



# An Empirical Study on the Influencing Factors of Website Development in the Public Sector

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## ABSTRACT

A new framework for managing the Website development in the public sector is proposed and tested empirically with a sample of 65 city Websites. The framework consists of basic dimensions and a 2x2 matrix that is a simplified revision of the Mohammed et al. (2002)'s Marketspace Matrix. The 2x2 matrix includes development stages and design modes of public Websites. The four factors in the matrix, Publicity, Local Service, Differentiation and Participation, together with two basic dimensions of Attracting and Delivering in Simeon (2001), were proved to be important elements in a workable research framework. The effects of dimensions/factors and the role of the Attracting are discussed in depth.

## 1. INTRODUCTION

Public institutions as well as business organizations use the Internet to deliver a wide range of information and services at an increasing level of sophistication. "Governments will be leading users of e-business opportunities" (Jutla et al., 2002). E-government projects, the BEGIX of Bertelsmann Foundation(begix.de) and the Internet Resources Guide(govtech.net) are those examples with great attention.

However, Websites are so complex that it is difficult for governments to select proper tools from the Internet tool-kits, invest in more effective dimensions, and achieve innovative goals strategically. This paper proposes that we need a simpler method for developing the Website strategy for public institutions. The research objectives are twofold:

- (1) A simple framework for managing the Website development process is proposed and tested empirically with a sample of 65 city Websites. The framework consists of basic dimensions and a simplified version of the Mohammed et al.(2002)'s Marketspace Matrix.
- (2) The effect of dimensions/factors is tested by use of regression analysis. A special attention is paid to a basic dimension of online 'Attracting' that is important for public institutions which usually do not use offline advertising aggressively.

If we identify basic dimensions or factors and their causal relationships, we can construct a workable Balanced Scorecard(BSC) system for monitoring the Website development process. A famous example of BSC in the e-government sector is Bertelsmann Foundation's BEGIX, which was designed to evaluate overall e-government performance. We need some knowledge about the relationship among dimensions/factors to apply the BSC to the Website development in the public sector. This paper is organized as follows: theoretical review, designing the instrument, data collection and analysis, discussions and conclusions.

## 2. THEORETICAL REVIEW

Many researchers on e-Business address the stages of Website development process. Green (1998) suggests three stages: Attracting, Transforming, and Utilization of Media Technology. Simeon(2001) suggests the AIPD - Attracting(A) refers to online and offline strategies employed to get the Internet users to visit a Website; Informing(I) relates to the exchange of fundamental information about company and products; Positioning(P) refers to activities which show the service differentiation strategies of a Website; and Delivering(D)

highlights the technical infrastructure for the presentation and delivery of information and service.

Since Simeon's components are too much software-oriented and the Positioning may be an inappropriate concept for the public sector that lacks market competition, it is necessary to revise the components to find proper concepts for the public sector. Positioning can be replaced by the term 'Community' which means a network enabling its members to interact and providing services based on the differentiation strategies on a Website. Therefore, the AIPD will be replaced by AICD(Attracting, Informing, Community, and Delivering) in this paper.

Mohammed et al. (2002, p.556-580) developed a 5x4 matrix framework called 'Marketspace Matrix' by dividing marketing levers into five elements(Product, Price, Place, Communication, and Community) and by dividing the relationship phase into four stages(Awareness, Exploration, Commitment, Dissolution). "As the matrix is a newly developed tool, its use will continue to evolve" (Mohammed et al., 2002, p.563).

We select five from the nine dimensions of 5x4 matrix to construct a core of the framework in this paper as follows: The Exploration and Dissolution that are not salient in public institutions are eliminated; Three marketing mix elements in the original Marketspace Matrix, Product, Price and Place, are combined into a term 'Informing'; Awareness and Commitment are replaced by similar terms, Attracting and Empowerment. Hence, the core of the framework consists of a 2x2 matrix with two development stages(Informing and Community), two design modes(Communication and Empowerment) and a separate dimension, Attracting.

