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A Web Site Sophistication Model Based on Value-Added Technology Solutions and Services

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Abstract

This research reports on the development of a framework to be used to benchmark the e-readiness of e-Commerce websites. This model will be used in a follow up study relating customer trust and the maturity levels of websites. While several models of e-Commerce capability and maturity have been developed over the years most of them have identified the stages of growth in broad and/or strategic terms. With advances in technology, and the availability of software development tools and new ways of enhancing the customer's shopping experience, it is possible to determine the maturity levels of websites in terms of these value added features. For this study, a list of website tools, technologies and services were placed in a common pool and subjected to classification by a selected panel of e-Commerce users who would determine which items should be assigned to which level of maturity. The objective was to determine which features, in the view of typical customers, suggested a certain level of maturity. The result is the establishment of a process for developing a general framework of e-Commerce maturity from a customer perspective based on the usage of currently available technology solutions and services.

Keywords

e-Commerce, maturity, sophistication, capability, model

Introduction

Companies, particularly small-to-medium enterprises (SMEs), can enter the e-Commerce arena at various levels of sophistication. We use the term sophistication to refer to the processes, structures and skills adopted by a company for facilitating the sale and purchase of goods/services over the Internet. Some companies enter as 'brochure-ware' sites, using the Internet as a first step in creating a web presence. Others use the Internet as a means of conducting business, taking sales orders online and processing payments offline. Yet others engage in relatively more complex operations such as offering online catalogues, receiving online orders and handling online payments. Recently websites have begun to employ newer technologies and features, such as blogs, RSS and alternate payment processes to enhance the shopping experiences of their customers.

Varian et al. (2002, p. 2) defined Internet business solutions in a broad way as "any initiatives that combine the Internet with networking, software and computing hardware technologies to enhance or improve existing business processes or create new business opportunities", which, according to an e-Business Watch report (Berlecon Research GmbH 2002), is also a reasonable definition for e-Commerce tools.

These technological solutions and services are also used to enhance the shopping experience of the customer and, as such, can be evaluated through the 'eye of the beholder'. Extending the assertion by Day (1997) regarding the concept of quality, we take a similar approach to determining the maturity level of a website, namely, that it is "whatever the customer says it is".

Based on the above parameters this study describes the process for developing a staged framework for benchmarking and differentiating e-Commerce websites from a customer perspective and in terms of available and state-of-the-art e-Commerce tools and technologies. While several models of e-Commerce capability and maturity have evolved over the years most of them have identified the stages of growth in broad and/or strategic terms and from a number of different viewpoints. The next section provides an overview of existing web models for e-Commerce followed by a discussion on their limitations.

Existing E-Commerce Web Site Models

A review of the literature has revealed that researchers have adopted several different high-level approaches to the development of web site design models (Goi 2007). Web typologies or digital business models are based on design or revenue strategies (Novak & Hoffman 2001; Schneider 2004; Schneider & Perry 2001; Wen, Chen &

Hwang 2001). A web site may be analysed based on these model descriptions and then classified as belonging to a particular type.

Various researchers have proposed phases or steps to represent the evolutionary adoption of e-Commerce by SMEs. PriceWaterhouseCoopers (1999) employed a categorization to examine the differences in perception between firms with different levels of e-Commerce capability. In an exploratory case study using the PriceWaterhouseCoopers staged model, Scupola (2003) concluded that the model did not take into consideration the changes in the company capabilities and business processes that have to take place in order to go from one level to the next of e-commerce capabilities.

Several other 'stages of development' models have also been formulated over the past few years to describe the increasing levels of IS/IT sophistication incorporated at each succeeding phase of the model. Amongst the ones identified by Prananto, McKay and Marshall (2003) are the E-Commerce Maturity Model (KPMG 1997), the Commitment-Implementation Matrix Model (Stroud 1998), the E-Commerce Levels (O'Connor & Galvin 1998), the E-Business Lifecycle Model (Berryman 1999), Intranet Maturity Model (Damsgaard & Scheepers 1999), E-Commerce Adoption Model (Daniel, Wilson & Myers 2002) and the Stages of Growth for e-Business (SOGe) model (Prananto, Marshall & McKay 2002). To classify a web site, its functionality is compared to those of the list and the level of growth incorporating the majority of its features is assigned to it. These capability levels recognize that firms typically evolve through successive stages of e-Commerce development, confronting different issues as they progress to higher levels of e-Commerce capability and activity.

Ho (1997) proposed a general framework to evaluate Web sites from the customer's perspective of value-added. Using a three by four dimensional matrix the purpose of a commercial web site is classified into three categories (promotion of product and services, provision of data and information, and processing of business transactions) and four types of value creation (timely, custom, logistic and sensational). Web sites can be analysed in sufficient detail to identify all its value-adding features (for example, items on sale, special offers, product announcements, general database search, customized news report etc.) and then classified using the framework.

