

Shopbot banking: An experimental study of customer satisfaction and loyalty.

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Abstract

Agent technology has been applied to design new services simplifying product and merchant brokering in several consumer industries. The term “shopbots” is generally used to characterize these services. It is proposed that shopbots will make consumers more rational, more satisfied, and less loyal. In this study, the propositions of reduced loyalty and increased satisfaction is elaborated. We propose seven hypotheses of the effects of using shopbots on customer satisfaction and loyalty. The hypotheses are tested in an experimental study of consumers choosing a financial service provider. We find strong support for the hypotheses of increased satisfaction with the Internet as a search medium, but no effects of shopbot use on product satisfaction. We find conditional support for the hypothesis of reduced cognitive loyalty, but no effects of shopbot use on affective, conative, action or behavioral loyalty. The implications of these findings for financial and information service providers are discussed.

Keywords: Shopbots, agent based services, software agents, customer satisfaction, customer loyalty, consumer buying behavior.

Introduction^[1]

A common belief is that the Internet will give consumers access to more information and make it easier to compare information about various products and vendors. It is proposed that this will give more rational consumers both when it comes to search for information and choice of products. With more information of product attributes, the consumers will choose products that better match their preferences. However, the amount of information available on the Internet is enormous. Consequently, it may be difficult for consumers to find relevant information, and to fully take advantage of the identified information when using traditional search engines. Furthermore, the information in web sites is presented in various formats, making it difficult for consumers to compare information presented to them. To assist consumers in their information search, information service providers offer agent based services that aggregate information of products and vendors, and make product brokering easier. Such agent based services are often termed “shopbots”^[2]. By using shopbots, it will be easier for consumers to locate updated information about attributes of products, to elaborate on these attributes, and to compare attributes across products and vendors.

It has been proposed that the availability of shopbots is one of the reasons why electronic markets will be more efficient (e.g. Greenwald and Kephart, 1999; Mougayar, 1998).

This is mainly explained by more rational consumer buying behavior and reduced consumer loyalty. A proposed additional effect is that consumers will be more satisfied in electronic markets because it will be easier for the consumers to find products that better meet their needs. Although the propositions seem plausible, they have so far hardly been

studied empirically. Economists have used simple models of the relationship between information of price, utility and consumer choice in studying shopbot effects. Using this approach, Greenwald and Kephart (1999) predict increased efficiency in electronic markets as a result of shopbot use. Their predictions correspond well with the analytic predictions of Bakos (1997). Agent technology researchers study software agents from a cognitive architecture perspective consisting of beliefs, preferences and intentions. Such models have been applied to the study of software agents in auction markets (e.g. Sandholm, 1996). A third approach is to apply a decision making model of the consumer buying process. Such models have been used to characterize the roles of software agents in electronic commerce (e.g. Maes, Guttman and Moukas, 1999). Recently, these models have also been applied to studies of the behavioral effects of using shopbots and other software agents on consumer buying behavior (Häubl and Trifts, 2000; Lynch and Ariely, 2000). Most of these studies have focused on the information search and choice stages of the decision process. Although a similar approach is used here, the purpose of this article is to study how shopbots affect customer satisfaction and loyalty. The study compares satisfaction and loyalty among on-line bank customers using shopbots when choosing a financial service provider^[3] with customers that are not given access to shopbot services. The paper is organized as follows: First, we discuss the concepts of customer satisfaction and loyalty, and propose seven hypotheses of how customer satisfaction and loyalty are affected by using shopbots. Next, we present the experimental design used to test the seven hypotheses. We then present our findings and discuss relevant validity threats. In the final section we discuss implications of our findings to research, to financial service providers, and to information service providers.

Theory and propositions

As argued by DeKimpe, Steenkamp, Mellens and Abeele (1997), it is more expensive to recruit new customers than to keep existing customers (Rosenberg and Czepiel, 1983). Loyal customers are also assumed to be less price-sensitive (Krisnamurthi and Raj, 1991), and loyal customers give a firm valuable time to respond to actions taken by competitors (Aaker, 1991). Furthermore, loyal customers may also reduce marketing costs and raise barriers of entry to the market (Sharp and Sharp, 1997). Therefore, firms strive to keep their existing customers.

