Designing Integrated Models as a Decision Aid in Web-based Marketing

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Abstract

Web information systems have been utilized extensively over the past decade. The Internet allows for the entire sales cycle to be conducted on one medium, nearly instantaneously. From making the consumer aware of the product to providing additional information to transacting the final purchase, the Internet can accomplish them all. The Internet is like one big point-of-sales display, with easy access to products and the ability for impulse shopping. Here, we point out different aspects of information technology (IT) in marketing. Consequently, we propose two frameworks as decision aids in web-based marketing environment.

Keywords : Information Technology, Electronic Marketing(e-marketing), Web Optimization

1. Introduction

Internet marketing, also referred to as web marketing, online marketing, or e-marketing, is the marketing of products or services over the Internet. The Internet has brought several unique benefits to marketing, one of which being lower costs for the distribution of information and media to a global audience [Varadarajan and Yadav, 2009]. The interactive nature of Internet marketing, both in terms of providing instant response and eliciting responses, is a unique quality of the medium. Internet marketing is sometimes considered to have a broader scope because it not only refers to digital media such as the Internet, e-mail, and wireless media, but it also includes management of digital customer data and electronic customer relationship management (E-CRM) systems [Graham, 2008]. Internet marketing ties together creative and technical aspects of the Internet, including design, development, advertising, and sale. Internet marketing also refers to the placement of media along different stages of the customer engagement cycle through search engine marketing (SEM), search engine optimization (SEO), banner ads on specific websites, e-mail marketing, and Web 2.0strategies. E-marketing means using digital technologies to help sell goods or services [Miller, 2002]. These technologies are valuable complements to traditional marketing methods whatever the size of the company or business model. The basics of marketing remain the same-creating a strategy to deliver the right messages to the right people. What has changed is the number of options you have [Henten and

Nicolajsen, 2009]. Though businesses will continue to make use of traditional marketing methods, such as advertising, direct mail and PR, e-marketing adds a whole new element to the marketing mix.

Many businesses are producing great results with e-marketing, and its flexible and cost-effective nature makes it particularly suitable for small businesses. E-marketing gives businesses of any size access to the mass market at an affordable price and, unlike TV or printed advertising, it allows truly personalized marketing. Some of the benefits of e-marketing are:

Global reach-a website can reach anyone in the world who has access to Internet. This allows one to find new markets and compete globally for only a small investment.

Lower cost-a properly planned and effectively targeted e-marketing campaign can reach the right customers at a much lower cost than traditional marketing methods.

Trackable, measurable results-marketing by email or banner advertising makes it easier to establish how effective a campaign has been. One can obtain detailed information about customers' responses to one's advertising.

24-hour marketing-with a website the customers can find out about the products even when the office is closed.

Personalization-if the customer database is linked to the website, then whenever someone visits the site, it is possible to greet them with targeted offers. The more they buy, the more refinement is done on customer profile and market effectively to them.

One-to-one marketing-e-marketing lets you

reach people who want to know about your products and services instantly. For example, many people take mobile phones and PDAs wherever they go. Combine this with the personalizedaspect of e-marketing, and you can create very powerful, targeted campaigns.

More interesting campaigns-e-marketing lets you create interactive campaigns using music, graphics and videos. You could send your customers a game or a quiz, whatever you think will interest them.

Better conversion rate-if you have a website, then your customers are only a few clicks away from completing a purchase. Unlike other media which require people to get up and make a phone call, post a letter or go to a shop.

Businesses that generate their revenues directly from their websites fall into the web based business category [Seybold, 2001]. Such businesses are typically online retailers offering various products for sale from an online catalogue. The needs of web based businesses go far beyond merely providing product information and collecting customer feedbacks. An entire system for handling orders and financial transactions must be in place.

The value propositions of products and services offered in the physical world are essentially limited "point solutions" that meet only part of a consumer's need or want. In the online world, even a simple banner advertisement can be both an advertisement and a direct marketing service [Beynon-Davies, 2004]. The banner raises the passive consumer's awareness of a product. Yet it also encourages the consumer to pursue action by clicking on it.

E-marketing must be defined to include the management of the consumer's online experience of the product, from first encounter through purchase to delivery and beyond. Digital marketers should care about the consumer's online experiences for the simple reason that all of them-good, bad, or indifferent-influence consumer perceptions of a product or a brand [Frieden and Roche, 2006]. The web offers companies'ownership and control of all interactions with customers and thus creates both the ability and the need to improve their overall experience [Chaudhury and Jean-Pierre, 2002].

There are two reasons for building the concept of e-marketing around consumer experiences. First, this approach forces marketers to adopt the consumer's point of view. Second, it forces managers to pay attention to all aspects of their digital brand's interactions with the consumer, from the design of the product or service to the marketing message, the sales and fulfillment processes, and the after-sales customer service efforts.

