indices in the model. So for example, some advertisers might regard visits to the Web site as a very important criterion of its success (objective), without wishing or expecting these visits to necessarily result directly in sales. Other advertisers and marketers might want the visit to result in dialogue, which could result in sales, but only indirectly—mailing or faxing further information, accepting a free product sample, or requesting a sales call. Another group of Web advertisers might wish to emphasise retention efficiency. They would want to use the Web as a medium for establishing dialogue with existing customers and facilitating routine re-ordering. It would therefore be useful for advertisers and marketers wishing to establish overall Web efficiency to be able to weight Web objectives in terms of their relative importance: doing so by weighting the efficiencies in the model would be an effective way of doing this.

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Discussion

In this section we discuss some of the problems and opportunities that industrial marketers face in managing Web communications and interactions. These are grouped under the themes of measurement problems, isolation issues, and ongoing developments.

Measurement dilemmas

The previously developed model assumes that all hits are counted. However, there are hits that are never detected by a Web server because pages can be read from a cache memory rather than the server. A cache is temporary memory designed to speed up access to a data source. In the case of the Web, pages previously retrieved may be stored on the disk (the cache in this case) of the personal computer running the browser. Thus, when a person is flipping back and forth between previously retrieved pages, the browser retrieves the required pages from the local disk rather than the remote server. The use of a cache speeds up retrieval, reduces network traffic, and decreases the load on the server. As a consequence, however, data collected by a Web server undercounts hits. The extent of undercounting depends on the form of caching.

Most browsers offer three levels of caching: once per session, always, and never. In terms of undercounting, the worst situation is never, which implies that if the page is in cache, the browser will not retrieve a new version from the server. This also means the customer could be viewing a page that is months out of dale. Always means the browser always checks to ensure that the latest version is about to be displayed. A hit will not be recorded if the page in the cache is the current version. The default for most browsers is once per session, results in

undercounting but does mean the customer is reading current information, unless that page changes during the session.

The existence of a proxy server can further exacerbate undercounting. A proxy server is essentially a cache memory for a group of users (e.g., department, organisation, or even country). Requests from a browser to a Web server are first routed to a proxy server, which keeps a copy of pages it has retrieved and distributed to the browsers attached to it. When any browser served by the proxy issues a request for a page, the proxy server will return the page if it is already in its memory rather than retrieve the page from the original server. For instance, a company could operate a proxy server to improve response time for company personnel. Although, dozens of people within the organisation may reference a particular Web page, the originating server may score one hit per day for the company because of the intervening proxy server. To further complicate matters, there can be layers of proxy servers and one page retrieved from the original web server may end up being seen by thousands of people within a nation. Clearly, the proliferation of proxy servers, which is likely to happen as the Web extends, will result in severe undercounting.

The use of cache memory or proxy servers will result in undercounting of hits (Q_2) and active visitors (Q_3). Consequently, the locatability/attractability index (η_1) will be underestimated since Q_2 is the numerator in the index's equation$_1$, and the conversion efficiency index ($_3$) will be overestimated as Q_3 is in the denominator. It is more difficult to conjecture the effect on the contact efficiency index $\left(\eta_2 = \frac{Q_3}{Q_2}\right)$. One possibility is that the index is underestimated because active visitors browse the site more frequently than those who just hit, and as a result are more likely to read the page from cache memory.

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Clearly, empirical research is required to estimate correction factors for ^sub 1^, ^sub 2^, and ^sub 3^. Unfortunately, these correction factors are likely to differ by page and change over time as the distribution of proxy servers changes. Therefore, the initial perception that the Web enables the ready calculation of efficiency measures needs to be tempered by the recognition that cache memory can distort the situation.

