Are You Worried About Personalized Service? An Empirical Study of the Personalization-Privacy Paradox

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Abstract. Many e-stores adopt personalized recommender systems to provide service for the customers nowadays, which they can rely on to predict customers' preferences based on the detailed individual customer information. Customers got better services provided by the personalized recommender systems. However, customers also concerned that the websites may steal, misuse or sell their information to a third party. Such situation causes the "personalization-privacy paradox". This study proposed a research model based on the privacy calculus theory to explore how the customers make decision between personalized service and privacy concern. An online survey was conducted to collect empirical data in order to test our research model. The results of PLS analysis indicate that personalized service is positively affects perceived benefit. Both information sensitivity and privacy concern positively affects perceived risk. However, when customers with low information sensitivity and low privacy concern, they are less likely to evaluate associated risks. Perceived value is influenced by perceived benefit and perceived risk and in term, affects customers' willingness to provide personal information. The findings of this study provide implications for both researchers and practitioners of using personalized recommender systems.

Keywords: Personalized service · Recommender system · Privacy concern

1 Introduction

Recently, the internet and e-commerce booming provide convenient life for the customers. However, large information providing from numbers of website causes customers face the difficulties of information processing when conducting purchase decision. The information overloading also results in the customers hard to make a decision between various options. Personalized recommender systems have been pay attention to provide more relevant information for the customers to facilities their purchase decision. Such personalized systems provide the benefits for customers to search personalized products and services in efficient ways. The companies also benefit from such system which predict consumer behavior more accurately and bring in higher sales volume and revenue.

Previous studies claimed that the success of personalized recommender systems rely on the companies' data collecting and processing capabilities. In addition,

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customers' willingness to share their personal information and obtain personalized services is vital to the development of personalized recommender systems [6]. In fact, companies need many information to be collected from the customers to provide personalized services for customers, however, the customers often have low willingness to share such personalized information with companies [2, 26]. The privacy issue is the largest concern of the customers to share the personalized information because a lot of personalized individuals information are collected, obtained, and sold inappropriately to the third parties. The privacy concern and the worry about the personal data are used in illegal ways cause the customers prefer to protect their personal data.

Such issue is largely drawn the attentions from previous studies [11, 28, 32]. Personalization-privacy paradox was incurred because the customers tend to get benefits from the personalized services which provided by the websites but are also afraid of their personal privacy are invaded [27]. Since personalization-privacy paradox is a very interesting phenomenon and an important research issue in personalized service, many previous studies have investigated this issue and provided insightful implications [27, 42]. However, prior studies are more focus on the causal effects among the related variables, but less studies focused on examining the influence of sensitivity in different level of personalized service and privacy concern on the willingness of sharing personal information. Hence, the purpose of this study is to explore the sensitive relationships between personalized service and privacy concern while an individual is using a personalized recommender system. The following sections are organized as follows. The theoretical foundations and hypotheses are proposed in the Sect. 2. In the Sect. 3, the experimental scenario design and empirical survey are described. Then, the results of statistical analysis are discussed in the Sect. 4. Finally, we make a brief conclusion in the Sect. 5.

2 Theoretical Foundations and Hypotheses

Privacy calculus theory claimed that the individuals' intention of disclosing personal information will depend on comparing perceived risks and anticipated benefits [12, 16]. Personal information is viewed as a tradable good between the customers and the websites. The consumer evaluate the benefit of providing information such as the privacy information and personal data and the risk of the concern of privacy invasion. Individuals will conduct a privacy calculation, which the customers compare the benefits and the risks of providing personal information to the websites and then decide the scope and the level of the privacy information they wants to expose.

Privacy calculation also is viewed as a cognitive process which indicates that the individuals make a decision based on measuring the potential cost and benefit of disclosing private information to others [5, 19]. If the foreseeable benefit is larger than (or equal to) the potential risk, the individuals will incline to disclose their personal information to exchange their desired products/services, such as financial incentives and personalized services [9, 13].

