Personalization versus Privacy: An Empirical Examination of the Online Consumer's Dilemma

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Abstract. Personalization refers to the tailoring of products and purchase experience to the tastes of individual consumers based upon their personal and preference information. Recent advances in information acquisition and processing technologies have allowed online vendors to offer varieties of web-based personalization that not only increases switching costs, but also serves as important means of acquiring valuable customer information. However, investments in online personalization may be severely undermined if consumers do not use these services due to privacy concerns. In the absence of any empirical evidence that seeks to understand this consumer dilemma, our research develops a parsimonious model to predict consumers' usage of online personalization as a result of the tradeoff between their value for personalization and concern for privacy. In addition to this tradeoff, we find that a consumer's intent to use personalization services is positively influenced by her trust in the vendor. Our findings suggest that: 1. online vendors can improve their abilities to acquire and use customer information through trust building activities; 2. it is of critical importance that vendors understand and evaluate the different values consumers may place in enjoying various types of personalization.

Keywords: personalization, privacy, trust, online transactions, SEM

Personalization can be defined as the ability to proactively tailor products and product purchasing experiences to tastes of individual consumers based upon their personal and preference information. Therefore, personalization is critically dependent on two factors: 1. vendors' ability to acquire and process consumer information, and 2. consumers' willingness to share information and use personalization services. While recent advances in Internet based tracking and profiling technologies have provided vendors with the ability to create sophisticated consumer profiles, many recent studies have shown that consumers may not be willing to share information about themselves due to concern for privacy online [12]. However, there has been no academic research to date that sheds light on consumers' need for online personalization or whether they will use personalization

services in the presence of privacy concerns, even if such services were provided for free.

Personalization is of great strategic significance to online vendors. For example, vendors invest in personalization and information acquisition capabilities such as Customer Relationship Management (CRM) tools and personalization engines to manage various customer retention strategies [56]. While in some cases personalization serves the distinct purpose of increasing customer loyalty and as a deterrent to switching [1], in others it can even be characterized as a competitive necessity as virtually every online vendor offers some form of personalization. Unlike its offline counterpart, online personalization in itself is seldom used to extract price premiums. For example, both Amazon.com and Barnes&Noble.com offer similar personalization services such as anniversary reminders and personalized shipping options, while neither of them explicitly charge consumers for these services. However, when customers provide information such as their anniversaries, Amazon.com can use this information to direct the customers to related products and offer them specific buying incentives. The importance of customers' preference information is well documented in both marketing and operations literature. It has been shown that this information is critical for vendors in predicting demand, managing inventories, assessing relationships with current and future partners, and engaging in discriminatory pricing [5]. For example, Amazon.com may send out e-coupons targeted at Pink Floyd fans when it needs to reduce excess inventory of the album "The Wall". In sum, there are both direct and informational benefits of investing in personalization.

An important question that online vendors face, however, is whether their customers will use personalization services at all. Currently there is no evidence that suggests consumers find online personalization useful, and there is no understanding of how consumers' concern for privacy will affect usage even if they find personalization to be of value. Therefore, the primary objective of this paper is to provide insights into online personalization strategies from a consumer behavior perspective. We develop a parsimonious empirical model to examine consumers' intention to use online personalization services (and hence their willingness to share information). Since factors that influence consumers' trust in a vendor is known to link to their privacy concerns, we also seek to understand if vendors can influence consumers' usage of personalization services through trust building activities.

The paper is organized as follows: The following section develops the independent variables in our model, namely consumers' value for online personalization and consumers' concern for privacy. We then develop a set of hypotheses that posit when a consumer will use personalization services (and hence will share information). Subsequently, Section 2 describes the research procedures and measurement of the latent constructs, and presents the empirical analysis of factor relationships using a second-generation SEM tool along with a summary of results. Section 3 discusses the managerial implications of our findings and concludes with a discussion of the limitations of our study and suggestions for future research.

1.   Conceptual development

In the offline context, personalization was exclusively employed by vendors in the luxury goods and services sector where it often signaled high quality with implicit price premiums for personalized products or services [38]. Other instances where offline personalization can be observed are when consumer-vendor relationships are strong and repetitive, such as a neighborhood mom-and-pop store owner greeting a customer by name. In contrast, online personalization transcends geographical boundaries. The general availability of customer information acquisition technologies creates a unique situation wherein nearly every online vendor offers some degree of personalization and, oftentimes, without specifically pricing these services even if they imply significant technological investments.

1.1.   The strategic importance of personalization to online vendors

Online personalization is primarily implemented through CRM tools combined with sophisticated data mining techniques that rely on acquiring information about customers and their preferences and analyzing this information to create customer profiles [45]. The construction of individual-specific profiles allows vendors to target customers on a one-to-one basis, which in turn helps them in improving customer satisfaction, developing customer loyalty, and increasing cross-selling possibilities [1,43]. For example, a consumer who has already personalized her shipping and gift information on one Web-based retailer may exhibit some inertia in moving to a competitor even if there may be some marginal differences in prices, as such switching would imply numerous fill-in forms again. Thus personalization coupled with prolonged contact makes it more difficult for a competitor to entice customers away [44]. Since acquiring a new customer may cost the firm up to ten times more than retaining an existing one [33], it is important for businesses to improve customer satisfaction and retention, for which personalization is an important vehicle [26,56].