The Communication in this paper is a new term corresponding to the traditional concept of 'promotion', as defined in Mohammed et al.(2002, p.12). Marketing is still peripheral to the management of public services. It is important not to overemphasize the extent to which the marketing orientation has influenced the public sector(Walsh, 1994). Empowerment is one of the most frequently cited key words in the public sector. Drummond et al.(2000) discuss the market orientation in police services and explain the factors as including communication and empowerment. Bertelsmann Foundation(2001, 2002) emphasizes online participation supported by Internet tools such as online meeting place and online debate/voting. But we need a clear operational definition of the term of empowerment that seems somewhat vague.

Davis(1999) defines the community empowerment model as a model that has a mechanism to provide the community issues and decision-making information to its members, along with interactive support. Fourie(1999) suggests effective empowerment programs with directing by clear goals, providing tools, preparing relevant contents, user involvement and supportive climate. Marketplaces create community programs in a number of ways: message boards, forum, collaborative work tools and links(Kim, 2000; Lee, 2001).

Jutla et al.(2002) present a list of metrics for innovation and a model of government support for e-business readiness. Two items, the online transformation of services and the frequency of innovative new services, are selected from the list and their mean value is used as a dependent variable called 'Innovation(or INNOV)' in this paper.

Simeon(2001) shows that a regression of Informing, Positioning and Delivering on Branding Potential as a dependent variable is significant. How-

ever, the validity and significance of a four-factor model with AIPD were not examined because he believed that Attracting often involved a wide range of non-Internet strategies. But it is important to study the role of online Attracting. Some would argue that awareness or attracting is the key of success in today's online business. Mohammed et al.(2002, p.208) argue that focusing on customer experience is "the single most profitable thing". The customer experience relates to Community and Empowerment rather than Attracting.

**3. DESIGNING THE INSTRUMENT**

In general, there are so many criteria that studying on the Website evaluation model seems to be complex. For instance, a table of the criteria presented on WorldBest.com(worldbestweb sites.com/criteria.htm) includes more than one hundred items relating to design, functionality, contents, and many others. But a systematic study based on a simpler list becomes possible if we focus on a few strategic factors and modify Simeon(2001)'s components as following:

*Attracting* consists of the following five items to measure the utilization level of tools on a homepage used to get Internet users to have a good impression on the Website:

- Design of Logo and Tagline(quick summary of what a Website is all about)
- Graphics(e.g., layout, color and figures of a homepage)
- Institution's Self-advertising(e.g., banner, button, interstitials)
- Services for Attracting(e.g., quiz, lottery, e-card, maps, weather, channels, download service)
- Contents for Attracting(e.g., entertainments, culture, tourism, game, kids, health, gallery)

*Informing* consists of eight items developed by modifying Simeon(2001)'s components: Local Links, Contents for Publicity, Reports, Descriptions on the Institution, Descriptions on Online Administrative Services, Projects, Contact Information and Counseling.

*Community* consists of 11 items: Online Forum, Events, Partner Links(or Ads.), e-Magazine(or Newsletter or Webcast), Message Boards, Users' Participation(e.g., articles, photos, personal links), Focus of News, Vision(or values), Domain Identity, Community Services(or online support for community meeting or networking), and Contents for Learning. We can use a good example for rating each item, for instance, 'Citizen Discussion Room' of Ulsan City(eulsan.go.kr) as a benchmark example for Online Forum System.

*Delivering* is measured on dichotomy (1 or 0) depending on the presence or absence of features for each item. A simple list of nine tools that are fundamental and easy to check is: Search Engine, Mailing List, Framework, Multimedia, Password System, FAQ, Chat, Downloadable Publications and Update Indication.