Incorporating the above three levels of business process, Burgess and Cooper (2000) introduced the Model of Internet Commerce Adoption (MICA) on the premise that organisations typically start by initially establishing a 'presence' on the Web and then building on functionality over time as the level of technical skill/expertise in the use of Internet technologies increased. In addition, as Web sites grew in complexity, so would the number of the modules included into the site increase (Goi 2007). MICA was developed to explain how business Web sites develop to incorporate aspects of Internet Commerce incrementally (see Figure 1).

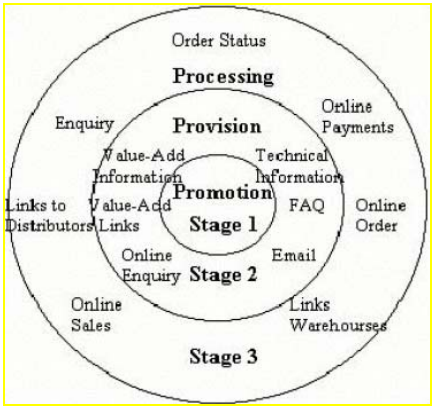

Figure 1: Model of Internet Commerce Adoption (MICA) (Goi 2007)

MICA was considered too simplistic by Boon et al. (2000) who developed the Modified Model of Internet Commerce Adoption (eMICA) by extending stage 2 (Consolidation) to allow for an even clearer distinction between sites.

Research Justification

From the above it is clear that a framework of e-Commerce sophistication can serve a number of purposes:

1. To describes the practices, services, components and technologies that any organization must perform in order to improve its customer experience;
2. To provide a yardstick against which to periodically measure an organization's level of sophistication and progress over time;
3. To establish a proven framework within which to manage the progression efforts.

An evaluation and assessment of an organization's website against a framework will determine the level at which the organization currently stands. It indicates the organization's maturity at a particular point in time and the practices on which the organization needs to focus in order to see the greatest improvement and the highest return on investment.

However, these models exhibit a number of shortcomings. They have largely been developed without a theoretical base and/or without adequate theoretical, psychometric, or empirical justification and therefore lacking in validity and reliability. For example, the empirical validation of the concept of 'stages' is limited (Prananto, McKay & Marshall 2003). There is also a lack of granularity of functionality in determining the various stages, and some have been critical for being too broad and simplistic to reflect the finer distinction between levels (Boon, Hewett & Parker 2000). As newer technologies emerge and new business services and processes are developed, existing models become increasingly inadequate in describing current reality. Also, those models that take a broad, strategic, organizational and backend business process perspective and emphasis are often difficult to operationalize.

No comprehensive instrument exists that describes actual website sophistication and development specifically in terms of available components, functionalities and technologies, and providing measures against the variety of perceptions of e-Commerce sophistication that exist. Furthermore, research to date has neglected consideration of functionality from the customer's perspective.

The next section describes the process used to develop a preliminary customer-focused framework of web site maturity.

Research Design

The development of the survey instrument was carried out in two phases. The first phase was **item creation**, the purpose of which was to create a pool of items that reflect available website components, tools, technologies, business processes and services and other functionalities typically available for use in commercial web sites. The list includes items that were directly accessible and available to website customers and on which they could reasonably be asked to make a judgement.

As a starting point, an initial list was created using items described in existing stages of development models together with ones identified by the authors from their own experiences in the field of website analysis and design. A hand-picked group of 10 experts and academics in the field of e-Commerce was then asked to help populate and refine the list resulting in a final count of 41 items. This process also ensured the content validity of the instrument.

The experts were then asked to describe, in their own words using keywords and phrases, each of the levels of sophistication in relation to the essential characteristics that distinguished one level from the next. With the experts supplying their own labels and definitions *a priori* the potential for "interpretational confounding" was minimized. For the purposes of this study, these responses, together with ones (such as FAQs, email, and payments) taken from the literature study discussed above were used to arrive at a generalized definition for each of the five stages.

The second phase in the process was **stage development**. The objective of this exercise was to have typical e-Commerce users sort the randomized items into the different levels of maturity, based on their assessment and understanding of the five levels. Items consistently placed within a particular stage would demonstrate convergent validity with the related stage or level of maturity. A web-based survey instrument was developed for this purpose and 15 post-graduate Faculty students participated in this aspect of the study.

A measure of both the reliability of the classification scheme and the validity of the items was developed for this research. The method required analysis of how many items were placed within each stage of maturity. In other words, because each item was included in the pool explicitly to determine its most likely appearance in a staged model of e-Commerce development, a measurement was taken of the overall frequency with which all survey

participants placed items within the intended stage. The higher the percentage of items placed in the target level, the higher the degree of inter-judge agreement across participants. Stages based on categories which have a high degree of 'correct' placement of items within them can be considered to have a high degree of construct validity, with a high potential for good reliability scores. It must be emphasized that this procedure is more a qualitative analysis than a rigorous quantitative procedure. There are no established guidelines for determining good levels of placement, but the matrix can be used to highlight any potential problems (Moore & Benbasat 1991).