According to the prior research, the privacy calculation has been viewed as one kind of functional exchange between the customers and the companies. The customers will calculate how much higher quality services they can earn from the website and

decide the level of the personal information that they are willing to offer [9]. The individual will evaluate the expected benefits and privacy risks of offering such private information to other people [22]. Once the individual perceived the benefits are higher than the risks of providing the information, they will have the higher willingness of sharing their personal information and preferences to others [8]. Hence, we propose hypothesis H1 as follows,

H1: The willingness of providing personal information will be positively affected by perceived value of personalized service

Previous studies found that when the consumer realized the benefit can generate from disclosing private information, they tend to behave lower concern of privacy issues. At this situation, the consumers prefer to release their individual information to exchange the potential benefits [12, 43]. Studies also found the evidences that the consumers have higher willingness to disclose their individual information if they can gain offerings or discounts from providing personal information [35]. In this study, perceived benefit is defined as the benefits of personalized service that the individuals can earn through disclosing their personal information. Thus, the hypothesis H2 is proposed here:

H2: Perceived value of personalized service will be positively affected by perceived benefit of information disclosure.

Privacy calculation theory also proposed that privacy risk will affect the likelihood of consumers' privacy intention and consumer behavior [21, 32]. For example, the uncertainty of using the Internet will force the consumers feel hesitate to disclose their personal information. The tendency of disclosing information will rely on the evaluation of risk and benefit. The perceived uncertainty results in the customers perceived risks of disclosing private information in inappropriately and unauthorized ways [24], such as internal personnel's use, intentionally access and selling to the third parties [15]. Such unauthorized information disclosing let the consumers suffer from possible risks because of exposing personal privacy under public without noticed. Therefore, we hypothesize that

H3: Perceived value of personalized service will be negatively affected by perceived risk of information disclosure.

Personalization provides the customized service to the customer, which let the customers can enjoy the services based on their personal preference and needs. Personalization also lets the consumers experience as serving by a customized salesperson during the purchase process [25]. Customer loyalty also is developed through satisfying the customers' personalized needs [18]. Recently, recommender system provides the personalized recommendations and information to the customers in helping their purchase decision in e-commerce websites [30]. Recommender systems can provide the relevant information and suggestions to the customers based on their preference and customer behaviors [1]. According to the prior purchasing history, the system recommends the products/services that may be interested by the customers. According, the customers can get accurate information and shorten the searching time in purchasing process. The personalization bring the benefits to the customers in reducing transaction

cost and searching cost through providing useful information to the customers. The system are thereby can earn the loyalty and recognition from the customers. Therefore, we propose hypothesis H4 as follows,

H4: Perceived benefit will be positively affected by personalization.

The risk of disclosing information depends on the types of information. The higher sensitive information represents the higher level of closeness of information to the individuals. Prior studies pointed out that higher closeness of information disclosing will cause the higher risk of personal losing [23]. Consumers prefer to disclose their demographic information rather than the sensitive information such as financial or identification information [29]. Moreover, consumer will perceive higher risk if they are asked to provide more sensitive information [29, 31, 37]. Such perceived risk will cause the consumers have more negative attitude and intention toward disclosing their personal information [24]. Therefore, the hypothesis H5 is proposed here:

H5: Perceived risk of information disclosure is positively affected by the sensitivity of information.

Warren and Brandeis [38] claimed that privacy is related to the individuals' rights and capabilities to control their owned information, to occupy their personal space [4, 39], to have their personal life [3], and to control the personal message [39]. Flushing internet draws scholars' attention from avoiding personal privacy invasion to learning the ways to protect personal information. Scholars suggest that information privacy should address the importance of how the private information to be used and to be transferred to users [40].

Consumers concern about the possible loss and risks after disclosing their private information [32]. In particular, the development of technology in monitoring and in searching information causes the consumers have the higher awareness that the personal privacy is under-protected and is invaded [7, 36]. People concern about their personal information is being misused [44]. In addition, unauthorized information assessed by the other organizations is also a vital concern to the customers [10]. Thus, the consumers' fell the difficulties of controlling the information after disclosing private information [11].

Studies also found that the privacy invaded causes consumers perceived risks to provide personal information in the future purchase. The negative perception and experience will be incurred to the customers, which causes the customers incline to provide the information or correct information to the website. Even more, some customers will claim to the organization or the official authorities [34]. Prior studies also found evidence that the perceived risk of information disclosure is positively associated with privacy concern [12]. The higher risks perceived by the consumers will lead the customers have higher concern of information disclosure [17]. Hence, we hypothesize that:

H6: Perceived risk of information disclosure will be positively affected by privacy concern.

