
Integrating Web Site Design Features for ‘one-on-one’ marketing: A QFD framework

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ABSTRACT

Numerous articles and books have described how to build “effective” websites, but, very little actual research has investigated the impact of website design features on Internet browsing and purchase behaviour. This research addresses this issue by developing an integral design framework based on Quality Function Deployment (QFD), which links the marketing features of the product or service to be promoted (sold) to each different market segment, to core functionalities of the web interface that is to promote the product or service. The web interface-functionalities are then translated into technical web design features and web design functions to effectively promote the product, and hence induce more sales. The framework is illustrated through a generic example of promoting a mobile phone on the web to three differing customer group segments.

This paper sets a research agenda for varying website design interfaces, thus enabling ‘one-on-one’ Web browsing and the altering Internet purchase behaviour.

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1.0 Introduction

The Internet is an ever-growing channel of marketing communication. Even small, local businesses are beginning to realise the value of effective websites for providing information to potential customers, receiving purchase orders, and performing various customer service functions. There is little or no research to explain what, exactly, makes a website effective in terms of these specific customer-related responses. Despite the plethora of articles and books on how to build “effective” websites, very little actual research has examined the impact of various website design features on Internet browsing and purchase behaviour. Yellow Pages publishers have research specifying the exact effects of 3-colour versus black and white on consumers attention to the focal ad, but website design companies have mainly platitudes and promises to justify the particular designs they use. This research attempts to fill this gap in knowledge, by developing an integral design framework based on Quality Function Deployment (QFD), which links the *marketing* features of the product or service to be promoted (sold) to each different market segment, to core functionalities of the web interface that is to promote the product or service. The web interface-functionalities are then translated into technical web design features and web design functions to effectively promote the product, and hence induce more sales.

This paper sets a research agenda for varying website design interfaces, thus enabling ‘one-on-one’ Web browsing and altering Internet purchase behaviour.

2.0 Literature Review

There is a genuine need for more information regarding what contributes to effective interactions with online customers. Creating a compelling environment has positive consequences (Dholakia and Bagozzi, 1999; Hoffman and Novak, 1996). This is supported by Jeff Bezos, founder and CEO of Amazon.com, who notes that creating an compelling on-line experience for cyber customers is the key to competitive advantage on the Internet (Weber, 1999). Bezos (1999) further argues that delivering a compelling customer experience is even more important online than offline. Cognitavive (1999) indicates that the most important driver of online purchase via commercial Web sites is the strong word-of-mouth online. This offers the opportunity to add differential value as the Web increasingly offers customers full information about product alternatives (Haubl and Trifts, 1999; Lynch and Ariely, 1999).

There is some understanding of the marketing strategies that attract visitors to Web sites (Hoffman, Navak, and Chatterjee, 1995; Morr, 1997; Schwartz, 1996; Tchong, 1998), but very little is known about the specific Web site design features that make a compelling customer experience, and of the key consumer behaviours that emerge from this experience.

Hoffman, Novak and Yung (1999) found that “Web site design must provide enough challenge to arouse the consumer but not so much as she becomes frustrated navigating through the site and logs off”. Chen and Wells (1999) concluded that complexity had a negative effect on ad effectiveness.

The user’s capacity to cope with complexity and volumes of information is limited. According to psychologists, people are able to deal with five to nine concepts at a time. This is often referred to as ‘7 +/- 2’ (Miller, 1956). Hence Web presentations must be broken down into small brief, concise, singular modules or information units (Conger and Mason, 1998). All aspects of design must minimise degree of

flow and time required. Hoffman and Novak (1996a), (2000), (2000a) suggest a hierarchy of effects – awareness, comprehension, attitude, legitimation, trial and adoption constitute a possible hierarchy of effects to Web site effectiveness. Thus, information structuring must also support information users to move and link various information units within the Web site.