Customer satisfaction is an important antecedent for loyalty (Yi, 1990), and it has been found to be the most important determinant of loyalty among on-line bank customers (Methlie and Nysveen, 1999). Customer satisfaction is often explained using a confirmation/disconfirmation paradigm. In this paradigm, satisfaction is a function of the discrepancy between a comparison standard and the customers' perception of the product after trial. Expectations about the product are often used as a comparison standard. If the customers' perceptions of a product do not come up to what was expected (disconfirmation), they will not be satisfied with the product. If the customers' perceptions of the product are as expected (confirmation) or better, they will be satisfied with the product.

Shopbots help customers to find relevant information on the Internet. Furthermore, shopbots present relevant information to the customers in a format that makes it easy for

them to elaborate the information and to compare attributes of various products.

Consequently, shopbot users will perceive the Internet as a more useful medium for information search than non-users. Thus, we propose the following hypothesis.

H1: Users of shopbots are more satisfied with the Internet as an information search medium than non-users.

If customers take advantage of shopbot access, their decisions about buying a product will be based on more information presented in a more consistent format. Consequently, these customers will develop expectations of the product based on the elaboration of more information. This makes their expectations more in accordance with their perceptions of the product after trial. For customers not using shopbots, it is more difficult to find relevant information on the Internet. Furthermore, the information that is found is presented in various formats, making it difficult to elaborate. Customers that do not use shopbots will not have elaborated so much information about the product as customers that have used these services. Thus, disconfirmation of expectations is more likely for non-using customers than for customers using shopbot services. Based upon this discussion, we propose the following hypothesis:

H2: Shopbot users are more satisfied with the product they choose than non-users.

Loyalty can be explained using a four-stage model of loyalty strength (Oliver, 1997).

Cognitive loyalty is based upon the product information available to the customer. For

example, if one bank offers higher savings account rates than other banks, the customers may keep on using the bank as long as it offers the high interest rates (Oliver, 1997). However, this is not a strong form of loyalty. If another bank offers a higher interest rate, the customers will change bank. Shopbots make it easier for customers to obtain information about the savings account rates of other financial service providers. If customers are cognitively loyal to their bank, shopbot services will assist in informing customers on the currently available rates, and make it easier for the customers to choose the bank with the best rates at all times. Based on this discussion, we propose the following hypothesis.

H3: Shopbot users are less cognitively loyal to a chosen product than non-users.

Cognitive loyalty is a weak form of loyalty, and banks want customers that are deeply committed to them. For that reason, it is important to study the effects of using shopbots on stronger forms of loyalty as well. Affective loyalty is based on customers' feelings toward and commitment to a product. This means that the customers have an attachment to the product that is based on more than cognition. Affective loyalty is a function of the customers' affect-based attitudes to a product. Attitude to a product is based upon an established relationship between the customer and the product. If customers have positive attitudes to the product, they will develop an affective loyalty to the product. Affect is more deeply encoded in the customers mind than cognition, which is more subject to counterarguments (Oliver, 1997). Affective loyalty is therefore harder to dislodge than cognitive loyalty. As noted earlier, shopbot services give the customers more information

about the products and present it in a format that makes it easy for the customers to elaborate the information. Therefore, customers that are using shopbots will develop expectations of product performance that are closer to the real product performance. Because they develop realistic expectations, they will also choose products that better meet their needs. Thus, customers will be satisfied with the product, develop a positive attitude to the product, and keep on using it.

Another argument for increased affective loyalty of shopbot users is based on the results of a study of on-line bank customers (Methlie and Nysveen, 1999). This study indicates that a reduction in search cost, for example as a result of shopbot use, leads to an increase in affective loyalty. The reason may be that customers appreciate that the banks make it easier for them to search for information, and this increases the customers' satisfaction with the banks. Therefore, we propose that the effect on affective loyalty of using shopbots is in the opposite direction of the effect on cognitive loyalty.

H4: Shopbot users are more affectively loyal to a chosen product than non-users.

Although customers are satisfied with a product, they may not buy the same brand again. Results from a study of car customers showed that although 85 to 90 percent of the customers were satisfied with the chosen product, only 40 percent of the customers repurchased the brand (Reichheld, 1993). This indicates that affective loyalty is not a perfect predictor of behavioral loyalty. An explanation of this may be that customers can be satisfied with many brands in a product category, and therefore be affectively loyal to

many brands. Conative loyalty is defined as the customers' behavioral intention to keep on using the brand in the future. Although this is an intentional measure of loyalty, it is assumed to be a stronger predictor of behavioral loyalty than both cognitive and affective loyalty.