3 Research Method

A survey questionnaire was developed to test the proposed hypotheses. The conceptual definition and the source of the measurement items for each construct are listed in Table 1. All constructs were measured using items equivalent to those used by previous studies. This study adopted the Likert Scales, allowing participants to choose one of seven levels of agreement with anchors ranging from 1 (strongly disagree) to 7 (strongly agree) with the exception of the personalization construct which was measured by the perception of personalized degree.

In order to explore the sensitive reaction to varied degrees of personalized service and personal information disclosure, three scenarios were designed as Table 2. Then three type questionnaires were designed to collect empirical data. Each questionnaire includes three parts. In part 1, the purpose of survey and one of three scenario, i.e., S1, S2, or S3, was described. In part 2, all items of the research constructs were designed by seven-Likert scales based on previous studies. In part 3, some questions related to respondents' profile and shopping experience were designed.

After questionnaire pretesting and revision, we conducted an empirical survey in May 2017 and gave 2 US dollars e-coupon to respondents who had filled the questionnaire successfully as incentive. Finally, 475 questionnaires were collected but 41 questionnaires were invalid. The valid amounts of three scenarios are S1:148, S2:142, S3:144, respectively. There were more females (67.7%) than males (32.3%). The majority are students (68.7%). Most of them averagely did online shopping once per month (46.1%) while some of them averagely purchased 2 or 3 times per month (35.9%). Furthermore, Most of them averagely spent no more than 35 USD (48.8%).

4 Preliminary Findings and Further Analysis

Partial Least Squares (PLS) was used to test the research model and six hypotheses because PLS is more appropriate to measure research models which are in the early development stages and have not yet been extensively tested. This study utilized the SmartPLS[1] software to conduct PLS analysis. Reliability and discriminant validity were tested before the research model was tested.

As Table 3 shows, the Cronbach's Alpha of each construct was higher than 0.74. The composite reliability of each construct is higher than 0.85. Notably, each square root of AVE is higher than 0.817 and also higher than the inter-construct correlation coefficients. Hence, the indicators of reliability and validity for the measurement model (i.e., item reliability, convergent validity, and discriminant validity) are all acceptable. Then PLS was used to assess the structural model. All path coefficients and explained variances for the model (all sample) are shown in Fig. 1.

The preliminary results of PLS analysis with all sample show that the explanatory power (R^2) of willingness of providing personal information is 25.6%. The path coefficient from perceived value to willingness of providing personal information is

[1] C.M. Ringle, S. Wende and A. Will, SmartPLS 2.0 (M3) Beta, Hamburg 2005.

Table 1. Conceptual definition of each construct

Construct	Conceptual definitions	Number of measurement [Reference]
Willingness of providing personal information	The customers' willingness to provide information for obtain better personalized services	3 [42]
Perceived value	The values perceived by the individuals' after comparing the risks of information disclosure and the benefits of personalized service	3 [42]
Perceived benefit	The benefits of personalization that the individuals can earn through disclosing their personal information [41]	3 [14, 42]
Perceived risk	The possible loss and risk of disclosing personal information	3 [42]
Personalization	The recommender system provides the personalized services to the customers based on the users' preferences	3 [42]
Sensitivity of information	The level of individuals feel uncomfortable to disclosure their private information to a specific website [20]	3 [14]
Privacy concern	The individuals' concern about how the websites collect and use their personal information [33]	4 [12]

Table 2. Experimental scenario design

Scenario	Personalized service	Personal information disclosure
S1	Users can customize their personalized webpages	Users were required to provide their basic profile, including user ID and password, when they were registering
S2	Users will get discount coupon for their birthday gift every year	In addition to basic profile, users were required to provide their medium-sensitivity personal data, including name, birthday, and telephone number
S3	Users will get special discount based on their credit card type when they are shopping	In addition to basic profile and medium-sensitivity data, users were required to provide their high-sensitivity personal data, i.e., credit card number

0.506 ($p < 0.001$), which means that H1 is significantly supported. In addition, there is a significantly positive association between perceived benefit and perceived value ($b = 0.515$, $p < 0.001$), while the association between perceived risk and perceived value is significantly negative ($b = -0.164$, $p < 0.001$). Hence, both H2 and H3 are significantly supported. The explanatory power (R^2) of perceived value is 30.4%. There is also a significantly positive association between personalization and perceived