One of the systematic tools for making the above links is quality function deployment or QFD (Akao, 1990; Mizuno and Akao, 1994; Hauser and Clausing, 1988). This established and well-known methodology translates the ‘voice of the customer’ or customer needs (the WHATS) into its means of accomplishment within an organisation (the HOWS). In a physical product context encountered in manufacturing, QFD provides a chain-like interface between customer needs, engineering or design characteristics, parts characteristics, key process operations, and production requirements. In a service context, many of the physical goods attributes no longer hold because of the “intangibility” of the service, and its interpersonal nature of being co-produced with the customer at time of consumption. This is somewhat similar to the “service” provided by the Web site design features and resulting interface, and the customer who consumes the service at the same time, with the aim of creating value for the customer with an eventual purchase of the product or service offered. In spite of adaptations of the original QFD method to services (Mazur, 1997, Stauss, 1993), service applications of QFD remain limited (Akao, 1997). Recently, an adaptation to QFD was suggested in its application to extended service transactions (Dube et.al, 1999), arguing that the limited application of QFD to extended service settings is mainly due to a lack of understanding of the breadth and complexity of the customer needs that had to be integrated into product design, environment design, and delivery systems. A successful QFD implementation for extended service transactions, applied to a public sector, was recently reported on (Selen and Schepers, 2001). A direct application of QFD to Web design features was reported by Tan and Chia (Tan and Chia, 1998). Their research, however, applied solely to the design of one particular Web-interface, and did not include the possibility of varying Web site features to link to needs of individual customer groups.

This research develops an integrated design framework for Web site design features in order to address individual (segmented) customer needs, thereby allowing for better ‘one-on-one’ marketing, which is crucial in today’s customer-centric competitive environment. A QFD-methodology will be applied for linking the identified customer segment needs to carefully designed Web site features, thereby presenting a management tool for linking ‘front-’ and ‘back-end’ delivery mechanisms in the on-line interface with the customer. Effective design may eventually lead to improved purchase behaviour, and the resulting design framework will result in a research agenda to induce further investigation in this area.

3.0 A QFD – framework for Integrating Web Site Design Features for ‘one-on-one’ marketing

This research evaluates Web site design features in terms of their effects on actual users. More specifically, “effective” Web site designs are those that hold users’ attention for long periods, entice users to access a great deal of information, and where appropriate, encourage users to purchase from the sponsoring company.

Examples of Web design feature areas include: headings, backgrounds, frames, tables, menus, graphics, and the like. Specific design factors are identified and these determine Web site effectiveness in terms of specific user responses. For example, if users are far more likely to click on menus having some kind of graphic display (buttons, picture-based, etc.) rather than simply underlined text, then graphic display menus are clearly superior in terms of the information function of Web sites. If there is little or no difference between graphic and text-based menus, then presumably, cost factors would drive this decision and simple underlined text would be used.

These web site design features are derived from analysing which *marketing* features of the product or service to be promoted (sold) are deemed relevant for each different market segment. These marketing features are then linked to core functionalities of the Web interface that is to promote the product or service. The Web interface-functionalities are then translated into technical Web design features and Web design functions to effectively promote the product, and hence induce more sales.

As such, the outcome of the QFD design-framework will identify which of these design factors are justified for enticing improved consumer response. For example, using complex graphics may add significantly to the cost of developing a Web site. But if graphics can be shown to increase the amount of time users spend at a Web site, the amount of information they access, and the likelihood of making a purchase, then clients would be willing to pay more to have this feature built into their Web sites.

A comprehensive service QFD was introduced (Mazur, 1993, 1997, 1998). This approach consists of six deployment matrices:

1. Customer Deployment:
Here priorities are first established in terms of organisational goals (such as profits and customer satisfaction) and related to existing and required organisational skills and resources, or core competencies (such as locations and human resources).
2. Voice of the Customer Deployment:
Here the core competencies are related to customer segments in an attempt to pinpoint those segments for which the core competencies will represent value.
3. Quality Deployment:
The House of Quality matrix translates the demanded service quality of the segments into tangible or intangible service quality attributes.
4. Function Deployment:
The selected service quality attributes from the House of Quality are translated into a corresponding set of activities or functions that have to be performed.
5. Process Deployment:
The targeted functions from the function deployment are used as input to process deployment, in which both existing and potential new process designs are related to the desired functions or activities.
6. Task Deployment:
Here job descriptions and operating procedures required to execute the service designs are formulated and detailed.