We have argued that customers using shopbots will be more satisfied with the product they decide to buy, and therefore more affectively loyal than customers that do not use shopbots. Attitudinal theories often predict an effect of affect-based attitudes on behavioral intention (Fishbein and Ajzen, 1975). Therefore, we argue that shopbots, by their effect on affective loyalty, will have a positive effect on conative loyalty.

H5: Shopbot users are more conatively loyal to a chosen product than non-users.

Action loyalty focuses on whether the customers are willing to take action against obstacles keeping them from buying the same brand. This is an even stronger form of loyalty than conative loyalty because it involves actions to overcome obstacles as well as a positive intention to repurchase the brand. Action loyalty is assumed to be a function of conative loyalty. We have proposed that customers using shopbots will be more conatively loyal than customers not using these services. Thus, we propose the following hypothesis.

H6: Shopbot users are more action loyal to a chosen product than non-users.

The hypotheses presented so far are based upon an attitudinal approach to loyalty. Our final hypothesis is based upon a behavioral approach (Dekimpe, Steenkamp, Mellens and Abeele, 1997). Behavioral loyalty is measured by whether customers choose a different brand or keep on using the same brand. In attitude theory, behavioral intention is used as a predictor of actual behavior. In our discussion above, we proposed that shopbots will have a negative effect on cognitive loyalty and a positive effect on affective loyalty, conative loyalty and action loyalty. Affective loyalty, conative loyalty and action loyalty are assumed to be stronger predictors of behavioral loyalty than cognitive loyalty. Therefore, we make the following prediction of the effect of agent based services on behavioral loyalty.

H7: Shopbot users are more behaviorally loyal to a chosen product than non-users.

Our setting for testing these hypotheses is the consumer banking industry. Financial services are information rich products with easily defined and often quantitative attributes. Several shopbot services are available^[4]. Consequently, major changes have been predicted in individual consumer behavior from the increased use of shopbots and similar services in consumer banking (Darlington, 1998).

Method

To test the seven hypotheses, a web-based experiment was designed. The setting of the experiment was a consumer banking situation. The experimental procedure consisted of a pre-experimental questionnaire, a task presentation, conditional access to a shopbot

service, and a post-experimental questionnaire^[5]. Extensive logging was combined with self-reported measures. To prevent the subjects from applying an inappropriate sequence of the different tasks, a session was created and controlled with “cookies” for each participant. By visiting the experiment website, the subjects were first given a brief introduction to the experiment. Next, the pre-experimental questionnaire was answered. Then the task context and the task were presented. In the task context, the student subjects were supposed to have recently graduated and had been employed in a fairly well paid job. They had supposedly been given a monetary gift from their parents and were about to buy an apartment. The task itself consisted of choosing a single financial service provider for a bundle of services consisting of a mortgage, a savings account, and a current account for their monthly average outstanding salary after tax. The task description is shown in appendix A. To assist the subjects in their choice, a web page of links was designed. The design of the web page represented the manipulation of the experiment. Subjects in the control group were given links to financial service providers only. Subjects in the manipulated group were given the same links, but in addition they were given access to a shopbot service. This service was especially designed for the experiment, and provided aggregated information on product and vendor attributes particularly relevant to the task^[6]. To assess if subjects in the control group used shopbot services, or if subjects in the manipulated group preferred not to use the shopbot, logging was applied. It was no need to reassign subjects based upon these logs. When the subjects had made their choice, they were directed to a post-experimental questionnaire in which their choice and other post experimental observations were reported. No time limits were set, but the subjects were informed that normal completion time was estimated to one

hour. Average completion time was 72 minutes. As an incentive to participate, the subjects could voluntarily register their email address for a lottery. The procedure and questionnaires were pre-tested and discussed in a pilot study involving eight PhD-students.

The subjects were recruited from a student pool at two different colleges at two different occasions. Participation was voluntary, and the opportunity to participate was announced in relevant student classes. To get sufficient variation in age, sex, domain knowledge, technical knowledge and innovativeness, students from a business school and from an engineering college were selected. The subjects were randomly assigned to the control and manipulated groups. A total of 144 subjects participated in the experiment. The distribution of the subjects is shown in table I.