*Innovation*: Public institutions have to utilize the Internet for actual service innovation. Hence, two variables indicating the innovation results are selected: the e-transformation level of existing services and the frequency of new innovative services. They are rated on a five-point scale: "Never(1), Only Descriptions(2), Online Request(3), Partial(4), Full Processing(5)" for the first item and "Never(1), ..., Many New Systems(5)" for the second item. Such quantification is possible because the introductions of new innovative systems on the public Website are prevailing, to name a few, Docket Access, View Property Assessments, and Request for Proposals of Philadelphia(phil.gov) and Citizen Assessment Systems, Citizen Satisfaction Monitor, OPEN(Online Procedures Enhancement) System of Seoul(metro.seoul.kr).

Every item except Delivering is graded on a five-point scale. The components in Informing can be summarized by two sub-dimensions: basic information about institution, products and local services and extended information for contacting and counseling. On the other hand, Community includes more diverse sub-dimensions representing online meeting-place, tools for relationship-building and differentiated promotion. The Communication or Empowerment items are not shown on the above lists, since the lists were developed according to the four stages of AICD. But it is expected that they will be identified explicitly at the following factor analysis.

**4. DATA COLLECTION AND ANALYSIS**

This paper focuses on the test of models through inspecting small number of well-developed Websites in detail, not on the comparative study by a large-scale survey. Therefore, we confine the sample units to cities, counties or states that usually have close relationships with locals/ citizens. We also con-

fine the scope to the Websites written in English or Korean, considering the language ability of inspectors. Hence, a sample of 65 official Websites is selected: 28 winners/finalists of the Best of the Web 2000 and 2001(centerdigitalgov.com), 26 Korean best city sites(100hot.co.kr), and 11 worldwide cities(officialcitysites.org).

Six teams of 23 graduate students who are enrolled on e-Business and Internet Marketing classes worked together to inspect the Websites during August-November 2002 by using the inspection method explained in Cunliffe(2000). SPSS 9.0 for Windows was used to analyze the data. Cronbach's  $\pm$  values indicating the scale reliability for the dimensions in Section 3 are 0.780 for Attracting, 0.653 for Informing, and 0.748 for Community. Moderately low value of  $\pm$  for Informing is due to Contact Information and Counseling. But because  $\pm$  is greater than 0.6 and it is expected that the roles of the two items may be important, all the 24 items in A, I, C are used together to extract factors.

Table1 shows a result of the factor analysis. After all, Contact Information, Counseling, and Message board are deleted in Table1 due to their low reliability ( $\pm < 0.6$ ). The Message Board is generally considered as an important tool for allowing people to meet on a Website(Kim, 2000, p.33). However, it was inevitable to delete it because it is so singular that the difference between countries is significantly large; Korean Websites use Message Boards very much and actively whereas foreign Websites hardly use it.

The five factors in Table1 are named Differentiation(DI), Attracting(A), Participation(PA), Pub-licity(PR), and Local Service(LS), respectively, to represent the meaning of items loaded high on each factor. For the development stage, Informing is divided into two factors PR and LS, and Community is divided into two factors DI and PA. We can also interpret the factor structure in a view of Website design mode for public institutions. PR and DI correspond to the concept of 'Communication' and LS and PA correspond to the concept of 'Empowerment'.

As explained in Section 2, Communication refers to promotion or differentiation in traditional Marketing while the Empowerment refers to participative problem solving. Therefore, the 2x2 matrix shown in Table 2 is proved to be workable framework for the study. The reliabilities for five factors in Table1 and four dimensions in Table 2 are larger than 0.6, which is a generally acceptable level for an exploratory study. To develop a measure for each factor/dimension, we define the degree of closeness of  $x_i^k$  (= the level of attribute  $i$  attained by Website  $k$ ) to ideal value  $x_i^*$  as a membership function  $d_i^k$ . If  $x_i^*$  is a maximum,  $d_i^k = x_i^k / x_i^*$  (Zeleny, 1982, p.159). Hence, the following measures are formulated:  $d_A = X_A / 25$ ,  $d_I = X_I / 30$ ,  $d_C = X_C / 50$ ,  $d_D = X_D / 9$ ,  $d_{PR} = X_{PR} / 15$ ,  $d_{LS} = X_{LS} / 15$ ,  $d_{DI} = X_{DI} / 30$ ,  $d_{PA} = X_{PA} / 20$ ,  $d_{CC} = X_{CC} / 45$ ,  $d_{EM} = X_{EM} / 35$ . Table 2 summarizes the results of the regression analyses to answer the research questions. A discussion based on the results will be followed in Section 5.

