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Abstract

In this paper we propose and test a model of the stages through which firm websites become more advanced. The advancement of a website is reflected in the goals firms pursue with it. Since websites are used by customers during their decision process, we derive the website goals from the customer service life cycle. The concept of website advancement stages assumes that the website goals form one or more goal hierarchies. A goal hierarchy implies that a firm that pursues simpler goals may or may not pursue more advanced goals, but that a firm that pursues advanced level goals also pursues the more basic goals. We present the results of an empirical study of 380 firms with a website, sampled from a wide range of industries. Using the generalized partial credit model, we find two separate hierarchies of website development, namely a transactional and a relational dimension, each having three stages. The findings of this study offer insights to managers for advancing their websites and building sites with improved customer oriented strategies.

Keywords: website advancement, website goals, goal hierarchy, e-commerce, generalized partial credit model

1   Introduction

The expansion of the Internet into a vast interactive communication medium of global proportions has made it a vital marketing and sales medium for many firms. These new circumstances have forced managers to seek guidelines on how to act effectively in the electronic marketplace. In order to develop customer-oriented e-commerce strategies, it is essential for managers to understand what the

customers' needs are in the online environment (Heinze and Hu, 2006). Firms are improving websites on a continuous basis, and managers observe the moves of their competitors in terms of their web presence and strategies (Wu et al., 2003). A firm may start with a simple website that presents only general information about the firm and its products. Over time, as a firm acquires more knowledge about the Internet, improves its technological infrastructure, and its customers gain more experience with incorporating the Internet in their purchase processes, the firm's website could gradually become more advanced (Willcocks et al., 2000; Teo and Pian, 2003). The site may then enable customers to order or to monitor order fulfillment online (tracing & tracking). Hence, it seems logical that firms adopt the Internet stage-wise and that these stages can be described in terms of the online support to customers. Therefore, we assess the stages of website advancement based on its goals to facilitate the customer purchase process.

Our study builds on the notion that firms can use their websites for different purposes. Thus, firms might differ in terms of their level of web adoption. Teo and Pian (2003) stated that Internet technology may be used in different ways by different firms depending on the goals of their websites. This implies that different firms can have different website goals. The objective of our study is to determine stages of website advancement based on the hierarchy of website goals. A goal hierarchy implies that a firm that pursues simpler goals may or may not pursue more advanced goals, but that a firm that pursues advanced level goals also pursues the more basic goals. Thus, a hierarchy of website goals leads to stages in the advancement of websites, where website advancement for a firm can be derived from the goals being pursued. A goal hierarchy implies that different firms pursue website goals in the same fixed order. Identification of this order has important implications for website development. It may guide firms in their continuous search for improvement of their website, and it may enhance our understanding of their current Internet use as a phase in an extended process.

We contribute to existing literature in a number of ways. First, we define website goals from a customer's point of view. Often the rationale for a stages process was more technically oriented (e.g. Srinivasan et al., 2002), but we explicitly consider websites as customer support tools. Websites are built for customers, and therefore we derive possible website goals from the customer service life cycle (Ives and Mason, 1990). This framework segments a customer's relationship with a firm into stages similar to the Engel et al. (1995) consumer purchase model, namely into the stages: requirement, acquisition, ownership and retirement. The goals we distinguish are directly linked to the various phases of the customer purchase process.

Second, we adopt an innovative modeling approach, namely a latent class extension of the generalized partial credit model (Muraki, 1992; Vermunt, 2001; Von Davier and Yamamoto, 2004) that combines latent class analysis and item response theory. We assess simultaneously: 1) the stages of website advancement, 2) the hierarchy of website goals. This methodology allows us to test whether a single hierarchy exists (as is usually assumed in website stages models), or whether the data is better described by distinguishing multiple hierarchies. Hence, contrary to extant research, we do not a priori determine the number of dimensions of website advancement nor do we fix the number of stages. Our

modeling approach, described in section 3.3, allows us to test and compare alternative representations, i.e. models with different numbers of dimensions and stages. In particular, following Zhu and Kraemer (2002) and Levy and Powell (2003) we explore whether website advancement is a multi-dimensional concept by formally testing whether the data on website goals represents one or multiple hierarchies. The conceptual model is tested in an empirical setting with data from 380 firms with websites that range from being rather basic to very sophisticated. We obtain our sample from a wide range of industries.

The structure of this paper is as follows. In the next section, we present our conceptual model and review the theoretical perspectives behind our model. Next, in section 3, the research design is described, including data collection and data analyses. Subsequently, the results are presented. Finally, in section 5, we discuss the implications of our findings.