Take in table I.

Table I shows a skewed distribution of male and female subjects in the two groups. This is primarily due to the low proportion of female students in engineering education. To identify any other systematic bias in the assignment of the subjects, we used four variables to compare shopbot users and non-users. Descriptive statistics showing the differences between the users and non-users are found in table II.

Take in table II.

The knowledge and innovativeness variables were multi item scales designed to measure knowledge of the consumer banking industry, knowledge of information technology and innovativeness respectively. The reliabilities of the measures are indicated by Cronbach's alpha in table II. T-tests of differences in means were used to reveal any systematic differences in the four variables between users and non-users. A significant difference between the two groups was found in knowledge of the consumer banking industry. The user group had significantly more knowledge of the industry. We discuss possible validity effects of the skewed gender distribution and the knowledge difference in the results section.

As indicated above, the stimulus variable was operationalized by giving users access to a shopbot service. The shopbot was particularly designed for the task context of the experiment, and included ordered display tables of financial service providers' terms, an overview of the expected financial costs of using each provider in different market segments, and a calculation service making it possible for the users to calculate the total financial costs of using each financial service provider. The shopbot also included a notification service where the users could require personal notification by email if the terms of a particular financial service provider changed.

The dependent variables of each hypothesis were either observed directly or measured in the post-experimental questionnaire. All attitudinal measures from the post-experimental questionnaire were multi item measures. An overview of all concepts, measures and reliabilities is found in table III.

Take in table III.

All attitudinal measures were based upon the subjects' agreement or disagreement with a number of attitudinal statements. A five-point scale was used to indicate agreement. An overview of the statements used to measure each concept is shown in appendix B. Since this was one of the first attempts to test the effects of using shopbots, and since there were no standardized measures of the concepts in table III, all measures except the action loyalty measure were considered sufficiently reliable (Nunnally, 1978). The action loyalty measure could have been made a single item measure. However, using single item attitudinal measures seldom give any improvement in reliability, so we preferred to keep the action loyalty measure a multi item measure and accepted the somewhat lower reliability. Service provider satisfaction and all loyalties were also measured in the pre-experimental questionnaire with very similar reliabilities. Behavioral loyalty was measured by comparing the current financial service provider reported in the pre-experimental questionnaire with the selected service provider of the task. If the subjects retained their current financial service provider, behavioral loyalty was considered high. All attitudinal satisfaction and loyalty measures were approximately gaussian, and naturally, behavioral loyalty was binomial.

Results

During the experiment, 67.7 % of the subjects selected a financial service provider different from their current provider. With such a high change rate, we expected to find

both attitudinal and behavioral effects of using the shopbot. As a manipulation check, we studied the differences in search time, perceived amount of information collected and perceived number of information sources used during the task between shopbot users and non-users. Shopbot users spend less time searching for information ($F(1,134)=7.536$, $p<0.01$), the perceived amount of information searched was larger ($F(1,129)=4.276$, $p<0.05$), and the perceived number of information sources used was higher ($F(1,129)=8.768$, $p<0.01$). Consequently, shopbot access represented sufficient manipulation with behavioral effects. Six of the sub hypotheses of satisfaction and loyalty were tested using a traditional analysis of variance model with group membership as the independent variable, and each of the attitudinal variables of table III as dependent variables. In table, IV a summary of the results is shown.

Take in table IV.

Table IV shows each dependent variable, the means of each variable in the user and non-user groups, the degrees of freedom (d.f.) of the F-tests, and the F-values of each analysis of variance. We found a significant difference in satisfaction with Internet as an information search medium. The difference was in the proposed direction, and strongly supported the hypothesis that shopbot users were more satisfied with the Internet as a search medium than non-users (H1).