The employment of sophisticated information tracking and processing capabilities has enabled vendors to store and process vast quantities of transaction data [13]. While such data was limited to point-of-sale and financial transaction information in the offline context, online vendors can now collect information on browsing activities of consumers even if no actual financial transaction took place. Consider the information that could be collected by BestBuy if they attached a camera and processor to every customer who steps into the store, followed him through every aisle visited and every product lifted from the shelves. BestBuy.com, the online counterpart, indeed has this capability that not only allows them to personalize their Web site on a return visit but also to construct nearly accurate shopping profile of their customers. Information about customers and their profiles have always been of great importance to sellers [16,34]; because in the absence of individual customer information, a product or service is tailored only to an average consumer or a segment of consumers. Such inability to address customers individually

results in increased customer arbitrage and sellers' inability to price discriminate [11]. Further, customer information is also crucial for product differentiation, offering products that are more valuable to consumers [1], as well as supply chain management. Many strategies such as JIT have evolved primarily on the notion of accurately forecasting demand [15,30,36] and having suppliers to move at the same pace as the firm [37].

The information technology (IT) investments required for employing personalization are by no means trivial. Reports by the trade press (http://www.crm-forum.com) and research firms such as Gartner indicate that CRM and other consumer oriented technological implementations can run into millions of dollars in fixed cost alone. Hence it is critical for online vendors to understand consumer behavior in the context of personalization. In the offline environment, consumers' decision to use personalized services depends primarily on the value it provides to the individual and the monetary premium that one has to pay to enjoy these services. Even if consumers do not pay a premium to use online services, they will do so only if they value personalization. Further, even if the services themselves are valuable, a consumer may still not choose to use them if their privacy concerns that arise from the associated information sharing outweighs any benefits of using the services. Therefore, to understand online consumer behavior in the context of personalization, we first develop two constructs: a new construct called the "value of online personalization," and a well researched construct called the "consumer concern for privacy" of their transactional information.

1.2. The value of online personalization to consumers

Currently there is little academic literature on online personalization. An industry group characterizes online personalization as "the use of technology and customer information to tailor electronic commerce interactions between a business and each individual customer" (http://www.personalization.org). The value of online personalization to a user primarily stems from the fit that a product or service provides, and the convenience of having it delivered in a proactive fashion. Consider the instances of personalization an online customer may encounter. First, a store can offer personalization based on individual specific characteristics like name, shipping address and preferred mode of delivery, and preferences on volume discounts, etc. The store can also offer to deliver these services to a hand-held device, e.g., an instant alert sent to the customer's PDA when prices of particular stocks in her "watch list" drop to a predefined level or when an auction comes to close. Further, firms on the Web can also personalize purchase experience of the customer. For example, Amazon and Barnes and Noble leverage the collective knowledge of their entire customer base to anticipate the preferences of each individual customer to make personalized recommendations. Using collaborative filtering technology, the store can propose new CD selections to particular customers based on recommendations by other users who exhibit similar preferences [53]. Some stores even allow users to personalize other attributes like the colors of their Web pages, the name by which an individual prefers to be greeted, and the ranking of search results based on the purchase and search histories of the customer.

In addition to personalization based on customer characteristics and browsing/purchasing preferences, firms on the Web can instantaneously personalize product offerings themselves. Firms such as Dell and Gateway provide personalized page views that are tailored for individual customers to configure, order, and pay for products online. Many also personalize after sales support specifically for the system purchased. Such services may include static information (e.g., FAQ) as well as dynamic interactions such as automatic system detection and delivery of corresponding updates. While physical product vendors such as car manufacturers and furniture designers use the Internet to create an interactive environment that allows consumers to provide inputs into the final production of their physical products, digital goods and services (e.g., music albums, software bundles, stock quote recommendations) can themselves be fully personalized according to consumer profiles. Broadly speaking, consumer profiles are constructed by online vendors based on various criteria, and different matching techniques are used to personalize products and services for a particular consumer profile [45]. The number of criteria describing a consumer profile varies with the context and technologies used for personalization. For example, Doubleclick is known to use 22 criteria in describing an anonymous consumer's Web browsing profile [45]. Thus, the net benefit of online personalization to consumers can be considered as being made up of the convenience from having different parts of the online browsing and purchase experience personalized.

As consumers may place different emphases on different types of personalization discussed above, we need to incorporate items to measure each type separately during scale development. A consumer may choose to use or not use one or more of these types depending upon their value for each attribute that is personalized. For example, a consumer who travels frequently may place greater value on having notification of changes in flight schedules delivered to her mobile and hand-held device, whereas a frequent shopper may prefer to have personalized coupons delivered to her email account. This implies that the former consumer would provide her phone number to an airline Web site while the latter would provide her email information to the shopping Web site. Thus, we can argue that the overall usage of personalization services is dependent upon the aggregate value that consumers place on each possible type of online personalization, i.e. a consumer will use only those services that he finds valuable.

Hypothesis 1: The online consumers' intention to use personalization services is dependent upon their individual specific value for personalized products, services and purchasing experiences.