2 Conceptual framework

2.1 Stages of website advancement

Several researchers have studied the adoption of IT-based innovations, see Forman and Goldfarb (2006) for a comprehensive review. Lassila and Brancheau (1999) studied these processes over time and identified stable periods of utilization that are disturbed by internal and external triggers of change. One major change trigger for firms in any industry is the advent of the Internet (Lyytinen and Rose, 2003). While firms explored the opportunities of the new medium, researchers focused on various aspects of e-commerce adoption. For example, Dehning et al. (2004) studied the value of the announcement of e-commerce initiatives, Chircu and Kauffman (2000) distinguished between potential and realized value of e-commerce, and Lee and Grewal (2004) developed a theoretical framework to comprehend the connection between strategic responses to the Internet and firm performance. Many studies examined the impact of potential antecedents, such as the perceived strengths and weaknesses of e-commerce (Beatty et al., 2001), organizational factors (Chatterjee et al., 2002), and e-commerce capabilities (Zhu and Kraemer, 2002). Hong and Zhu (2006) provide a more comprehensive overview of e-commerce adoption studies. To derive guidelines for effective web applications, several scholars have proposed stage models in which e-commerce adoption is described as a phenomenon with various levels of advancement. Dichotomous classifications were used by both Lee and Grewal (2004) and Dholakia and Kshetri (2004) when comparing firms with an informational website and a transactional site. A more elaborate model was proposed by Bégin et al. (2001). They found three levels of advancement, with firms having informational, promotional or transactional websites. Daniel et al. (2002) found four clusters of firms, which they labeled as developers, communicators, web presence, and transactors. At the successive levels, firms perform a higher number of e-commerce activities. Teo and Pian (2004) proposed a stages model based on different business objectives and distinguished between five levels, ranging from email adoption to business transformation. In the empirical part of their study, they used self-reported grouping by showing respondents descriptions of each level. Teo and Pian (2004) profiled each level by the extent to which certain website features are provided on these websites.

In contrast to previous studies, Levy and Powell (2003) distinguished between two underlying drivers of e-commerce advancement, namely business growth and business value of the Internet. With two levels in each dimension, they constructed a 2x2 matrix, containing four different categories of websites, each fitting a different business context. The extremes are labeled 'brochureware' (no business growth expected and low business value of the Internet) and 'business development' (growth expected and high business value of the Internet). Zhu and Kraemer (2002) also considered e-commerce as a multi-dimensional phenomenon. Regarding customers, they made a distinction between the three dimensions: information, transaction and interaction. In this paper, we build on this notion that a website can become more advanced in different directions.

Although the various stages models have similarities, there are also clear differences. An important distinction is that the stages can be based on different factors. A stages model can be based on technical issues, business objectives, or the customer support provided. In this paper, we study website advancement stages based upon the support the website provides to customers. Therefore, we derive website goals from the customer purchase process. A customer-oriented firm focuses efforts and resources to satisfy customer needs and places a high priority on continuously finding ways to also deliver customer value via websites. Thus, knowledge of the customer purchase decision process should drive the design of a website (Huizingh, 2002). By understanding the various phases customers go through when making purchases, firms can determine what kind of support they can or should offer in their websites.

2.2 Website goals

Most customers follow the same process when making a purchase and using a product (Engel, Blackwell and Miniard, 1995). To capture this general process, Ives and Mason (1990) proposed the customer service life cycle (CSLC) model, and studied how information technology can be used to improve customer service. Saeed et al. (2005) applied the CSLC model to investigate the support of web sites in delivering customer service at various stages of the purchase process. The CSLC model covers the stages of requirement, acquisition, ownership and retirement. In the requirement stage customers formulate their needs and explore which products and suppliers could possibly satisfy their needs. In the acquisition stage the customer obtains a product and major activities include ordering, payment and delivery. The ownership stage is concerned with product usage, operation, service, repair and maintenance.

As websites could play a more or less important role throughout the CSLC, we adopt this model to examine website advancement. For the first three CSLC stages, we derived website goals (Table 1). The retirement stage is outside the scope of this study, because we focus on customer support in the purchase and usage process. For the requirement stage we formulated two goals: improving the firm's image and assisting product selection. It is important that websites convey and support the image of a firm to increase the buyer's propensity to consider the firm as a potential supplier. An overview of available products, detailed information about these products and tools to review the products are helpful instruments in supporting customers in articulating their needs in terms of desired product attributes and in selecting products to be included in the consideration set.