2. The 7 Cs of E-Marketing

Impulse shoppers have found a true friend in the Internet. Within seconds from being made aware of a product, consumers can purchase it online. Further, with the targeting techniques available to advertisers, consumers who turn down a product because of the price can be identified and served with a special offer more likely to result in a purchase. In the right hands, with the right tools, the Internet really is an advertiser's dream come true. The changing out-

look in the area of e-marketing can be explained on the basis of 7 Cs of e-marketing.

Contract : The e-marketer's first goal is to communicate a core promise for a truly distinctive value proposition appealing to the target customers.

Content : This refers to whatever appears on the website itself and on hot linked websites. If chosen appropriately, it can increase both the rates at which browsers are converted into buyers and their transactions.

Construction : The promises made by e-marketers are not unique to the Internet, but the medium's interactive capabilities make it easier for them to deliver on their promises quickly, reliably, and rewardingly. In practice, this means that promises must be translated into specific interactive functions and Web design features collectively giving consumers a seamless experience. Such design features as one-click ordering and automated shopping help deliver the promise of convenience.

Community : Through site-to-user and user-to-user forms of interactivity (such as chat rooms), e-marketers can develop a core of dedicated customers who become avid marketers of the site too.

Concentration : Targeting through online behavioral profiling. Advertisers have known for some time that behavioral targeting (profiling) is vastly superior to simple demographic targeting. Knowledge of a consumer's past purchase interests, likes/dislikes, and behavior in general allow an advertiser to target an advertisement much more effectively. Department stores have long kept track of consumers' past purchases.

They are thus able to project what other types of products a consumer might be interested in and then send an appropriate coupon or sale offer. Credit card companies are the ultimate gatherers of behavioral targeting information. They maintain vast databases of cardholders' past transactions, and they sell lists of this datato advertisers. The same type of behavioral model is forming on the Internet. Publishers and advertisement networks monitor the items that a consumer has expressed interest in or purchased on a site (or network of sites) in the past and target advertisements based on this information.

Convergence : We will soon enter the next round of the E-marketing battle as broadband reaches the masses. The Internet will become more ubiquitous and wireless; televisions will become more interactive; video/data/voice appliances will converge; brand advertising and direct marketing practices will integrate; domestic brands, commerce and marketing will become even more global; and big marketing spenders will spend more money online. Many companies that are well positioned today will need to continue to evolve to take advantage of the opportunities. The success of Internet advertising companies will largely be driven by how they maneuver among the coming developments. Rich media, brought on by broadband, will allow advertisers much greater creativity by bringing in new types of advertising to the Internet, as well as enhancing some of the more traditional forms. Broadband technology will allow the convergence of television and the Internet. Dubbed "interactive TV", in its simplest form, will con-

sist of a television with some interactive capabilities. Basically, a user will see a television screen that is three-quarters of a traditional television, but with a frame that has Internet capabilities. This frame will allow users to access up-to-the-minute sports scores or news on the Web, for example. More importantly for E-marketers, it would allow viewers to immediately leap to the website of an advertiser whose ad was being shown. The user could find out more information or order the product right there.

Commerce : The last emerging fundamental of e-marketing is commerce, whether it includes offering goods and services directly, or marketing those of another company for a fee, thus helping to cover the fixed costs of site operations and to offset customer acquisition costs.

3. Web Optimization

There are a number of techniques you can use to help potential customers find your site -known as search engine optimization (SEO) techniques [Nissanoff, 2006]. These include techniques likeentifying the keywords and phrases that customers use to search for your products and services, inserting the keywords into the right places in your websitewhen it is being built, submitting your site to search engines and directories, andlinks with websites selling related but non-competing products [Bevilacqua, Ciarapica and Giacchetta, 2009]. Technology gives us the opportunity to collect lots of information on our customers. This doesn't mean we should use it carelessly though. It is very important to ensure that any data we collect

about our customers is handled carefully, and in line with the principles of the Data Protection Act. We must also keep it up to date and not needlessly reveal information about customers [Soroor, Tarokh and Shemshadi, 2009].

Here, we propose a mathematical model which is a new framework for identifying the target market of an export enterprise via web site viewing. A costumer will search for his requirements in a web site. Then, the time duration which he stays in a web page is recorded. Also, he may not visit some of the web pages. As a result, an export enterprise is able to analyze various aspects of a costumer visit from the web site. The results are as follows:

- The location of the visitors that lead to finding the target market.
- The pages which attracted the visitors and lead to identify the products.
- The mal-designed web pages which lead to the redesign of the web site.
- Non-visited pages which can be excluded.