1.3. Consumer concern for privacy

Since consumers need to provide preference information in order for the vendor to tailor his offerings to their tastes, personalization is infeasible to achieve without some loss of privacy. The question, therefore, is if online consumers will shy away from using personalization services? In this regard, prior research argues that people place a

premium on their privacy [12] and specifically, consumers may be willing to share their personal information and preferences if they realize that there are benefits to be obtained in returns [13]. Such benefits are not confined to monetary benefits alone but can also include intangible benefits [24,40]. In this paper we argue that a consumer is willing to share her preference information in exchange for apparent benefits, such as convenience, from using personalized products and services. Literature in marketing would classify the exchange of preference information for benefits from personalization as an example of a social exchange that includes the transfer of intangible elements [6]. It has been further argued that people participate in such social exchanges only if their expected rewards outweigh or at least compensate their loss due to participation [6,29,52]. Along these lines we propose that online consumers will participate in the exchange of preference information for personalization benefits if the quantified value of personalized services outweighs quantified loss of information privacy. Although this proposition is consistent with the views of Culnan and Bies [14], who suggest that people will accept the loss of privacy as long as there is a positive net outcome from such information disclosure, it urgently needs empirical validation as pointed out by the authors. Therefore, just as we developed the value construct of personalization in previous sub-section we now quantify the loss due to privacy concerns to empirically assess the consumers' benefits and costs.

Research in IS and marketing has argued that information privacy and consumer concern thereof is one of the most important issues in today's technology based environment [41,51]. The concept of privacy is in itself not new and has generally been defined as an individual's ability to control the terms by which their personal information is acquired and used [55]. In measuring the concern for information privacy (albeit of individual's concern of organization practices), the instrument called Concern for Information Privacy (CFIP) developed by Smith et al. [49] is the first. It identifies four factors, namely collection, errors, secondary use and unauthorized access as the dimensions of an individual's concern for privacy. Later research has argued that "CFIP needs to be reinvestigated in light of emerging technology, practice and research," [51], and it is also suggest that "CFIP itself maybe more parsimoniously represented as a higher-order factor rather than a set of correlated first-order factors". This view is supported by others who suggest that privacy measurement itself needs re-examination in varying consumer contexts, and argue that in addition to CFIP, a validated scale to measure overall privacy attitudes is needed [13]. Subsequently an individual's concern for privacy has been shown to be a higher-order factor that can be used in conjunction with other variables such as the computer anxiety of an individual in a CFIP nomological network [51]. On the other hand, it has also been argued that through "procedural fairness," organizations can employ "procedural fairness," to reduce consumers' privacy concerns and lead to trust building [13]. Similarly, other marketing research observes that consumers' privacy concerns are governed by environment control and secondary use of information control [28]. The former refers to a consumer's ability to control actions of other parties in a transactional environment while the latter implies that ability to control the subsequent use of any information provided during a transaction.

As individual consumers may not be able to fully exercise their beliefs regarding privacy and given its importance in sustained commercial activities, the safeguard of information privacy in commercial transactions has fallen into the domain of governmental entities such as the Federal Trade Commission (FTC). The FTC provides a set of guidelines known as the Fair Information Practices [25] that are built upon testimonials of researchers in this field and prior findings.[1] Consistent with the CFIP scale developed by Smith et al. [49], the guidelines incorporate rules that define how vendors should collect information, how they should fix any errors regarding personal information, how they should inform consumers regarding subsequent use of their information and how the vendors should prevent any unauthorized access to information. Similarly, consistent with findings of Culnan and Armstrong [13] and Hoffman et al. [28], the guidelines require that vendors should provide consumers control over all aspects of information collection and usage. The guidelines can be summed up into five principal actions: notice, choice, access, integrity, and enforcement. First, notice requires that disclosure notices inform online consumers about how their information will be collected. Second, choice requires that online consumers have a choice about how their information will be used and to which parties it will be disclosed. Third, access requires that online consumers have the opportunity to exercise control over their information. Fourth, integrity requires adequate mechanisms are employed to protect online consumer information from unauthorized use. Finally, enforcement requires that there is an effective authority to enforce and impose sanctions for potential violations.

An important difference in the concern for information privacy between online and offline transactions is the fact that virtually all forms of electronic access leave a trail. This allows vendors to relate even seemingly innocuous information together to construct reasonably accurate consumer profiles. A recent report from the FTC[2] observes, "*Although the information gathered by network advertisers is often anonymous (i.e., the profiles are linked to the identification number of the advertising network's cookie on the consumer's computer rather than the name of a specific person), in some cases, the profiles derived from tracking consumers' activities on the Web are linked or merged with personally identifiable information. This consumer data can also be combined with data on the consumer's offline purchases, or information collected directly from consumers through surveys and registration forms.*" Thus in the online context consumers are not only concerned about the privacy of their personally identifiable information but also other information that can be linked together at a later time. In this regards, the FTC [20,21] broadly classifies the information collected online into three categories:

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[1] The origin of government involvement in privacy issues through fair information practices can be traced to a 1973 study by the US Department of Health and Human Services (See http://www.epic.org). The first global consideration of privacy guidelines can be attributed to the recommendations by the Council of the Organization for Economic Cooperation and Development (See http://www.oecd.org) in September 1980. We would like to thank one of the anonymous reviewers for directing us the correct sources.

[2] Please see http://www.ftc.gov/os/2000/07/onlineprofiling.htm

(a) Anonymous information. It refers to information gathered about page visits without the use of any invasive technologies, typically the standard information sent with any Web or Internet request. Such information includes a machine's IP address, domain type, browser version and type, operating system, browser language, and local time.

(b) Personally unidentifiable information. It refers to "information that, taken alone, cannot be used to identify or locate an individual". Information such as age, date of birth, gender, occupation, education, income, ZIP Code with no address, interest and hobbies fall into this category. The consumer through radio buttons, menus or check boxes on a Web page has to explicitly disclose most of this information. In addition to solicited information, personally unidentifiable information also often involves the use of sophisticated tracking technologies, e.g., cookies, clear gifs, etc. Such technologies, though not identifying a customer individually, enable the information collecting entity to sketch an effective customer profile.