**5. DISCUSSIONS**

Many public Websites show active utilizations of the tools for attracting. Good examples are Button Licensing, My California, Web Winner, Contest and Lottery of California State(ca.gov) and e-Card, Quiz, Awards, Channel and Lottery of Washington State(access.wa.gov). But the mean value of 59% for Attracting is very low and its variation is very large. Although there are some cities like New York(home.nyc.gov), Taegu(daegu.go.kr) and Pohang(ipohang.org) showing excellence in all dimensions, many cities are

Table1. Factors in the Dimensions A, I, C for Public Institutions (n=65)

Component Items	Factor 1 DI	Factor 2 Attracting	Factor 3 PA	Factor 4 PR	Factor 5 LS	Cronbach's $\alpha$
Focus of News	.742					.796
Domain Identity	.738					
Community Services	.717					
Events	.640					
Contents for Learning Vision(or Values)	.526 .446					
Institution's Self-advertising Logo and Tagline		.793 .730				.780
Services for Attracting		.692				
Graphics		.677				
Contents for Attracting		.650				
Online Forum			.723			.647
Users' Participation			.701			
e-Magazine Partner Links(or Ads.)			.584 .529			
Projects				.835		.677
Contents for Publicity Descriptions on Institution				.761 .551		
Descriptions on Admin. Service Reports					.730 .598	.637
Local Links					.455	

Table2. 2x2 Matrix by Development Stages and by Design Modes

Design Modes Stages	COMMUNICATION (CC) 9 items, $\alpha = 0.799$	EMPOWERMENT (EM) 7 items, $\alpha = 0.647$
INFORMING (I) 6 items, $\alpha = 0.700$	PUBLICITY(PR): Descriptions on Institution Contents for Publicity Projects	LOCAL SERVICE(LS): Descriptions on Admin. Services Local Links Reports
COMMUNITY (C) 10 items, $\alpha = 0.779$	DIFFERENTIATION(DI): Events Focus of News Domain Identity Vision or Values Community Services Contents for Learning	PARTICIPATION(PA): e-Magazine Partner Links Online Forum Users' Participation

unbalanced between Attracting and other factors. For example, the Attracting is poor compared with other excellent dimensions in Boston City(cityofboston.gov), Virginia State(vipnet.org) and Montgomery County(montgomerycounty md.gov), and the cities vice versa can be easily found.

The first four models, Model 1-Model 2' in Table 2 show whether each input variable is influential or not on the innovation level. Both main dimensions(Communication and Empowerment) in Model 1' and four factors(PR, LS, DI, and PA) in Model 2' are all significantly influential. But the p-value of Attracting is 0.09 in model 1 and 0.114 in model 2.

It means that colorful designs and attracting features of a homepage have not necessarily anything to do with innovation. This message can offer a good piece of advice for managers of Websites. Considering the arguments in the literature, this result has an important meaning. Some emphasize the maximization of the loads in a home or opening page(Lapham, 1995). Others emphasize the importance of simplicity of the homepage repeatedly(Easton, 1999). This study can give an answer to these arguments. Attracting and Delivering are strongly emphasized in many cases, but the fact that those have not necessarily an influence on innovation should be acknowledged.

However, Attracting cannot be entirely ignored due to a skeptical result. There are notable opinions like "The Web is still a developing medium, with no firmly established standards for either presenting advertising or measuring its effectiveness"(Black, 2001) and "The choice of tools must be consistent with positioning choice or learning trends" (Mohammed et al., 2002, p.578). The possibility that Attracting has a significant influence on major dimensions depending on the phases of Website development(starting phase or maturity phase) and the types of organizations(businesses or nonprofit organizations) should be considered. So at the next step, we can study on the question what the effects of Attracting and Delivering on other factors than innovation, are.