Our research is limited to deployment of three matrices (voice of customer deployment, quality deployment, and function deployment) within this framework, as the enabling of Web site features is assumed to take place within an existing technology and portfolio of process capabilities. The analysis will be extended to include 'process-', and 'task-deployment' with, say, the introduction of new technologies, such as voice-recognition features of a Web site. This, in turn, would define deployment of new processes and tasks to make this a reality. For our current framework, we limit ourselves to linking Web site features to inducing purchase behaviour within existing processes and technological capabilities. Furthermore, the customer deployment matrix is not appropriate for our application, as organisational goals are pretty much set (increase market share, establish new market share, etc.)

The respective deployment matrices translate into our application framework as follows: Let us take the marketing of a particular type of mobile phone as an example for illustration purposes. This phone is to be positioned (differently) towards three differing market segments: customers over 55 years of age (the pensioners' market), young adults (young professionals market), and women non-active in the workforce (homemakers' market).

3.1 Voice of Customer Deployment

Here the *marketing* features of the mobile phone will be established for the differing market segments, and be linked to core functionalities of the Web interface that is to promote the product. For example, “durability” and “ease of use” may need to be heavily promoted in the pensioners’ market segment, whereas “multitude of technical features” and “colour schemes” could be overriding functionalities of the Web interface for young adults.

As such, the core Web face functionalities are linked to the marketing requirements for each customer segment to induce a greater propensity to purchase the product. It is clear that each market segment may result in differing core Web functionalities, and hence different Voice of the Customer Deployment-matrices. The customer deployment step for the pensioner’s market is illustrated in Figure 1:

Figure 1: Voice of Customer Deployment (Pensioner)

		Core Promotional Functionalities - Displayed on Web Site																			Weighting for Pensioner				
		text spec	video test	email	SMS	call list	call time	hard to damage	phone+external aerial	compact expensive phone	block(no aerial) phone	fold out flip-phone	screen size	screen colour	screen design	ship direct	ship to retailer	pickup	special carry case	hands free		video screen phone			
Marketing Features - Pensioner's Segment																									
durability (withstand harsh treatment)		9	3					9	3	3	9	1										1	15		
advanced features (wish list of add-on features)				3	9	9	1													9	3	3	2	5	
style (shape or design of phone)								3	3		3			9	9	9					9	3	3	3	9
delivery (mode of delivery to customer)																9	3	1					4	12	
	Column Weight	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
	Normalised Importance	135	45	15	45	45	5	162	72	45	162	15	81	81	108	36	12	81	27	27					
		8	3	1	3	3	0	10	4	3	10	1	5	5	5	7	2	1	5	2	2				

Figure 1 indicates the marketing features identified by pensioners purchasing mobile phones. Buyer needs include durability, advanced features, style and delivery mode. These features are mapped and rated against core Web promotional functionalities, such as video clips of the mobile phone’s testing results, the presence of SMS features (to send text messages), and mobile phone screen properties/features.

The pensioner group displays strong correlation between the ‘durability’ marketing feature and the core promotional functionality attributes of information provided in ‘test spec’, toughness or ‘hard to damage’ and shape ‘block phone’. Thus the pensioner deems these three attributes highly significant when assessing a mobile phone’s value. The weightings for each marketing feature are determined by focus groups. These are converted to relative weights on a 1 to 15 point scale. The matrix correlations are quantified using the conventional rating of 9, 3, 1 – indicating, respectively, strong, medium, or weak associations between the marketing features and the various core promotional functions. The output, or relative 'importance' of each of the promotional functions, is calculated by multiplying the respective marketing feature weight by its corresponding correlation, summed across the marketing features that are correlated with a particular Web site promotional function. The resulting importance weights for all promotional functions are subsequently normalised on a scale of 10. All attributes with normalised importance values greater than 4 are used in subsequent quality deployment matrix, which is discussed next.