For the acquisition stage we defined four goals: online ordering, online payment, online delivery, and order progress information. These four goals are directly related to the major activities in this stage of ordering, payment and delivery. For the ownership stage we identified two goals: after-sales services and strengthening relationships with customers. After-sales services are intended to support customers when using, repairing or maintaining the product. The other goal, relationship strengthening, recognizes the increased importance of the relational component of business exchanges. In summary, we derived eight website goals based on the three stages of the customer service lifecycle (Table 1). Next, we conceptualize the degree of website advancement as the degree to which these website goals are pursued by a firm. For example, in the initial stage of website advancement, a firm has to focus on basic goals, whereas (virtually) all website goals are pursued by firms in the most advanced stage of website development.

Table 1: Customer service life cycle stages and corresponding website goals

Customer service life cycle stages	Website goals
Requirements	**1. Image building** *(Image)* **2. Assisting customers in selecting products** *(Product selection)*
Acquisition	**3. Online ordering** *(Ordering)* **4. Online payment** *(Payment)* **5. Online delivery** *(Delivery)* **6. Information about order progress** *(Order progress)*
Ownership	**7. After-sales services** *(After-sales)* **8. Strengthening relationships with customers** *(Relationships)*

3 Study design

In order to test the conceptual framework, we used a mail survey to collect data from Dutch firms that have a website. Using commercially available contact information, provided by the Dutch database firm Cendris, 1600 firms were sampled. All firms have more than fifty employees and they operate in a wide range of industries. Our respondents were mainly CEOs and marketing managers. The questionnaire was pre-tested by three marketing managers. Based on the feedback, some items in the questionnaire were re-worded. Three weeks after distributing the first mailing, a reminder was sent to non-respondents. Both mailings included a personalized cover letter, a self-administered questionnaire, and a postage-paid envelope. To stimulate participation in the study we organized a lottery in which the survey respondents could win a free market research project. This procedure resulted in 380 usable questionnaires, giving an effective response rate of 24 percent. Table 2 presents descriptive statistics of our sample, and Table 3 presents the website goals frequencies.

The eight website goals were measured by asking the respondents how important each of these goals is for their website (on a five point scale ranging from 1, is not important at all, to 5, is very important). This yielded eight polytomous response variables.

Table 2: Profile of the firms and websites in the sample

Firm size	Small	41 %
	Medium	33 %
	Large	26 %
Market share	Market leader	29 %
	One of the larger firms	59 %
	One of the small firms	12 %
Technological	=< 20	27 %
opportunism	21 – 25	39 %
	26 – 30	26 %
	31 – 35	9 %
Marketing department	Yes	63 %
	No	37 %
Website age	< 1 - 2 years	19 %
	3 – 5 years	40 %
	6 – 7 years	25 %
	8 – 10 years	14 %
	>= 11	1 %

Industry	High information intensive	46 %
	Low information intensive	54 %
B2B/B2C market	B2B	80 %
	B2C	20 %

Table 3: The website goals frequencies

	Importance ratings		
Website goal	*% larger than 3*	*Mean*	*Standard deviation*
Image	.88	4.3	.74
Product selection	.66	3.8	1.11
Ordering	.27	2.5	1.43
Payment	.06	1.49	.93
Delivery	.34	2.53	1.61
Order progress	.09	1.67	1.08
After-sales	.20	2.27	1.26
Relationships	.59	3.54	1.14

3.1 Model

The purpose of our analysis is to classify firms into stages of website advancement on the basis of the website goals they pursue. Furthermore, we intend to assess whether one or more hierarchies underlie the website goals. To achieve this latter objective, we apply the Generalized Partial Credit Model (GPCM; Muraki, 1992) which is a polytomous Item Response Theory model (IRT; Embretson and Reise, 2000). GPCM is appropriate for analyzing attitude items where subjects responded to statements on a multi-point scale. In particular, we apply a latent class extension of GPCM (Vermunt, 2001), as available in Latent GOLD 4.0 (Vermunt and Magidson, 2005a and 2005b). Latent class models assume that the observed cases belong to one of multiple groups. These groups form a discrete latent factor, because the classification of firms into groups is not actually observed. Hence, the combination of GPCM and latent class models (LC-GPCM) exactly matches our research objectives.