Table 3. Correlation matrix and average variance extracted for the principal constructs

Constructs	CR	α	WP	PV	PB	PR	PL	SI	PC
Willingness of Providing Personal Information (WP)	0.945	0.914	0.923						
Perceived Value (PV)	0.941	0.906	0.506	0.917					
Perceived Benefit (PB)	0.854	0.743	0.368	0.527	0.817				
Perceived Risk (PR)	0.938	0.901	-0.443	-0.201	-0.071	0.914			
Personalization (PL)	0.933	0.893	0.211	0.424	0.654	0.028	0.907		
Sensitivity of Information (SI)	0.896	0.825	-0.534	-0.224	-0.099	0.708	0.060	0.862	
Privacy Concern (PC)	0.957	0.940	-0.452	-0.199	-0.048	0.814	0.074	0.743	0.921

Note: The shaded numbers in the diagonal row are square roots of the average variance extracted.

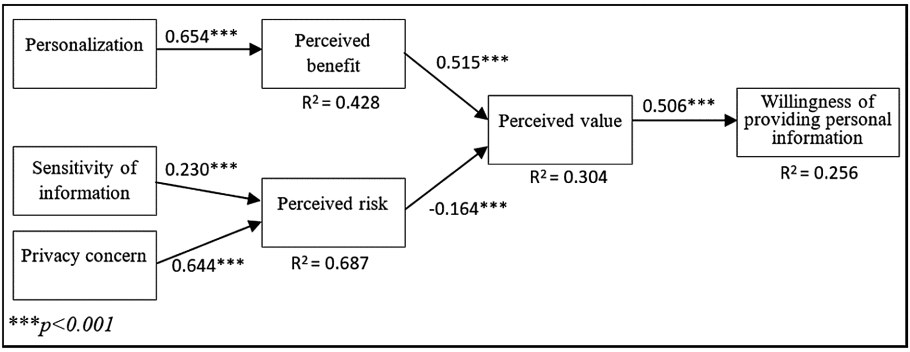

Fig. 1. Results of PLS analysis

benefit. Hence, H4 is significantly supported and 42.8% of the variance of perceived benefit can be explained by providing personalization. Finally, we found that perceived risk was significantly affected by sensitivity of information and privacy concern, R^2 = 68.7% means that the explanatory power is high. The test results of H1–H6 are listed in Table 4.

In addition, we found that when customers are asked for data with low information sensitivity and low privacy concern, they are less likely to evaluate associated risks by performing a cost-benefit analysis. Since three scenarios were designed in this study, further analysis is required to explore the sensitive relationships between perceived benefit and perceived risk.

Table 4. Test results

Path	Coefficient	T-statistic	Hypothesize	Results
Perceived value → Willingness of providing personal information	0.506	13.021	H1	Supported
Perceived benefit → Perceived value	0.515	13.435	H2	Supported
Perceived risk → Perceived value	−0.164	3.310	H3	Supported
Personalization → Perceived benefit	0.654	20.455	H4	Supported
Sensitivity of information → Perceived risk	0.230	5.523	H5	Supported
Privacy concern → Perceived risk	0.644	15.629	H6	Supported

5 Conclusion

This study proposes a research model based on the privacy calculus theory to explore the sensitive relationships between personalized service and privacy concern. i.e., how the users react when they perceived the decision dilemma between exposing the personal privacy (perceived risk) and earning the benefit of personalization (perceived benefit), and how the customer perceived value of personalization contribute to their willingness to provide personal information. Accordingly, this study aim to investigate the impact of personalization on perceived benefit of personalized service with information disclosure. In addition, the influence of sensitivity of information and privacy concern on perceived risk of information disclosure. Moreover, we further examined the influence of perceived benefit of personalized service with information disclosure and perceived risk of information disclosure on perceived value of information disclosure. Finally, we tested the relationship between perceived value of information disclosure and the willingness of providing personal information.

We collect the empirical data through an online survey to test our proposed research model. The results of PLS analysis indicate that personalized service positively affects perceived benefit. In addition, both of information sensitivity and privacy concern positively affect perceived risk. The results also indicate perceived value positively affected by perceived benefit but negatively affected by perceived risk. Moreover, perceived value will increase the customers' willingness to provide personal information. The findings of this study provide implications for both researchers and practitioners of personalized recommender systems.

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