The results of a regression of A and D on each I, C, CC, or EM are summarized as the following: Delivering has influences on all the four dimensions: Attracting has an effect on C and EM. As shown in Table 3, although R<sup>2</sup> values are moderately low, both Attracting and Delivering have a positive impact on C in model 3 and on EM in model 4, respectively. Because Delivering

Table3. A Summary of Regression Analyses

Model	Dependent Variable	Independent Variables	Unstandardized		Standardized $\beta$	p	$\square$	
			B	Std. Error			Adjust R <sup>2</sup>	p
1: Modes & A, D	INNOV	constant	-.771	.346		.030	.757	.000
		d <sub>cc</sub> communication	2.202	.439	.391	.000		
		d <sub>em</sub> empowerment	3.280	.591	.493	.000		
		d <sub>a</sub> attracting	.570	.331	.126	.090		
		d <sub>b</sub> delivering	.329	.383	.061	.394		
1': Modes	INNOV	constant	-.597	.329		.075	.747	.000
		d <sub>cc</sub> communication	2.147	.434	.381	.000		
		d <sub>em</sub> empowerment	3.927	.513	.591	.000		
		d <sub>a</sub> attracting						
		d <sub>b</sub> delivering						
2: Factors & D	INNOV	d <sub>pr</sub> publicity	1.038	.378	.196	.008	.753	.000
		d <sub>ls</sub> local service	1.098	.554	.164	.052		
		d <sub>di</sub> differentiation	1.420	.405	.306	.001		
		d <sub>pa</sub> participation	1.976	.358	.445	.000		
		d <sub>a</sub> attracting	.540	.337	.120	.114		
		d <sub>b</sub> delivering	.244	.395	.045	.539		
		constant	1.096	.368	.207	.004		
2': Factors	INNOV	d <sub>ls</sub> local service	1.200	.557	.180	.035	.747	.000
		d <sub>di</sub> differentiation	1.388	.408	.299	.001		
		d <sub>pa</sub> participation	2.336	.303	.526	.000		
		d <sub>a</sub> attracting						
		d <sub>b</sub> delivering						
3: A, D on C	Community	constant	.294	.089		.002	.225	.000
		d <sub>a</sub> attracting	.223	.096	.273	.023		
		d <sub>b</sub> delivering	.325	.114	.334	.006		
4: A, D on EM	Empowerment	constant	-.357	.069		.000	.323	.000
		d <sub>a</sub> attracting	.269	.074	.396	.001		
		d <sub>b</sub> delivering	-.257	.088	-.318	.005		

refers to the technical infrastructure for the presentation and delivery of information and service, it can be easily inferred that it has an effect on the main dimensions, Informing, Community, Communication and Empowerment. Unlike Delivering, Attracting does not show wide effects and has influences on Community and Empowerment. Since Attracting represents users' look-and-feel about a Website, it would have strong connection with Community and Empowerment, which encourage users to stay and participate.

6. CONCLUSIONS

Main dimensions/factors for the public Website development are found theoretically and empirically. Two new perspectives augment the existing AIPD framework(Simeon, 2001) to study the Website development process in depth: (1) The design modes of Communication and Empowerment and (2) A 2x2 matrix including two development stages and two design modes of public Websites, which is a simplified revision from Mohammed et al. (2002)'s Marketplace Matrix. Four factors in the 2x2 matrix, Publicity, Local Service, Differentiation, and Participation, together with two basic dimensions of Attracting and Delivering, are proved to be important elements in a workable research framework. And subtle subjects like the effects of dimensions/ factors and the role of Attracting were discussed.

Because the cyber space has not shown any determined shape through the short periods of the introduction and the spread, it is hard to set up a universal model or to deduce a general rule. Therefore, proper case studies or modifications of the model need to be continuously tried. This exploratory study has its limits in instrumentation, sampling, and the narrow range of selected category. If the approach presented here is applied to other categories or fields, the component items and scales need to be modified appropriately.

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