(c) Personally identifiable information. It refers to information that can be used to identify or locate an individual. These include email addresses, name, address, phone number, fax number, credit card number, social security number, etc. Invariably, such information is almost always gathered explicitly from the customer and is typically collected when consumers register with Web sites or engage in financial transactions.

As online personalization involves the collection and use of each of these various types of information, consumers' concern for privacy in using personalization services should assess privacy perceptions regarding each information type. Therefore, in order to quantify losses from privacy to the consumer we need to measure consumer attitudes with regards to how each information type will be collected and treated consistent with the fair information usage principles. It is reasonable to expect that if the consumers believe their information were collected and treated fairly, they would be more willing to share their preference information with the vendor and hence use personalization services that are offered.

Hypothesis 2: The online consumers' intention to use personalization services (and hence their willingness to share information) is negatively influenced by the individual specific concern for privacy of their anonymous, personally unidentifiable and personally identifiable information.

1.4. Relationship between privacy concerns and presence of trust building factors

A marketing exchange such as the exchange of preference information for personalization benefits are those that involve relationships that entail unspecified future obligations based on trust between the exchanging parties [6]. Such an exchange differs from a pure economic exchange in the sense that it may rely upon social ties and deal with informal

exchange of intangibles such as feelings, favors, social power and ideas [6,29]. Hence a consumer's feeling or attitude towards a vendor becomes critical in determining whether or not an exchange will take place. In a commercial context, such a feeling can be captured by the existence of factors that build trust in the vendor.

There are two ways in which the presence of trust building factors can affect a consumer's use of personalization services. One is simply the existence of some basic form of trust that is necessary for consumers to conduct a commercial transaction, and the role of such trust in online environments is well documented by IS literature [31,39]. Given that usage of personalization services is a form of (or part of) a commercial transaction, one could argue that greater the presence of trust building factors, greater is the likelihood that a consumer will use the services offered by the vendor. The second way in which trust plays an important role is from the manner in which it affects any situation that involves sharing of information and concern for privacy. Research on privacy suggests that trust in online transactions are closely related to issues of privacy [19,48]. The presence of factors that build trust assures the consumers that collection and subsequent access, use, and disclosure of their personal information is consistent with the fair information practices, i.e. their concern for privacy maybe negatively related to the existence of factors that build trust. Two important factors that are known to build trust are the consumer's familiarity with the vendor [47], and her past experiences with them [18,22]. Therefore we examine for the presence of trust building factors in the usage of personalization services as well as their direct and indirect (through mitigation of privacy concerns) effects on a consumer's decision to use these services.

Hypothesis 3: The online consumers' intention to use personalization services (and hence their willingness to share information) is positively correlated with factors that build trust in the vendor offering personalization services.

Hypothesis 4: The online consumers' concern for the privacy of their information is negatively correlated with factors that build trust in the vendor offering personalization services.

Figure 1 shows the hypothesized relationships amongst the constructs that we test through an empirical study. In order to test this model, we need to first develop and validate scales for the new construct, consumers' value for online personalization, and incorporate it in the nomological network of the other well understood constructs. The following section describes in detail the empirical method adopted for this study.

2.   Empirical study

In this section we first discuss our data collection procedures and pre-test issues, followed by a detailed statistical analysis of the data.
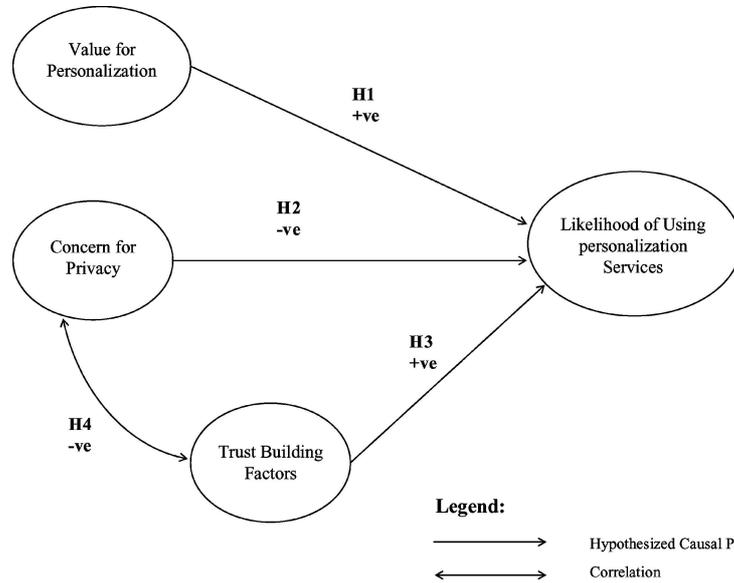
Figure 1. Consumers' likelihood of using online personalization services: A causal model.

2.1. Data collection

We identified five popular online industry categories for our study: 1. Personal Computers, 2. Automobile, 3. Apparel, 4. Financial Services, and 5. Travel Services. After constructing a list of the ten most popular firms in each of these industries, we developed surveys as though we were soliciting responses regarding each of the 50 online firms. The surveys were administered in person by 50 MBA students who agreed to act as data collectors (designed as a part of their course). Our sample consists of consumers who had purchased products or services online at some point in time, and were familiar with the particular industry category for which they filled out the survey. However, note that the respondents were not necessarily customers of those particular online firms. We obtained a total of 243 valid responses of which 61% were male. Our choice of participants does not account for self-selection and social desirability bias, but there is a satisfactory variance in the responses for the principal constructs.