4 Results

4.1 Model selection

To determine the optimal model we estimated a large number of models with varying numbers of discrete factors and levels. In particular, we estimated models with up to three discrete dimensions and with up to five levels per dimension. According to the lowest BIC decision rule (Andrews and Currim, 2003), the preferred model contains two discrete factors with three levels in each factor. Therefore, the results of this model will be presented in the next subsections.

4.2 Dimensions of website advancement

Table 4 shows the percentages of firms having websites in each advancement level in both discrete factors.

Table 4: The percentage of websites in 3 levels of 2 discrete factors

Website advancement level	*Discrete factor 1*	*Discrete factor 2*
Level 1	42 %	17 %
Level 2	39 %	67 %
Level 3	19 %	16 %

Next, we identify which website goals significantly relate to each discrete factor (Table 5). In particular, we examine which goals have significant alphas. If the alpha (the slope parameter) is significant it indicates the strength of the effect of the discrete factor on the website goal. In addition, the factor loading is an important indicator of the strength of the relation between a website goal and a particular discrete factor. Only if these two indicators, significance and substantiality, are satisfactory, will we utilize the goal for interpretation of that discrete factor.

Table 5: Model results: Website goals discrimination, Wald statistics and loadings per discrete factor

Website goal	Discrete factor 1: Transactional			Discrete factor 2: Relational		
	Slope parameter α_j	Wald statistic	Loadings	Slope parameter α_j	Wald statistic	Loadings
Image building	-0.05	0.06	-0.015	0.93	6.26	0.207
Product Selection	1.23*	34.97	0.404	0.36	2.09	0.100
Ordering	6.15*	26.79	0.880	0.84	1.63	0.080
Payment	3.16*	48.17	0.599	1.30*	10.46	0.187
Delivery	1.75*	32.68	0.664	0.43	2.59	0.113
Order progress information	2.33*	44.65	0.528	2.22*	29.69	0.372
After-sales service	2.23*	12.21	0.395	5.04*	14.02	0.678
Strengthening relationships	0.59*	7.23	0.161	2.42*	17.24	0.560

In the first discrete factor the goal ordering has the highest alpha, followed by payment, order progress, after-sales service, delivery, selection process, and strengthening relationships. The p-value of the goal image is larger than 0.10, thus this goal is not significantly related to this factor. Although the alpha for the goal strengthening relationships is significant, its loading on the first factor is quite low (< .2), implying that the relation with the first factor is weak. Therefore, interpretation of the first discrete factor is based on the following goals, in order of relevance: ordering, payment, order progress, after-sales service, delivery, and product selection. Based on these goals we label this discrete factor as the *transactional* dimension.

In the second discrete factor the goal after-sales service has the highest alpha, followed by strengthening relationships, order progress, payment, and image building. The following goals are not significant for this factor: delivery, ordering, and product selection. Furthermore, of the significant goals, payment has a relatively low loading (< .2) and will therefore be discarded. To conclude, the second discrete factor covers four website goals: after-sales service, relationships strengthening, order progress information, and image building. Based on these goals we label this discrete factor as the *relational* dimension.

The most appropriate model (with the lowest BIC) has three levels for both dimensions. To facilitate interpretation of the website advancement stages defined by these two discrete factors, Table 6 displays the average importance ratings per website goal for each level of each discrete factor.

Table 6: The website goals mean importance for levels in discrete factors 1 and 2

Website goal	Discrete Factor 1: Transactional			Discrete Factor 2: Relational		
	level 1	level 2	Level 3	level 1	level 2	level 3
Image building	x	x	x	4.02	4.32	4.53
Product selection	3.30	4.00	4.45	x	x	x
Ordering	1.23	2.75	4.63	x	x	x
Payment	1.06	1.35	2.71	x	x	x
Delivery	1.36	2.60	4.18	x	x	x
Order progress	1.18	1.65	2.78	1.18	1.60	2.45
After-sales service	1.78	2.38	3.06	1.14	2.14	3.90
Strengthening relationships	x	x	x	2.37	3.65	4.42