Since we found a strong effect of shopbot use on search satisfaction, we expected to find product satisfaction effects as well. However, no significant difference in product

satisfaction between shopbot users and non-users was found. Thus, shopbot users were not more satisfied with the chosen product than non-users (H2). Since this was rather surprising, we studied the relationship between pre-experimental product satisfaction and change of financial service provider. As could be expected, satisfaction with the current financial service provider was significantly lower among the subjects changing their provider than among those retaining their current provider ($F(1, 139)=14.330, p<0.01$). Since we found no significant difference in post-experimental product satisfaction between the subjects changing their financial service provider and those retaining their current provider, we expected to find an interaction effect of shopbot use and change of service provider on satisfaction. This could have explained any lack of significant satisfaction effects at the aggregate level. However, analysis of variance using a factorial model of shopbot use and change of financial service provider showed no significant interaction effect on product satisfaction ($F(1, 134)=0,710$). Consequently, we concluded that there was no significant increase in product satisfaction from using shopbots (H2).

A small difference was observed in all attitudinal loyalties between shopbot users and non-users. The difference in cognitive loyalty was in the proposed direction, but the differences in affective, conative and action loyalties were in the opposite direction of those proposed in the hypotheses. However, none of the observed differences were significant. Thus, we found no support for the hypotheses that shopbot users were less cognitively loyal (H3), more affectively loyal (H4), more conatively loyal (H5) and more action loyal (H6).

To investigate the effect of shopbot use on behavioral loyalty, we studied the differences in frequencies of financial service provider change between shopbot users and non-users. A chi-square test of independence between behavioral loyalty and shopbot access showed a chi-square value of 0.541 (d.f.=2). This value was far from significant, and we concluded that there was no difference between users and non-users in the frequencies with which they changed their service providers. Consequently, we found no support for our final hypothesis of increased behavioral loyalty among shopbot users (H7).

Since the relationship between attitudinal and behavioral loyalty has not been given too much attention, we decided to investigate this further. Because behavioral loyalty was a binomial variable, analysis of variance with behavioral loyalty as the independent variable and the attitudinal loyalty measures as dependent variables was used. The F-values were significant for affective loyalty ($F(1,136)=55.552, p<0.01$), conative loyalty ($F(1,137)=20.899, p<0.01$), and action loyalty ($F(1,138)=22.195, p<0.01$), but not significant for cognitive loyalty ($F(1,138)=2.085$). This confirmed the assumptions made in the theory section that cognitive loyalty is the least relevant antecedent of behavioral loyalty. For the other loyalty variables, this result showed a close relationship between attitudinal and behavioral loyalty. We also studied if any interaction effects could be found of behavioral loyalty and shopbot use on the attitudinal loyalties. No interaction effects were found for affective loyalty ($F(1,134)=0.133$), conative loyalty ($F(1,135)=0.065$) and action loyalty ($F(1,136)=0.207$). However, there was a significant interaction effect on cognitive loyalty ($F(1,136)=5.300, p<0.05$). This is further illustrated in table V.

Take in table V.

In table V we find the mean cognitive loyalty among the shopbot users and non-users changing or retaining their financial service provider. Among the subjects that retained their financial service provider, shopbot users had a somewhat higher cognitive loyalty than non-users. However, the difference was not significant. Among the subjects that changed their financial service provider, shopbot users had a significantly lower cognitive loyalty than non-users ($t(93)=2.372, p<0.05$). This explained the interaction effect, and showed that for customers that had broken their existing behavioral loyalty to their current financial service provider, access to shopbots had the effect proposed in the theory section (H3). This finding gave conditional support for the hypothesis that use of shopbots may have a negative effect on cognitive loyalty (H3).

As indicated above, 67.6 % of the subjects selected a financial service provider different from the one they reported as their current provider. One of the reasons for this high percentage may have been that the task context made the subjects less committed to the selected service providers than they were in real life settings. However, there was no reason why this task context effect should bias the change frequency in the direction of shopbot users or non-users. Due to skewed distributions of gender, age and domain knowledge, we tested age and domain knowledge as covariates in the models. Neither age nor domain knowledge proved significant as covariates in these models. We tested for the effects of the skewed gender distributions by including the gender variable in a

factorial model. We also made a similar analysis including the subjects' education (business school or engineering college) as a variable in a factorial model. No significant interaction effects of the gender and education variables were found with the variable indicating use of shopbots in the models. We also tested differences between shopbot users and non-users in the product satisfaction and attitudinal loyalty variables from the pre-experimental questionnaire. The results showed that there were no differences in pre-experimental satisfaction and loyalty between the two groups. Thus, lack of effects could not be attributed to bias in the allocation of satisfied or loyal customers to any particular user group prior to completion of the experimental task. Based upon these tests, we concluded that our findings were consistent and internally valid.