3.2 Quality Deployment

The House of Quality matrix translates the identified “Web design needs” for each customer segment into required Web design features to meet those needs. For example, the functionality of communicating “durability” in the voice of the customer deployment-matrix may be communicated by dropping a rock on a mobile phone on the Web site, which translates into a need for appearance features such as video and sound. This “need” for video and sound is then translated in the House of Quality into Web design features such as use of video clips, and sound files. This is shown in Figure 2:

Figure 2: Quality Deployment (Pensioner)

Core Promotional Functionalities - on Web Site	Technical Web Design Features																				Weighting for Pensioner	
	use small plain images (increase interest)	more animation to increase interest	video clips to increase interest	sound to increase information	text simple and easily readable	page has uniform orientation	well planned page design	adequate information provided	logical location of information	important info -> brief & separate clauses	simple language (globally understood)	information has consistent tone	companion site links to Web Co's	good text link integration-not 'click here'	minimal links	site loads fast	allows exploratory behaviour	proof of reliability				
text spec (detailed written description of durability)					9	1	1	3	3	9	3	1	1	3							1	12
hard to damage (toughness eg outdoors/workplaces)	3		3	3	1			9		3	1	1									3	14
phone+external aerial (better reception)	1		1					9	9	1	1										4	6
block (no aerial) phone (neat phone esp. city dwellers)	1							9	9	1	1										6	13
screen size (size determines 'card' visual capacity)	3							1	1	1	1										7	7
screen colour (colour selected by manufacturer/user)	3							1	1	1	1										8	5
screen design (set by manufacturer/user)	3	1	3	3		9	9	1	1	3	1	1	3		9						9	8
ship direct (online order/shop order)								1	1	9	1	1								1	10	9
special carry case (extra to phone)	3							1	1	1	1										11	4
Column Weight	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Normalised Importance	4	0	2	2	4	2	2	5	7	10	3	2	1	2	0	3	0	0	0	0	0	

3.3 Function Deployment

The selected Web design features from the House of Quality are translated into a corresponding set of activities or functions that have to be performed. Figure 3 shows the function deployment step for the pensioner’s market segment. Here, for example, the logical location of information translates into the uniform Web page design and Web page organisation functions. Other Web design features translate into a more complex set of Web design functions. For example, Figure 4 (part of the matrices set developed for the young professionals market segment) identifies “video to increase information content” prompts functions, such as use of graphics, use of 2D/3D animation, use of video clips, and use of sound files (as sound is not used in isolation on a Web site) and telepresence (where time appears to stand still and one’s attention is captured and suspended for a time interval).

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1. To investigate the effect of Web site design features on Internet browsing behaviour.
 2. To analyse the effect of Web site design features on surrogate transactions.
 3. To determine and prioritise Web site design features in terms of effectiveness.
 4. To analyse design features in actual dynamic Internet browsing environments.
 5. To track and analyse the Internet browsers' (users') movements across Web sites.

In addition, the QFD-framework outlined in this paper could be tested across different markets for differing market segments to yield which design features eventually result in higher sales; or even a "generic" Web site for a particular market segment, as individualised Web site interfaces across a wide selection of products/services and customer segments may become impractical or too costly.

The authors are currently pursuing these research questions, with the aim of leveraging the on-line communication with customers to create a feeling of 'one-on-one' marketing that is both effective and productive (yielding more sales).

5.0 Conclusions

There are many articles and books investigating how to build "effective" Web sites, however, very little actual research has examined the impact of various Web site design features on Internet browsing and purchase behaviour. This research attempts to fill this gap in knowledge, by developing an integral design framework based on Quality Function Deployment (QFD), which links the *marketing* features of the product or service to be promoted (sold) to each different market segment, to core functionalities of the Web interface that is to promote the product or service. The Web interface-functionalities are then translated into technical Web design features and Web design functions to effectively promote the product, and hence induce more sales.

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