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2008

How Personality and Relationship Affect Customers' Adoption of Advanced Self Service Technology in Branch Banking

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ABSTRACT

Self Service Technology (SST) in brick-and-mortar outlets advances from pure transaction processing to elaborate pro-active sales functions, where customers can be addressed directly as part of interactive marketing and customer relationship management approaches. This opens up new ways to reach customers for transaction intensive industries like financial services. SST may be used to increase revenues by cross or up-selling instead of just cost-cutting by lowering transaction costs. Customer adoption of in-branch SST like ATMs or kiosk systems might take different courses than those of internet sales platforms and previous research suggests a high influence of personality traits as well as customer relationship characteristics.

We extend well proven technology adoption models by moderating effects from personality traits and customer relationship characteristics. Using survey and customer account data from customers of a European retail bank, we identify relevant moderating effects. Our study contributes by the transfer of SST adoption models to the specific research domain and the integration of moderating effects into adoption models by using additional external data.

Keywords

Self Service Technology, Adoption, Personality Traits, ATM

INTRODUCTION

The past decade has seen rapid and substantive changes in the way the customer relationship is dealt with in financial services. The internet is well established as a sales channel, but for the branch network the majority of banks do not exploit the possibilities of Self Service Technology (SST) and confine themselves using them solely for simple transaction processing like cash withdrawals (Bielski, 2007). Nevertheless, self service technology advances to more complex applications (Lake et al., 1998) and can depict a business process for pro-active selling: product recommendations from next-product-to-buy-prediction models (Knott et al., 2002) can be communicated via automated teller machines (ATMs) or in-branch kiosk systems to facilitate multi-channel integration (Neslin et al., 2006). Thereby, the customer can be reached when he is already engaged with his financial affairs (and rather open for banking products) and even directly purchase the product.

Banks are hesitant to enforce such advanced self-service technology for marketing purposes, although they could reach a part of their customer base, different from the online clientele. These internet-averse segments can be targeted successfully for sales of those financial products which do not require a substantial amount of explanatory support (e.g. time deposits, travel or property insurances) or initiate a personal consultation or a phone call from the sales personnel.

For this purpose, specific business processes (for marketing, customer relationship management and sales processing) as well as IT systems (database, campaign management tools) have to be implemented and this additional channel has to be marketed to the customers. A sound understanding of in-branch SST as a sales channel is a prerequisite for a successful implementation (Meuter et al., 2000) and therefore valuable for retail banks' customer relationship and channel management. Still, there is not a common understanding, what makes customers adopt such pro-active sales SST. Existing studies investigating the adoption mostly do not analyze the sales aspect of SST usage; they just focus on the transaction aspects.

Especially personality traits were shown to have a strong effect in the adoption process for SST (Meuter et al., 2005). Thus, the factors influencing the adoption of SST for pro-active sales in retail banking should be analyzed, in order to provide a basis for design considerations and support the specific customer communication in the roll-out phase. Therefore, our research question is:

In how far do consumers' personality traits and relationship characteristics affect the major drivers for SST adoption?

As Dabholkar (2002) summarizes, researchers suggest that hypothesizing direct effects may be somewhat redundant and obvious, and it is much more meaningful to investigate the moderating effects of external factors. Following this advice, we build on Parasuraman (2000) and Dabholkar's work and focus on the moderating effects of personality traits in the adoption decision to approach our research question.

The remainder of the paper is organized as follows: after a short description of the object of research (section 2), we review current literature related to the influence of personality traits on individual adoption of customer self service technology (section 3), develop a causal model and derive hypotheses based on prior literature on innovation adoption (section 4). We describe our methodology (section 5), then analyze the model using Partial Least Squares (PLS) method and data from a European retail bank (section 6) and conclude with a discussion and the limitations of our research (section 7).

SELF SERVICE TECHNOLOGY

In this section, we give a brief overview on SST in retail banks and cater to related research. SST are defined as technological interfaces enabling customers to use a service independent of direct service-employee involvement (Meuter et al., 2000). As technology-oriented interactions now have the potential to determine the long-term success of a business (Meuter et al., 2003), the role of SST in the customer interaction increased significantly.

In retail banking context, this mainly involves automated teller machines (ATMs) as well as telephone and internet banking systems. As benefits for the adopting retail bank, increased productivity and cost-savings are commonly cited (Dabholkar, 1996a; Weijters et al., 2007), as well as increased revenues by attracting more customers (Moutinho and Curry, 1993). For the consumers time-savings (Bateson, 1985), convenience and increased availability (Weijters et al., 2007) count and the increased control for processes makes them prefering SSTs over person-to-person encounters (Meuter et al., 2000).

Located within bank branches, SST is represented by traditional ATMs, presentation kiosks or advanced ATMs merging traditional transaction processing capabilities and pro-active individual marketing approaches. This is supported by the introduction of web-based ATMs facilitating the use of multiple applications on the terminal (Walsh, 2006). In contrast to the online banking channels, in-branch SST is mostly in use for processing standardized transactions, but rarely for the advanced proactive sales functions (Bielski, 2007).

Existing scientific research on SST includes the profiling for distinct SST users based on the demographic characteristics, although already early research indicates, that a stringent relationship could not be established (Meuter et al., 2003). Furthermore, classification schemes for new SSTs (Dabholkar, 1996b) and the role of the technology in enhancing service quality and service encounters (Dabholkar, 1996a; Beatson et al., 2007; Weijters et al., 2007).