To sum up, there were no differences in satisfaction with the selected financial service providers between shopbot users and non-users in this study. However, there was a significant difference in satisfaction with Internet as an information search medium between the two groups. Further, there were no differences in loyalty between shopbot users and non-users after the choice of a financial service provider had been made. The final conclusion was also consistent when using both attitudinal and behavioral measures of loyalty. Elaboration of the analysis showed a pattern of behavior indicating that the subjects that were unsatisfied with their current financial service provider were more likely to change their service provider. The subjects satisfied with their current provider were more likely to retain their provider. After the choice was made, these two subject groups were more similar in their satisfaction with their chosen financial service provider. The same pattern was found for subjects that were characterized as disloyal or

loyal to their current financial service provider in the pre-experimental questionnaire. However, access to shopbots had no effect in this behavioral pattern, neither on satisfaction, affective, conative, affective nor behavioral loyalty. For cognitive loyalty an effect was found. Among customers that had broken their existing behavioral loyalty by changing their financial service provider, users of shopbots were less cognitively loyal than non-users. In addition, shopbot services made all subjects more satisfied with the Internet as their most important medium in evaluating whether to change their financial service provider or not.

Discussion and implications

Even though our findings were considered internally valid, the uniqueness of the subjects, the financial task context and the particular shopbot service used in the experiment may limit the external validity of the study. It can be argued that students are not representative of consumers in general. However, the student subjects of this experiment had an average age of 24.4 years, and 11 % of the subjects were more than 30 years old. Furthermore, age showed no explanatory power in the covariate models indicated above. In addition, 141 of the 144 subjects had an established relationship with a financial service provider, and should be considered as consumers with a low, but stable income. It is even possible that the uniqueness of the subjects strengthens the external validity of this study. We argue that if these subjects were generally less loyal than consumers in general, it is even less likely that loyalty effects from using shopbots will be found among more loyal consumers.

The uniqueness of the financial task context is mainly represented by the attributes of financial services. These “products” are rich in information content and their attributes are easily comparable. However, the buying process may be different from the one used when buying other products. One example is that a loan decision is integrated with the decision of buying the product that the loan is financing. We argue that the information richness and the easily comparable attributes of financial services make them well suited for a test of the effects of using shopbots. These features are in fact ideal for the application of shopbot services, and this makes it even more surprising that so few effects were found. We argue that since so few effects were found when using shopbots as an assistance tool in buying information rich and easily comparable products, it is unlikely that more effects will be found with less information rich and less comparable products. The complexity of financial services represents a true threat to the external validity of our results. Complex products often imply higher shifting costs and more loyal customers. However, the complexity of the financial services did not prevent 67.7 % of the subjects from changing their financial service provider. Bearing in mind that financial services are complex products, one should not eliminate the possibility that satisfaction and loyalty effects of using shopbots may be found when studying simpler consumer goods like books or CD’s.

It may be argued that the stimulus of the task – the shopbot service – was not properly operationalized, meaning that if other shopbots had been offered to the subjects, more significant effects may have been observed. This argument always applies to tests of propositions of the behavioral effects of new technology. It also seems that very little

documentation is required of those proposing such behavioral effects. In fact, this situation is very different from other disciplines. In medicine, it is unlikely that any effect of a new drug can be proposed without proper posterior documentation. However, in information systems research, similar norms do not seem to exist. We still argue that the shopbot service offered to the subjects of this study was representative of services for product and merchant brokering of financial services. Our manipulation check showed behavioral effects of using the shopbot on search time, perceived amount of information and number of information sources used. This supports our argument that the offered service represented a proper manipulation. The significant difference in satisfaction with the Internet as a search medium between users and non-users also indicated that the shopbot was seen as a useful and satisfactory service for product and merchant brokering. We argue that the uniqueness of the subjects, the financial task context and the shopbot service used in this study do not seriously limit the external validity of our conclusions.