4.3 Hierarchies of website goals

The transactional and relational dimensions are presented in Figures 1 and 2, respectively. For each dimension, we present only those website goals that are relevant for that dimension, based on the alpha parameters and factor loadings (Table 5), and each website goal is presented by its mean importance rating per advancement stage (Table 6). The vertical axis in Figures 1 and 2 represents website goal importance, the horizontal axis shows website goals. The figures depict the three levels of website advancement in the transactional, respectively relational dimension. Hence, both figures highlight the extent to which the various website goals are pursued in each website advancement stage. Then, knowing the goals pursued in each level, we derive the order in which website goals are pursued simply, by placing the goals from level 1, as initial goals, followed by the goals pursued in level two and then three. As the end result, we obtain hierarchies of website goals for the transactional and relational dimensions. The website goal hierarchy for the transactional dimension is as follows: product selection, ordering, delivery, after-sales, order progress and payment. The website goal hierarchy for the relational dimension is as follows: image building, strengthening relationships, after-sales service, and order progress. The two hierarchies assume that websites that have realized simpler goals may or may not pursue more advanced goals, but that all websites at the advanced level also pursue the more basic goals.
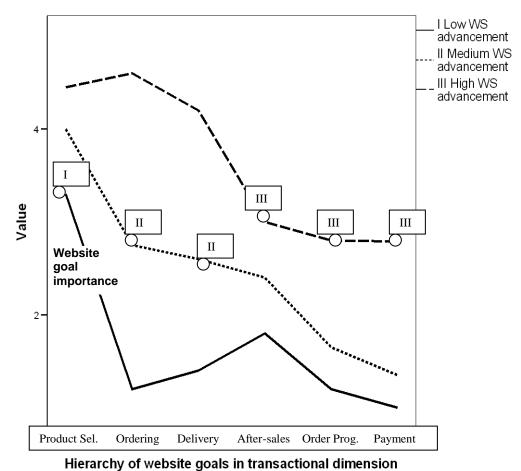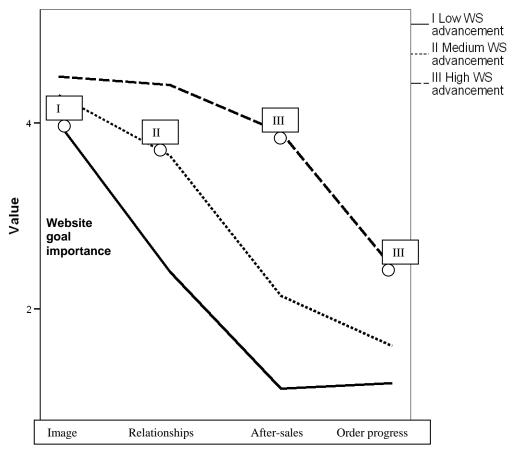
Figure 1: Hierarchy of website goals in transactional dimension

Figure 2: Hierarchy of website goals in relational dimension

5 Conclusion and discussion

By means of this study, we extend prior research in three ways. First, we formulate website goals based on the customer purchase process. In this way our findings can assist in developing customer-oriented website strategies. Second, we test explicitly for the presence of one or more hierarchies in pursuing website goals. Our findings show that website advancement is a two-dimensional concept. Contrary to some other studies (e.g. Wu and Lee, 2005) which discuss Internet only as a communication channel, we show the complete picture of Internet usage for marketing purposes. We demonstrate possible website development in two dimensions: transactional and relational.

The two hierarchies we derive based on website goals are in line with the previous research using different approaches. Daniel et al. (2003) identified four sequential stages of e-commerce adoption, where firms at a specific stage undertake all activities of the previous stages and some additional. The third stage adds receiving orders online, as it is our medium level of the transactional dimension. Firms at the most advanced stage add after-sales service and payment capabilities, which is again similar to our findings. Daniel et al. (2003) suggested that the companies in the third stage were about to develop transactional capabilities in addition to the information-providing. Lee and Grewal (2004) discussed adopting

the Internet as communication channel and as sales channel. Hence, they also perceive the communication channel as an initial step before adopting a sales channel. The channels are recognized as consecutive steps of development stages. Our study deviates from these and other studies by specifying two separate dimensions of website development. Our empirical findings indicate that website advancement should be treated as two related but different sequences of e-commerce adoption: transactional and relational aspects.

This study contains some useful findings from the managerial perspective. First, our results allow a firm to determine the current status of advancement of its website which is crucial for a designing an Internet strategy. Second, the results of this paper suggest which goals could be pursued given the current stage of a firm's website. Business practice provides many examples of company websites that went through a change process, for example by implementing transactional components (TWICE, 2000). Alternative strategies can be derived from our goal hierarchies depending on whether one intends to improve on the transactional or the relational dimension, or perhaps on both simultaneously.

We note certain limitations of this study and suggest some directions for further research. First, a performance measure has not been included in this study. Future research could test how performance is related to the transactional and relational goal hierarchies and the website advancement levels in both dimensions. Finally, to provide managers guidelines for website design, future research could focus on website features required to achieve various website goals.

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