A configuration of the proposed model is shown in <Figure 1>.

The notations of the model are as follows:
Indices:

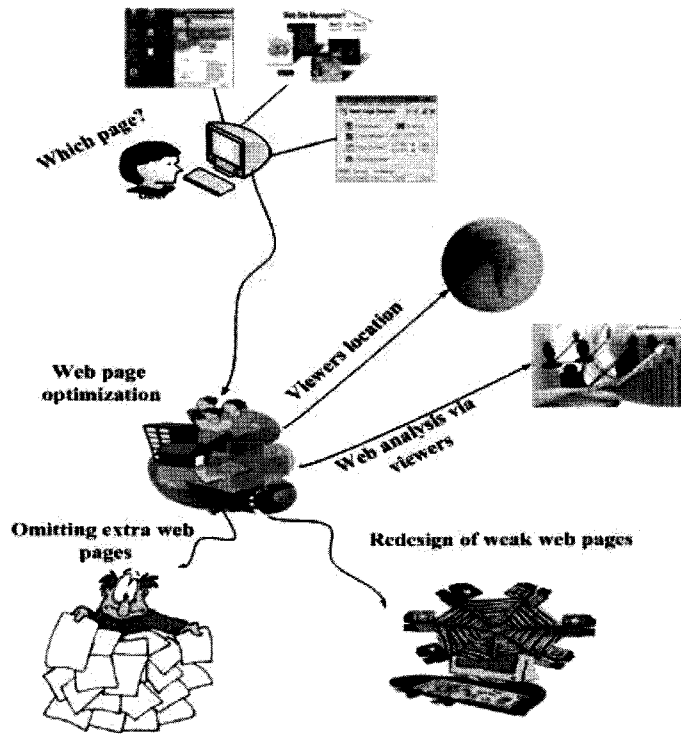I Counter for geographical location; $i \in \{1, \cdots, I\}$

j Counter for products; $\qquad j \in \{1, \cdots, j\}$

k Counter for enterprises; $\qquad k \in \{1, \cdots, k\}$

l Counter for web pages; $\qquad l \in \{1, \cdots, L\}$

Parameters:

T_{iljk} Time duration for visiting web page l of product j in enterprise k from location i

⟨Figure 1⟩ A concept of web optimization

M_{ljk} Maximum possible time duration for visiting the web page l of product j in enterprise k

N_k Maximum possible time duration for visiting the web site of enterprise k

G_{jk} Maximum number of geographical location that can be serviced for product j of enterprise k

Decision Variables:

$$X_{ijk} = \begin{cases} 1 & \text{if the visitor is selected from location } i \text{ viewing product } j \text{ of enterprise } k \\ \\ 0 & \text{o.w.} \end{cases}$$

$$Y_{ijk} = \begin{cases} 1 & \text{if the page } l \text{ of product } j \text{ in enterprise } k \text{ is considered} \\ \\ 0 & \text{o.w.} \end{cases}$$

The mathematical model is:

$$Max\, Z_1 = \sum_{i=1}^{I} \sum_{l=1}^{L} \sum_{j=1}^{J} \sum_{k=1}^{K} T_{iljk} \times X_{ijk} \times Y_{ljk} \qquad (1)$$

s.t.

$$\sum_{i=I}^{I} X_{ijk} \leq G_{jk}, \quad \forall j,\, k, \qquad (2)$$

$$\sum_{i=1}^{I} \sum_{j=1}^{J} \sum_{l=1}^{L} T_{iljk} \times X_{ijk} \times Y_{ljk} \leq N_k, \quad \forall k, \qquad (3)$$

$$\sum_{i=1}^{I} X_{ijk} \times X_{ijk} \times Y_{ijk} \leq M_{ijk}, \forall,\, j,\, k, \qquad (4)$$

$$X_{ijk},\, Y_{ljk} \in \{0,1\}, \, \forall i,\, j,\, k,\, l. \qquad (5)$$

Formula (1), the objective function, is maximizing the value of the web site based on the costumer view point from different locations on all products. Inequality (2) confines the model to service an identified number of geographical locations for each product and enterprise. Inequality (3) indicates the maximum time period for visiting web page of each enterprise. Inequality (4) shows the maximum time period for visiting web page of each product in each enterprise. Relation (5) presents the type of decision variables.