This study has several implications for research, for financial service providers and for information service providers. Our findings indicate a strong relationship between the customers' satisfaction and their decision to change product or vendor. Satisfied customers retain their current product or vendor, and access to shopbot services do not change their satisfaction or loyalty. Dissatisfied customers are likely to change their product or vendor, and consequently they become behaviorally disloyal. However, access to shopbot services does not seem to affect their satisfaction and strong forms of loyalty. Instead, access to shopbots seems to affect their cognitive loyalty. Since these customers become disloyal through their behavior, cognitive loyalty may be an important

determinant of their future change of product or vendor. It is likely that this effect of shopbots will be strongest in product categories where loyalty in general is low. An example of such a product category is simple consumer goods like books and CDs. Thus, a similar study of the effects of shopbots on customer satisfaction and loyalty when buying simpler consumer goods should be done.

As indicated in the introduction, shopbots have been seen both as a threat and as a means to build customer loyalty. Our findings suggest that shopbots are not an unconditional threat to customer loyalty. For financial service providers that pay attention to their customers' satisfaction, shopbots represent no threat to loyalty. The situation is somewhat different if the customers become dissatisfied with their current provider. We have shown that if customers decide to change their provider, shopbot access may affect their cognitive loyalty. The other forms of loyalty do not seem to be affected by shopbots, meaning that if the financial service provider re-establishes customer satisfaction, shopbots represent no threat to the loyalty of these customers. However, the findings also suggest that shopbots are not the kind of value added services that can be used by vendors to build customer loyalty. If agent technology is to be applied, it should be used to create other kinds of value added services, such as e.g. personalized financial services, more likely to create customer loyalty. The same conclusion holds for product and vendor satisfaction. However, we have shown that satisfaction with using the Internet as a search medium increases with access to agent based services. Giving customers access to these kind of services may also be seen as an indication of vendor honesty. If the vendors give customers access to such services, vendors may both improve their image in the

electronic channel and increase the number of consumers performing their shopping in electronic channels.

Two strategies are usually found among information service providers offering shopbot services. One strategy is to offer product information from a large number of vendors. With this strategy, the service providers make product information a service in itself, and hope that customer trust and vendor independence will create site traffic, and consequently income. In the consumer banking market, BankRate^[7] relies on this strategy. Another strategy is to cooperate with selected vendors and create value added services on top of the information service. One example is to make it easier for customers to order the products they finally choose by providing direct links from the shopbot service to the participating vendors. With this strategy, both site traffic and fees of participating vendors generate the necessary income. In the consumer banking market, Quickenmortgage^[8] relies on this strategy. Our findings indicate that shopbots make consumers more satisfied with the Internet as a search medium, but have no effects on product satisfaction. To information service providers, this means that satisfaction with a good shopbot service is not automatically transferred to the product selected from the shopbot service. This also means that information service providers should be careful not to sell their shopbot services to financial service providers with the argument that these services create customer satisfaction. It also means that a strategy of vendor independence and consumer trust may be more successful for information service providers than a strategy based upon close relationships with selected financial service providers. We intend to investigate both these implications for information service

providers and the implications for financial service providers indicated above in a new study in the near future.

Notes

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² See e.g. <http://www.jango.com>; <http://www.dealpilot.com/>; <http://shop.lycos.com/>.

³ In this paper, the term “financial service provider” is used of all providers offering financial services to consumers in the consumer banking industry. Examples of such providers are banks, insurance companies, credit card companies and other payment service companies.

⁴ E.g. <http://www.bankrate.com> and <http://www.quickenmortgage.com>.

⁵ The procedure, questionnaires and task are found at the experiment site <http://sol.nhh.no/design> (in Norwegian).

⁶ A somewhat simplified version of the service is found at <http://sol.nhh.no/noagents/idefault.asp>.

⁷ See <http://www.bankrate.com>.

⁸ See <http://www.quickenmortgage.com>.

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Table I. Distribution of subjects (N).

Group/Education	Business	Engineering	Total
Nonusers	Male: 16 Female: 18	Male: 27 Female: 10	Male: 43 Female: 28
Users	Male: 30 Female: 10	Male: 27 Female: 6	Male: 57 Female: 16
Total	Male: 46 Female: 28	Male: 54 Female: 16	Male: 100 Female: 44

Table II. Descriptive statistics for users and nonusers (** p<0.01, * p<0.05).