2.2. Scale development

Measures for the two trust building factors, familiarity and past experiences are based on past studies [18,22]. Since there is no existing scale for the value of online personalization, we developed our own items following standard psychometric scale development procedures [2,3]. This new scale measures the consumers' value for different types of personalization discussed, namely personalization based on non-purchase related customer attributes, personalization of the product browsing and purchasing experience

and personalization of products or services themselves. Items for privacy concerns were adapted from previous instruments developed for measuring consumer information privacy in online contexts [9,31,51]. Along the lines of the discussion presented in the earlier sections and consistent with the FTC classifications [21], we incorporate items to capture consumer concern for privacy for each type of information, namely anonymous, personally unidentifiable, and personally identifiable information. Recent research suggests that the role of consumer comfort in service relationships is critical and that it has a significant and incremental impact on commitment with service providers [50]. Since personalization is a type of service relationship, we measure the likelihood of a consumer using personalization services through her comfort in sharing information and using the services.

Content validity of all items, especially of those newly developed, was carefully assessed. Before we conducted the structural analysis, we tested both constructs in the context of Internet based personalization transactions through a series of informal interviews with faculty and doctoral students in the business school of a large west coast university to ensure face validity of the items and proper operationalization. These items were examined by two colleagues with expertise in measurement theory and questionnaire design. After the items were developed, the initial questionnaires were pilot tested with 13 Ph.D. students in marketing, information systems and computer science, as well as 5 managers of firms in both IT and non-IT related industries. This resulted in 6 items for the consumer's value for personalization (PER) and 4 items for consumer's concern for privacy (PRI). Each of the items are measured using a seven point Likert scale anchored by "1 = strongly disagree" to "7 = strongly agree". Opinions were solicited to identify and correct items that appear to be confusing and ambiguous. To test the respondents' understanding of the questionnaire and the appropriateness of the wordings and construction of the items, questions were asked by randomly picking items from the original survey. A number of minor revisions were made to come up with the final questionnaires after analyzing the responses. Particularly, based on the comments by managers in non-IT related firms, extensive examples were introduced to clarify the meaning of certain technical terms. After refining the items according to the recommendations, we constructed the final survey instrument. Table 1 presents the descriptive statistics of all of our variables, and the survey instrument is provided in Appendix.

2.3. Data analysis

An exploratory factor analysis was performed to test for existence of common method variance (CMV) in the data set. CMV is a potential threat to internal validity particular to social science research involving the use of survey instruments administered to subjects within a single setting. According to Harman's one-factor test, the threat of CMV is high if a single factor is obtained or if one factor accounts for a majority of covariance in the independent and dependent variables [17]. Our factor analysis did not indicate a single-factor structure explaining a majority of the covariance, and hence CMV is not

Table 1
Descriptive statistics and correlation coefficients.

Variable	Mean	Std. Deviation	Correlation Coefficients													
			PER1	PER2	PER3	PER4	PER5	PER6	PRI1	PRI2	PRI3	PRI4	FAM	EXP	LIK1	LIK2
PER1	5.082	1.478	1.000													
PER2	5.292	1.452	.311	1.000												
PER3	4.790	1.667	.125	.519	1.000											
PER4	4.276	1.716	.185	.369	.321	1.000										
PER5	4.877	1.598	.145	.435	.411	.447	1.000									
PER6	4.626	1.828	.077	.322	.388	.083	.312	1.000								
PRI1	3.708	2.105	.152	-.116	.083	.013	.084	-.029	1.000							
PRI2	4.177	1.757	-.078	-.067	-.106	-.077	-.060	-.035	.300	1.000						
PRI3	3.926	1.775	-.035	.058	.024	-.012	-.039	-.008	.243	.436	1.000					
PRI4	5.914	1.359	.093	.055	-.005	.019	.060	-.129	.124	.094	.260	1.000				
FAM	.757	.430	.050	-.032	.084	.177	.234	-.020	-.016	-.325	-.270	-.010	1.000			
EXP	.247	.432	.040	.009	-.044	-.056	-.059	.001	.069	-.145	-.071	-.033	.110	1.000		
LIK1	4.757	1.538	.083	.227	.320	.116	.189	.283	-.219	-.332	-.261	-.271	.194	.233	1.000	
LIK2	5.712	1.202	-.022	.136	.161	.031	.186	.185	-.059	.049	-.225	.003	.059	.089	.252	1.000

of particular concern in our sample. We then use structural equation modeling to perform confirmatory factor analysis (CFA) to assess unidimensionality, convergent validity, and discriminant validity of the scales used in the study. To assess unidimensionality, the significance of the association among indicators representing a single concept was assessed using the *t*-statistics generated by CFA for each individual factor loading. Convergent validity refers to the extent to which different measures of a single construct agree with one another, and was evident with the statistically significant and sufficiently large correlations of different measures of the same trait for each of our constructs of interest. Finally, the chi-square difference test comparing two alternative models was used to assess discriminant validity using CFA. The differences in chi-square between pairs of hypothesized models in our study—one with correlation of a pair of constructs constrained to unity, another with the same correlation being allowed to vary—are large enough (>32) and are statistically significant ($p < 0.01$), ensuring that the constructs are indeed distinct.