4. E-marketing via Web-based Catalogues

As stated above, the model is trying to determine the target market and to optimize the web site. Hence, after identifying the target market and the product types, the strategy for export should be clarified. Here, we will present a mathematical model which aims for the customer utility about products within web environment. Any enterprise would apply a method to introduce its products to customer. One of these methods is applying web-based catalogues which are currently being used in electronic commerce. Each customer considers digital catalogues to find out different specifications of various products of the enterprise. In any catalogue, some classifications in hierarchical structure is proposed where the major category of the products is on the first page, and then more information are given in the relevant tabs. Meanwhile, if the customer is interested in a product then she/he can find

out the details in the tab by a click. A configuration of the proposed web-based catalogue is presented in <Figure 2>.

The notations of the proposed mathematical program are as follows:

Indices:
  p Counter for products $p \in \{1, \cdots, P\}$
  c Counter for catalogues $c \in \{1, \cdots, C\}$
  k Counter for enterprises $k \in \{1, \cdots, K\}$
  I Counter for geographical location
    $i \in \{1, \cdots, I\}$
  t Counter for time $t \in \{1, \cdots, T\}$
Parameters:
  p' Total number of considerable products in a catalogue
  C Total number of catalogues
  W_c Weight of catalogue c
  θ Minimum number of products to cover any geographical location

$$\rho_{pkit} = \begin{cases} 1 & \text{If product } p \text{ of enterprise } k \text{ is interested by location } i \text{ at time } t \\ 0 & \text{o.w.} \end{cases}$$
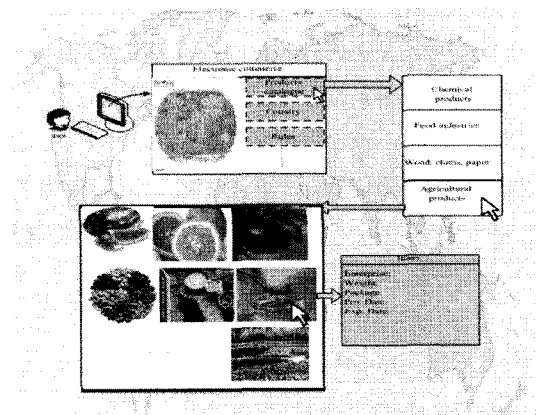
<Figure 2> A configuration of the proposed web-based catalogue

Decision variables:

$$\rho_{pkit} = \begin{cases} 1 & \text{If product } p \text{ of enterprise } k \text{ is} \\ & \text{interested by location } i \text{ at time } t \\ & \text{o.w.} \end{cases}$$

$$Y_{pkit} = \begin{cases} 1 & \text{If product } p \text{ of enterprise } k \text{ exists} \\ & \text{in catalogue } c \text{ at time } t \\ 0 & \text{o.w.} \end{cases}$$

$$X_{ict} = \begin{cases} 1 & \text{If product } p \text{ of enterprise } k \text{ exists} \\ & \text{in catalogue } c \text{ at time } t \\ 0 & \text{o.w.} \end{cases}$$

The mathematical model is:

$$Max\, Z_2 = \sum_{c=1}^{C} W_c [\sum_{t=1}^{T} \sum_{i=1}^{I} X_{ict}] \tag{6}$$

s.t.

$$\sum_{k=1}^{K} \sum_{p=1}^{P} Y_{pkct} \le \acute{p}, \quad \forall c, t, \tag{7}$$

$$\theta \times X_{ict} \le \sum_{k=1}^{K} \sum_{p=1}^{P} \rho_{pkit} \times Y_{pkct}, \quad \forall i, c, t, \tag{8}$$

$$\sum_{c=1}^{C} X_{ict} \le 1, \quad \forall, t, \tag{9}$$

$$X_{ict}, \ Y_{pkct} \in \{0, 1\}, \quad \forall i, c, t, p, k \tag{10}$$

In the proposed mathematical model, formulae (6), the objective function, is finding the data mining strategy to maximize the market through coverage by digital catalogues. Inequality (7) confines the number of products considered in any catalogue. Inequality (8) guarantees the selection of minimum number of products to be covered by a catalogue in any location. Inequality (9) ensures that each location is covered by one catalogue. Relation (10) presents the type of decision variables.

5. Conclusions

We investigated the role of information technology in different aspects of marketing. Internet marketing is a very cost effective approach in exporting. Considering the importance, we proposed a web-based marketing model that provided several opportunities for exporters. Finally, we proposed two mathematical models as new frameworks for identifying the target market of an enterprise via web site visiting of customers and application of digital catalogues as an e-marketing decision aid. The advantages of such models include ease of use, multi-aspect output, and capabilities offered as a web site optimization tool.

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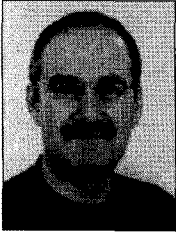
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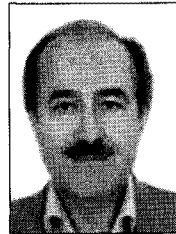
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