The descriptions of the stages of development supplied by experts in phase one, together with those offered in the literature, were then analysed and consolidated into five levels (as shown in Table 1).

Table 1: e-Commerce sophistication level description (developed for this study)

Level	Type	Characteristics
1	BROCHURE	Basic website with static, limited content with primary intent to create a web presence for advertising and marketing purposes
2	CATALOGUE	Navigable product catalogue and or services offered with simple order form and offline payment options. Basic email capability.
3	TRANSACTION	Shopping cart, checkout and online ordering and payment via credit card. Minimum security.
4	REGISTRATION	Customer registration and login. Order tracking. Advanced security options. Alternate payment options.
5	PERSONALIZATION	Customized and customizable web pages. Innovative use of emerging technologies.

Each level includes a list of distinguishing features and none of the functionalities of levels succeeding it. It is assumed that each level includes the characteristics of the lower/preceding levels. These levels were used in phase two of the research as a basis for typical e-Commerce customers to match against from the given list of website features, technologies and services. A number of additional items, for example, blogs and RSS, were suggested particularly in relation to their innovative use for business purposes and these were included in the final list. The full list of items and levels as determined in phase two of the research is shown in Table 2.

The survey instrument was then administered and the responses from the sample of customers were then checked before importing them from the survey tool to a spreadsheet to calculate the proportion of responses for each item according to the five levels.

Results and Discussion

Adopting the strategy of accepting the highest percentage point at the lowest maturity level, the 41 items were clustered into the five levels as shown in Table 2. For some items, such as *direct bank transfer payment*, there was strong consensus on the level of sophistication. For other items, respondents did not appear to agree. For example, *multi-currency options* was equally ranked at levels 3 and 4; *email* was equally distributed to levels 1, 3, 4 and 5.

A significant number of items, particularly at the lower levels, do appear to fall largely within the expected levels of sophistication. The largest percentage of items (46%) was clustered around level 3 (see Figure 3). Items such as order tracking and alternate payment options that would have been considered emerging or state-of-the-art processes and technologies not so long ago appear at the lower levels of sophistication, suggesting a heightened level of demand and/or expectation of customers as familiarity with and use of these technologies increases over the period.

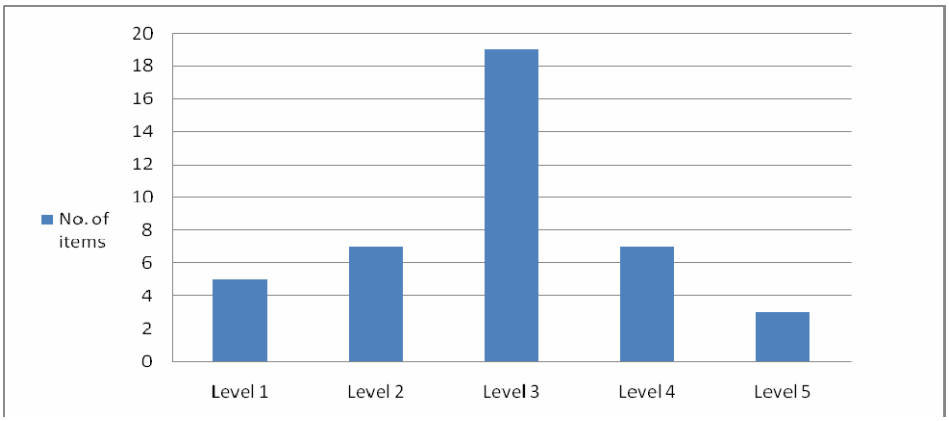

Figure 2: Item clusters and levels of sophistication

Despite the limitations imposed by a very severely restricted sample size, the results as shown in Table 2 arising out of the match of items with sophistication levels highlighted several issues:

- The high percentage of "Don't know" responses associated with some of the more recent innovations (for example, Blogs, Buyer authentication credit card processing and RSS) indicate either a lack of awareness of certain emerging technologies and processes or an inability on the part of the survey participants to associate them with particular levels. While it is likely more the former in the majority of the cases, the survey instrument will need to be modified to cater for these two possibilities.
- The existence of some features, though in existence for some time now, might not have been obvious from the given descriptions. For example, the awareness of SSL functionality might have been through the https protocol or an icon. Alternate descriptions need to be incorporated into the survey where such ambiguity or uncertainty may arise.
- Certain items need to be further elucidated (for example, what is meant by email marketing) in order to avoid any possible confusion in terminology.
- The number of items at level 5 has the potential to expand as innovative features are realized to take fuller advantage of the Web and customers become more familiar with their usage over time.