Variable	Group	Mean (N)	t-value	alpha
Age	Nonusers	23.4 (71)	2.081	Single item
	Users	25.4 (71)		
Banking knowledge	Nonusers	8.3 (71)	2.413*	0.812
	Users	9.4 (71)		
Technology knowledge	Nonusers	9.8 (70)	0.592	0.745
	Users	10.1 (72)		
Innovativeness	Nonusers	6.7 (70)	1.087	0.697
	Users	7.0 (71)		

Table III. Concepts and their measures.

Concept of each hypothesis	Measure	Items	Alpha
Internet search satisfaction	Attitudinal	3	0.770
Product satisfaction	Attitudinal	5	0.813
Cognitive loyalty	Attitudinal	2	0.862
Affective loyalty	Attitudinal	4	0.873
Conative loyalty	Attitudinal	3	0.824
Action loyalty	Attitudinal	3	0.583
Behavioral loyalty	Observed	Single item	-

Table IV. Results of the analysis of variance for each attitudinal dependent variable (** p<0.01, * p<0.05).

Dependent variable	Nonuser mean	User mean	d.f.	F-value
Internet search satisfaction	11.29	12.48	138	8.123**
Product satisfaction	18.58	18.62	139	0.007
Cognitive loyalty	8.17	7.83	141	1.359
Affective loyalty	12.48	11.49	139	2.098
Conative loyalty	10.36	10.07	140	0.472
Action loyalty	6.70	6.44	141	0.708

Table V. Differences in cognitive loyalty between users and nonusers (** $p < 0.01$, * $p < 0.05$).

	Nonusers		Users		Total	t-value	d.f.
	Mean	N	Mean	N	N		
No change of provider	7.42	25	7.95	21	46	-1.248	43
Change of provider	8.57	46	7.69	50	96	2.372*	93
Total		71		71	142		

Appendix A. Task given to the subjects.

“You have recently graduated and have been employed in a fairly well paid job. Your yearly salary is NOK 320 000. However, the transition from student to employee requires you to make some financial decisions. First of all, you have decided to buy an apartment. You have found a good apartment priced at NOK 600 000. As a graduation gift, your parents have decided to give you NOK 250 000. Their requirement is that NOK 200 000 of the gift is used as equity in financing your apartment. The rest of the amount is to be placed in a savings account to cover for unforeseen future events. You are also interested in getting the best possible terms on your current account. This account is to be used in payment services and as a debit account for your cards. In this new situation, you are reconsidering the relationship you have with your existing bank. Either you can continue as a customer in your current bank, or you can change to a different financial service provider. However, this task requires that you select one, and only one, service provider for the following services:

- ✍ A mortgage of NOK 400 000
- ✍ A savings account of NOK 50 000
- ✍ A current account with good terms

With the assistance you can get from using the Internet, we ask you to select your financial service provider for the services listed above. To help you locate the relevant information, we have designed a web page with links to relevant sources of information.”

Appendix B. Statements used for measuring satisfaction and loyalty

Concept	Statements
Service provider satisfaction	<p>“I have good feelings toward the bank I have chosen”</p> <p>“I feel that I will have good experiences with the bank I have chosen”</p> <p>“I think it was a good decision to choose this bank”</p> <p>“I am very satisfied with the terms of the bank I have chosen”</p> <p>“I think I was offered good terms in the bank I have chosen”</p>
Internet search satisfaction	<p>“Using the Internet gave more relevant information than search based on conventional methods”</p> <p>“I found more relevant information using the Internet than I would have found without access to the Internet”</p> <p>“The search on the Internet gave more relevant information than I would have expected from a traditional search”</p>
Cognitive loyalty	<p>“I will keep on using this bank as long as it is profitable for me”</p> <p>“I will keep on using this bank as long as it offers the best interest rates for me”</p>
Affective loyalty	<p>“I have a positive emotional relation to the bank I have chosen”</p> <p>“I feel attached to the bank I have chosen”</p> <p>“In the future, I would like to remain a customer of the bank I have chosen”</p> <p>“The bank I have chosen has personal meaning to me”</p>
Conative loyalty	<p>“I will recommend the bank I have chosen to persons I know”</p> <p>“I think I will keep on using the bank I have chosen for a long time”</p> <p>“I intend to remain a customer of the bank I have chosen”</p>
Action loyalty	<p>“Because I feel committed, I will keep on using this bank”</p> <p>“If I need other financial services, I will go to the bank I have chosen”</p>