Confirmatory factor analysis is performed by first generating a sample or observed covariance matrix that captures the set of covariance between item measures calculated through collected data. Then, an implied matrix of covariance is generated according to the specified model using maximum likelihood estimation. In this study, the covariance matrices and maximum likelihood estimates are generated using LISREL version 8.5 [32]. Good model fit and hence sufficient evidence that the specified model is indicative of the collected data can be concluded when the observed matrix is close enough to the implied matrix, as measured by the size of the chi-square. The following sub-sections describe the validation of the theoretical constructs, as well as the details of testing alternative factor structures.

2.4. Measurement model—analysis of factor structure

The consumers' value for personalization (PER) and her concern for privacy (PRI) are hypothesized to jointly affect their intent to use online personalization services (and hence willingness to share her preference information). Since there exists no theoretical argument regarding the independence of the two main constructs, we explicitly tested two alternative factor structures in this research. We first tested the oblique model and found that the correlation between value for personalization and concern for privacy was insignificant. We then proceeded to test the orthogonal model and established that the two independent variables of our study are indeed orthogonal constructs (see figure 2). Table 2 summarizes the results of the analysis. Although the two alternative models are highly comparable in their goodness of fit statistics, the correlation between the two independent constructs in the oblique model is both low (-0.05) and insignificant ($t = -.72$), therefore the oblique model is rejected. We now turn to take a closer look at the goodness of fit of the orthogonal model. The summary statistics reported in Table 2 indicates that the orthogonal model is a good fit in general. The adjusted goodness of fit index of the model exceeds both the 0.80 value recommended by Segars and Grover

Table 2

Goodness of fit statistics of alternative measurement models for the two main constructs.

	Model	
Statistics	Oblique	Orthogonal
Goodness of fit index (GFI)	0.97	0.97
Adjusted goodness of fit index (AGFI)	0.95	0.95
Standardized root mean square residual (RMR)	0.078	0.080
Weighted least squares chi-square (χ^2)	85.14	85.54
Chi-square to degrees of freedom ratio (χ^2/df)	2.504	2.444
Normed fit index (NFI)	0.83	0.83
Comparative fit index (CFI)	0.89	0.89
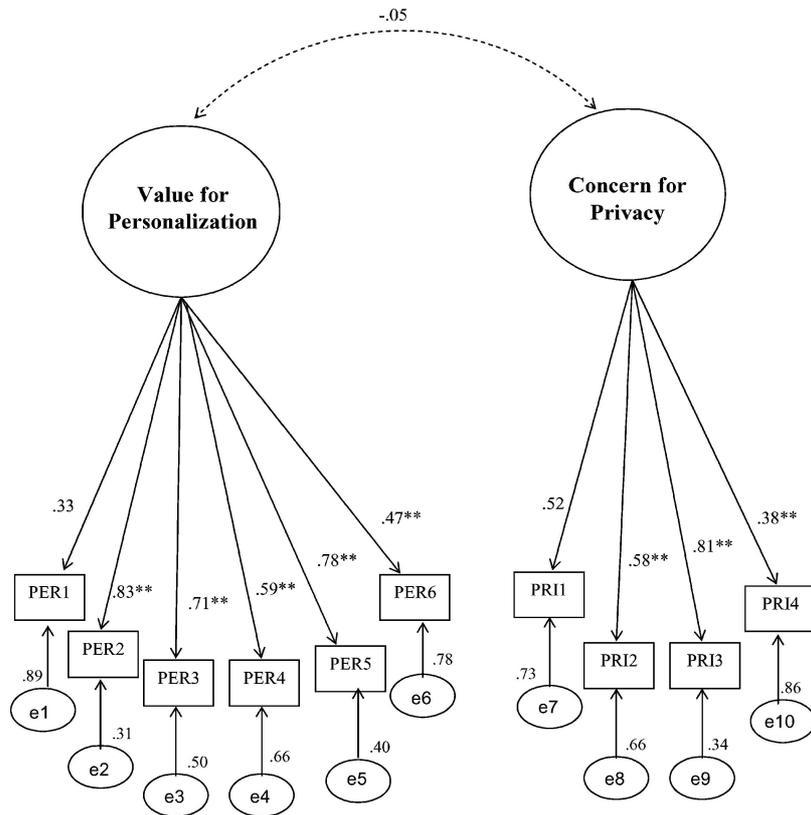
All factor loadings are standardized

***Significant at the .01 level*

Legend:

←- - - - - - - - → Insignificant Correlation

Figure 2. Comparison of oblique and orthogonal measurement models.

Table 3
Factor loadings and reliabilities.

Construct	Item	Latent Construct Loadings (and Error)				Reliability coefficient[a]
		PER	PRI	TRU	LIK	
Value for personalization	PER1	.33				
(PER)	PER2	.83 (.52)**				
	PER3	.71 (.48)**				
	PER4	.59 (.40)**				.86
	PER5	.78 (.52)**				
	PER6	.47 (.32)**				
Concern for privacy	PRI1		.52			
(PRI)	PRI2		.58 (0.17)**			
	PRI3		.81 (0.27)**			.90
	PRI4		.38 (0.15)**			
Trust building factors	TRU1			1.39		
(TRU)	TRU2			.68 (0.16)**		.98
Likelihood of usage (LIK)	LIK1				.87	.96
	LIK2				.68 (0.09)**	

$N = 243$ **Significant at .01 level.
[a]Construct reliability is calculated as: $(\sum (\text{std. loadings}))^2 / ((\sum (\text{std. loadings}))^2 + \sum (\text{std. errors}))$.