Using this framework websites can then be rated both in terms of their use of e-Commerce tools and from the perspective of the customer, offering opportunities to further analyse websites by such characteristics as industry type, business model and trust mechanisms. The framework and survey instrument can also be extended to analyse customer perceptions of websites in terms of demographics such as age, experience and gender, and customer website behaviour like trust, satisfaction and adoption levels.

Research Limitations

It must be noted, however, that there are some serious limitations with regard to the survey sample size. The tables presented should therefore be only regarded as an initial presentation of figures. These will be largely complemented and, for the sake of a coherent methodology, substituted by a more representative survey. Also, whilst care was taken to ensure that the sample of students selected to make the assessments were studying the same course, and therefore assumed to be at a similar educational level, there are other demographic factors that need to be controlled as people with different backgrounds can interpret levels of website maturity or complexity or features in very different ways.

Further Research

The framework will eventually comprise three components:

1. The e-Commerce Sophistication model;
2. e-Commerce characteristics/attributes available at different maturity levels;
3. The e-Commerce Sophistication model scorecard.

This framework can then be used to evaluate a website's features against the model to determine the level at which the organization currently stands from the perspective of prospective customers.

Summary and Conclusion

E-commerce websites undergo a number of stages of growth or levels of maturity in their evolution. While several models of e-commerce capability and maturity have been developed over the years most of them have identified the stages of growth in broad and/or strategic terms and typically from a merchant and/or business enterprise perspective rather than from that of the customer.

With advances in technology, and the availability of software development tools and new ways of enhancing the customer's shopping experience it is possible to determine the maturity level of a website in terms of the specific features/technologies/services it offers.

This research highlighted the stages of e-Commerce deployment leading to various degrees of alignment with business and marketing objectives and the technology and approaches needed to support this. The framework developed for this study distinguishes 'front office features' and 'back office functions' as regards customer perceptions of maturity levels and could be a useful tool to benchmark the maturity of electronic businesses at various stages of growth.

The aim was to provide a technique for categorising a website against a pool of possible website features with each level of sophistication representing an increased ability to offer enhanced online customer experience. It indicates the organization's maturity in the area concerned, and the practices on which the organization needs to focus in order to see the improved customer experiences.

Table 2: Inter-Customer Agreement on Level Placement (developed for this study) n=15

Item	Level 1 (%)	Level 2 (%)	Level 3 (%)	Level 4 (%)	Level 5 (%)	Don't know (%)
Graphics/Images	**47**	13	27		7	7
E-mail Marketing	**27**	27	20	13	13	
Customer support via Phone/Fax/Mail	**27**		27	27	13	7
Email contact	**27**	27	20	13	13	
Email	**20**	13	20	20	20	7
Simple demonstrations of buying process	13	**47**	12	20		7
Knowledgebase (FAQ)	20	**40**	13	27		
E-Newsletters	20	**40**	27	13		
Offline ordering		**34**	27	20	20	
Product Catalogue	34	**40**	20	7		
Search capabilities	13	**27**	13	27	13	7
Cookies	7	**20**	13	13	20	27
Instant Messaging		20	**33**	27	20	
Online Ordering with Shopping Cart		20	**34**	27	13	7
Order Tracking		7	**33**	33	13	13
Direct Bank Transfer payment option		20	**60**	13	7	
Shipping options		33	**40**	13	7	7
Encryption		13	**33**	13	20	20
Discussion Groups		13	**40**	27	20	
Security policies	7	7	**33**	27	27	
Multimedia demonstrations of Buying Process	7	20	**40**	20	13	
Money order payment option		20	**40**	27	13	
Trust mechanisms (third party)		13	**47**	13	7	20
One-Click payment option	7	7	**54**	20	13	
Offline credit card payment & authorization		20	**34**	34	13	
Multicurrency options	7	13	**27**	27	13	13
Return Policy	7	20	**40**	20		13
VbV and 3D Secure code	7	13	**27**	13		40
Blogs	7	7	**27**		20	40
SSL		13	**27**	7		54
COD Payment option		13	**40**	13		33
Online credit card payment & authorization		13	13	**54**	20	
P2P (e.g. PayPal) payment option		13	33	**40**	13	
Gift Vouchers payment option	7	20	27	**40**	7	
Cheque payment option		13	27	**54**		7

Item	Level 1 (%)	Level 2 (%)	Level 3 (%)	Level 4 (%)	Level 5 (%)	Don't know (%)
Customer Profile		7	27	**67**		
Loyalty Program		13	20	**27**	7	34
Customer Registration		20	27	**40**	13	
Customer Personalised Webpage		7	13	27	**47**	7
RSS		7	13	7	**20**	54
User Polls & Feedback	7	7	20	7	**20**	40

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