Although the caching problem is present, it is hardly a new problem for marketers. Viewership, listenership and readership of conventional media are all cases in point. The issue of readership, for example, has perplexed advertisers, researchers and publishers for many years: How does one measure readership? Is it merely circulation? That probably undercounts in one way, because there may be more than one reader (e.g. two people read the subscription to Harvard Business Review), or overcounts in another (no one reads the subscription). How does one define readership - is it read from cover to cover, read some, browse? Where many people "read" a magazine such as Business Week on a company circulation list, can we go on the size of the circulation list (it may overcount - not everyone reads, but simply signs and sends on, or undercount - people who are not on the circulation list, such as secretaries, or juniors may still read it)? We would argue that industrial marketers using the Web are simply faced with a new version of an old problem, and creative managers still need ways to solve them. Moreover, compared to other media the potential to estimate correction factors is enhanced on an interactive electronic medium such as the Web.

Isolation issues

A fundamental problem in researching the effectiveness of marketing mix variables, such as pricing strategy or advertising is that of isolating them from others. This is compounded further when the effects of that variable can be indirect, or have a prolonged lag effect. Cases in point are Web advertising's ability to create awareness, which might or might not lead to an immediate sale, and its lag effects-industrial buyers may remember slogans long after campaigns have ended, and the effects of this on sales continue to intrigue researchers. Thus, advertisers and marketers sustain their efforts in searching for ways in which returns to marketing investments generally, and communication capital in particular, can be enhanced. This highlights the importance of establishing specific

communication objectives for Web sites, and for identifying measurable means of determining the success of Web ventures. The Web is a lot more measurable than many other marketing communication efforts, with feedback being relatively quick, if not immediate.

Ongoing developments

In this article it has been our objective to provide a set of generic efficiency measures. Clearly ongoing developments in the Web are likely to change how these are achieved, and indeed could well generate new sub-stages. However these developments do not change the fundamental stages of awareness, attraction, conversion, retention etc. Further research would profitably explore refinements of the various stages.

Conclusion: Strategic Implications

Strategy can be defined as the panned and emergent alignment of an organisation with its environment through time (cf. Mintzberg, Quinn, and Ghoshal, 1998). As we move into an Information economy increasingly dominated by electronic commerce the issues of an organisation's presence and activity in Cyberspace has become of strategic concern (Watson, et al. 1999). Bondra and Davies (1996), note that the measures of IT (i.e., the Internet) performance should be closely linked to the objectives that were to be achieved through its applications.

Based on this, in this article we have set out 1) a three stage framework for delineating and assessing industrial Web site strategies, 2) a process model describing the translation of Internet surfers into purchasers and repeat purchasers, and 3) a series of efficiency indices to measure each stage of this process.

Industrial companies can employ this process model in three strategic ways. First, using the model, obviously managers can assess the effectiveness of their own firm's Web site. Such an assessment can help companies to: identify the extent to which their Web site is effective in achieving their strategic objectives on the Web; isolate possible weak areas in their Web site strategy; and ultimately, prioritize potential Web strategy improvements. Second, the model can assist managers in evaluating their company's Web site vis-à-vis those of its main competitor. We believe that such comparisons are particularly important to the development of sound, competitive Web sites in terms of overall effectiveness in an industrial context. Third, industrial firms create strategic advantage by using this model to benchmark their site against state-of-the-art Web sites in other industries worldwide. This would enable these firms to strengthen their Web sites drawing from the best practices all over the world.

Footnote

Endnotes

1. (http://www.promega.com/)
2. (http://www.raytheon.com/)
3. (http://www.millipore.com/)
4. (http://www.ge.com /gep/homepage.html)
5. (http://www.lubricants. dupont.com/)
6. (http://cs7bbs. com/pegit/pegit.html)
7. (http://www.mmm.com/)
8. (http://www.io.org/~estim8s/best-est.htm)
9. (http://www.isworld.org/isworld.html)
10. (http://www.thrustssc.digital.co.uk/)
11. (http://www.olympus.net/biz/pratt/pratt.htm)
12. (http://www.digital.com/)

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