[46] and the more restrictive 0.90 threshold cited by others (e.g. Chin and Todd [10], Hair et al. [27]). The chi-square is highly insignificant with a *p*-value of less than 0.001. Furthermore, the chi-square to degrees of freedom ratio is lower than the 3:1 ratio suggested by Gefen [23].

Although the root mean square residual and normed fit index do not satisfy the guidelines by Hair et al. [27], all other indicators offer strong evidence to the model's validity. Based on the above observations, the hypothesis that a consumer's value for personalization and her concern for privacy being independent constructs is strongly supported. Item loadings of the orthogonal model are presented in Table 3. In a second generation SEM tool such as the LISREL, reliabilities are computed using factor loadings and standard errors of the individual items produced in the factor structure analysis. The results on reliability analysis are also reported in Table 3.

2.5. Structural model

The structural model and the relevant goodness of fit statistics are presented in figure 3 and Table 4 respectively. The adjusted goodness of fit index well exceeds the recommended level of 0.8. Although the root mean square residual is high, it should be noted that these residuals are difficult to interpret because they are relative to the sizes of the observed

Table 4
Goodness of fit statistics for the structural model.

| Statistics	Results
Goodness of fit index (GFI)	0.99
Adjusted goodness of fit index (AGFI)	0.99
Standardized root mean square residual (RMR)	0.10
Weighted least squares chi-square (χ^2)	306.63
Chi-square to degrees of freedom ratio (χ^2/df)	4.20
Squared multiple correlation (SMC)	0.49
Normed fit index (NFI)	0.99
Comparative fit index (CFI)	0.99
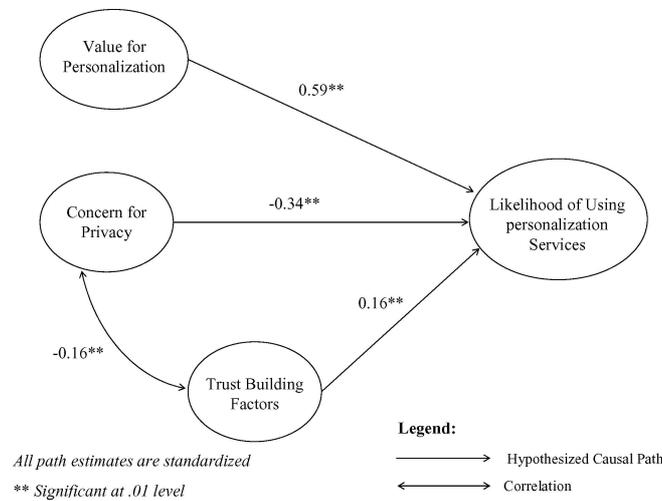
Figure 3. Parameter estimates of the personalization to privacy tradeoff model.

variances and covariances [8]. Our residual size of 0.1 falls within the acceptable region.[3] Since all paths are significant and in agreement with the hypothesized directions, and that the Chi-square statistic is highly insignificant ($p < 0.001$), it can be concluded that the proposed structural model provides an excellent fit to the data [32].

2.6. Summary of results

The proposed hypotheses and parameter estimates of the relationships from the empirical study are shown diagrammatically in figure 3. As shown in Table 3, the individual factor loadings of the items we used to measure the consumers' value for personalization

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[3] According to Gefen et al. [23], only 25% of the reported RMR in major IS journals fall within the 0.5 bound.

are highly significant, implying that all items effectively measure the same construct. Further, the reliability coefficient (the equivalent of Cronbach's alpha) is also very high and therefore testifies to the scale validity of the items. We proposed 3 causal relationships in H1, H2 & H3, a correlation in H4, and further we had proposed a negative direction for H2 and H4. All of our hypotheses are strongly supported. Our results not only indicate that all of our hypothesized relationships are highly significant ($p < .01$), but they also confirm our proposed directionality of the construct relationships. Moreover, consumers' value for a personalized service is independent of their privacy concerns regarding the information they share. This can be observed from the fact that while the two measurement models exhibit high goodness of fit (Table 2), there is no correlation between the two constructs themselves (figure 2). An important outcome of this analysis is that while consumers' value of personalization positively affects their decision to use personalization services, usage is negatively affected by the corresponding concern for privacy. Therefore even though these two constructs are independent, there is a combined effect representative of the consumers' personalization to privacy tradeoff that determines usage. While the absolute values of the parameter estimates are not useful for critical analysis, their relative weights provide rich managerial insights. Our results find that in absolute terms, the consumers' value for personalization is almost two times (0.59 vs. -0.34) more influential than the consumers' concern for privacy in determining usage of personalization services. This suggests that while vendors should not ignore privacy concerns, they are sure to reap benefits by improving the quality of personalized services that they offer.

3. Discussion

In the absence of defined metrics, we first developed and validated items to measure consumers' value of online personalization. Our analysis lends support to measuring consumers' value of online personalization as the combined value of different levels of personalization. While in this paper we do not delve deeper into the relative weights that consumers place on having their Web site personalized for browsing and purchasing versus those personalized based on individual specific information, our scales offer a first understanding of the consumers' overall value for these services. Another important result of our study is the orthogonality of the constructs of personalization and privacy. A vendor offering personalization services only observes if the consumer uses his services or not. It is not clear from the usage information alone if it is value of the personalized services that has influenced the consumers' decision or if it is the fact that consumers would have to share information (and hence their concern for privacy) that determines usage decision. Our results provide definitive insights into this usage decision and suggest that vendors can independently engage in creating personalization value and methods to reduce consumers' concern for privacy. Further, we show that trust building factors not only directly affect consumers' usage of personalization services but are also negatively related to their privacy concerns. Therefore, while vendors can do little to positively

influence consumers' concern for privacy directly other than following the FTC guidelines, our analysis sheds light on the possibility for them to indirectly affect consumers' privacy concerns through trust building. Prior research suggests various ways in which vendors can build online trust, e.g., improving their brand image [42,54] and engaging in trust building activities through relationships with trusted third parties [4,7,19]. Therefore, our findings would argue that online vendors who seek to benefit from their personalization strategies should not only be mindful of their consumers' privacy concerns but should also uncover ways through which they can build trust. In fact, the relative reputation of online vendors is one reason why consumers prefer to use personalization from one vendor while ignoring another, even if the services themselves are virtually undifferentiated.

Contrary to common wisdom, our measurement model also indicates that consumers are concerned not just about their personally identifiable information, but even their anonymous and personally unidentifiable information. The intuition behind this finding is that consumer profiles are created by aggregating all of the different types of consumer information and there is always a likelihood that a piece of anonymous information being associated with personal information to construct what may be perceived to be an intrusive profile. For example, a recent survey by the Personalization consortium shows that only 62% of people accept cookies although it is well known that cookies do not carry any personal information but can only aid in creating the profile of an anonymous individual. Doubleclick's recent purchase of Abacus and the privacy problems that surfaced along with is a testament to the possibilities of anonymous information being combined with identifiable information at some future time [14]. Hence vendors need to be sensitive to the fact that consumers may be concerned about providing even information that does not identify them directly.

Another interesting finding in our study is that while it has been empirically demonstrated that trust plays an important role in a consumer's intent to buy [31], we show that factors that build trust are also important even when a consumer engages in non-financial transactions. Finally our results lend credence to the argument that privacy is not an absolute concept; i.e. consumers may give up some privacy if corresponding benefits are provided. This argument is consistent with Laufer and Wolfe's [35] suggestion that consumers engage in a cost-benefit analysis in dealing with privacy and Culnan and Bie's [14] notion of "privacy calculus," where consumers assess the outcomes they receive when sharing information with organizations. Ours is one of the first empirical studies that test this proposition and shows that non-monetary benefits such as convenience from online personalization can also serve as incentives for consumers to part with their personal and preference information.

3.1. Limitations and future research

The goal of our paper was to develop a parsimonious model of consumers' personalization to privacy tradeoff. In this study, we have not considered other factors such as gender,

ethnicity, education, expertise and other individual specific attributes in the larger nomological network. Our study suffers that same limitations of generalizability as many other empirical studies in that "confirmatory findings should be viewed as scientific findings only to the extent that they can be replicated in subsequent studies," [51]. Further, we measure only the intent to use personalization services as we are limited in our access to actual usage statistics of personalization services. Thus our study suffers from the typical limitations of any intention versus actual behavior model.

While we consider the composite effect of various types of personalization (those that are based on anonymous to individual-specific attributes), it may be interesting to explore further the variance in consumers' value for each type. Since the cost of individual-specific personalization is usually much higher than those that are common to a group, the marginal benefit to the vendor in personalizing all attributes may be somewhat limited. Further, the context where personalization is being offered may be very critical to the consumers' willingness to share information. For example, consumers may be more sensitive about privacy in their interactions with a web site that provides financial services compared to those that sell books and CDs. In other words, the domain where personalization strategies are being employed could be an important factor in determining consumers' usage of these services and thus an interesting direction to look at in future research.

Appendix: Survey instrument

(Items were modified to match the specifics of each industry and relevant examples were provided to the participants)

Consumers' value for online personalization

PER1 I value Web pages that are personalized for the device (e.g. computer, palm, mobile phone etc.), browser (e.g. Netscape, Internet explorer) and operating system (e.g. Windows, Unix) that I use.

PER2 I value Web sites that are personalized for my usage experience preferences

PER3 I value Web sites that acquire my personal preferences and personalize the services and products themselves

PER4 I value goods and services that are personalized based on information that is collected automatically (such as IP address, pages viewed, access time) but cannot identify me as an individual.

PER5 I value goods and services that are personalized on information that I have voluntarily given out (such as age range, salary range, Zip Code) but cannot identify me as an individual.

PER6 I value goods and services that are personalized on information I have voluntarily given out and can identify me as an individual (such as name, shipping address, credit card information).

Consumers' concern for privacy

PRI1 I am sensitive about giving out information regarding my preferences

PRI2 I am concerned about anonymous information (information collected automatically but cannot be used to identify me, such as my computer, network information, operating system, etc.) that is collected about me.

PRI3 I am concerned about how my personally un-identifiable information (information that I have voluntarily given out but cannot be used to identify me, e.g., Zip Code, age-range, sex, etc.) will be used by the firm.

PRI4 I am concerned about how my personally identifiable information (information that I have voluntarily given out AND can be used to identify me as an individual, e.g., name, shipping address, credit card or bank account information, social security number, etc.) will be used by the firm.

Consumer comfort in using personalization services (proxy for likelihood)

LIK1 I am comfortable providing information about me to this firm in return for personalized services and products.

LIK2 I am comfortable in using the Web to purchase services and products.

Trust building factors in the usage personalization services

FAM I am familiar with the Web site(s) of (names of firms omitted).

EXP I have previously used or purchased services or products from (names of firms omitted).

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