Even though this field is of certain theoretical and managerial significance, there is not a clear understanding of factors which determine the adoption of SST by consumers, especially not in the context of using advanced SST used for pro-active sales.

RELATED RESEARCH

To analyze the adoption of SST, one can draw from the vast literature on innovation adoption especially in the field of information systems. For the individual perspective, the Technology Acceptance Model [TAM] (Davis, 1989) is a well-known model based on the Theory of Reasoned Action (Ajzen, 1980), explaining the individual adoption by two constructs, the Perceived Ease of Use and the Perceived Usefulness. Both constructs have been used to study adoption of innovations in many cases (Lucas Jr et al., 2007).

There is a vast amount of derivatives and additions to the basic model (Benbasat and Barki, 2007) of Davis' seminal article. An important addition influencing adoption research was made by Parasuraman (2000) who developed the Technology Readiness Index (TRI) as a framework identifying four dimensions of peoples' dispositions regarding technology (optimism, innovativeness, discomfort, insecurity) and five corresponding clusters of people. In a UK replication, support was found for four of the five clusters (Tsikriktsis, 2004) and a link to TAM research was established (Yi et al., 2003).

In the field of SST supported transactions, a few applications of the TRI exist, e.g. Liljander et al. (2006) explained the use of SST for airline check-in with the help of the TRI dimensions. Lin and Hsieh (2007) extend the study of Meuter et al. (2003) and put the emphasis on customer satisfaction as the outcome of SST usage. Recent advances brought together TRI and TAM derivatives for SST adoption research (Walczuch et al., 2007).

Although TRI caters to personality traits, the incorporation of overall traits into research was even more emphasized by Dabholkar and Bagozzi (2002) involving a broader scope of traits as well as situational factors for the adoption. A recent

meta-analysis also puts emphasis on moderating effects within TAM-derived models (Jeroen and Martin, 2007). Both findings advise to pursue the SST adoption research in this way.

In addition, a thorough review of generic IS innovation adoption factors given by Jeyaraj et al. (2006) reveals several factors derived from the complexity of the adopter's circumstances. In the field of SST, this is represented by the characteristics of the banking relationship and especially the financial resources to manage.

Nevertheless, common adoption research models for in-branch SST do not cater to this factor set and were not applied to the specific research domain of SST for pro-active sales.

RESEARCH MODEL

In this section, we develop our research model (see Figure 1), integrating a basic attitudinal model and moderating aspects of personality traits and customer relationship characteristics.

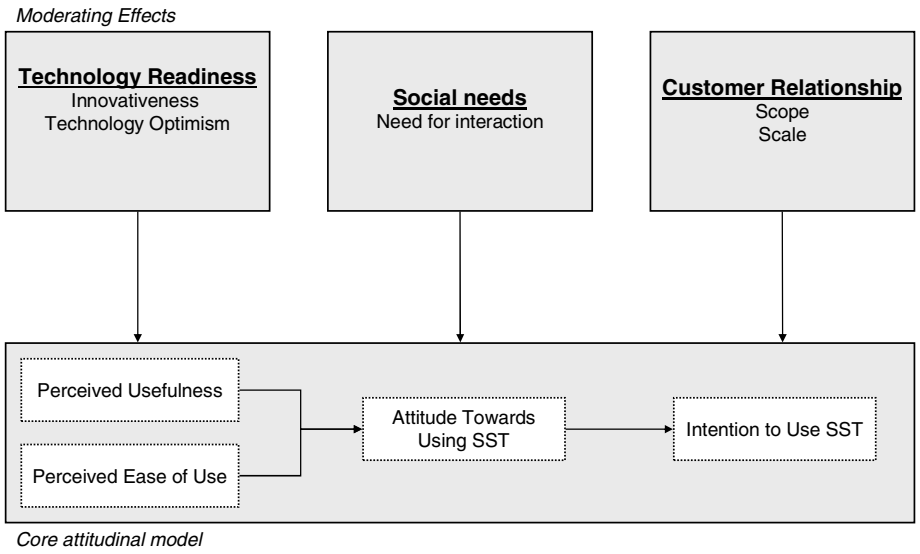

Figure 1. Conceptual model for moderating effects on SST adoption

Core attitudinal model

In a technological context, the vast quantity of studies following Davis' technology adoption model (for a recent review see Benbasat and Barki, 2007) identified relationships between the constructs of *Perceived Usefulness (PU)* and *Perceived Ease of Use (PEU)* and the adoption of a certain technology, determined as the attitude to use technology affecting the usage intentions. SST is a typical technological device new to the consumer, especially when providing advanced, pro-active sales functions instead of mere transaction processing. It therefore qualifies as an innovation according to Rogers (2003), who states that innovation is *"[…] an idea, practice, or object that is perceived as new by an individual or other unit of adoption"*. We therefore hypothesize:

H1a: Perceived Usefulness has a positive (direct) effect on the attitude towards using SST.

H1b: Perceived Ease of Use has a positive (direct) effect on the attitude towards using SST.

H1c: Attitude has a positive (direct) effect on the intention to use SST.

Relevant external effects moderating the adoption behavior

In the following we focus on how external factors (both personality traits and customer relationship characteristics) moderate the relationships delineated in the core attitudinal model.

Personality Traits

Consumer differences are considered influential for adoption research and those personality-specific traits are of greater interest than demographic or psychographic influences as those are "at the heart of consumer attitude formation and behavioral intentions" (Dabholkar and Bagozzi, 2002). Among a plethora of personality traits, our research domain suggests to concentrate on traits known to affect the technology adoption, which directly leads us to the Technology Readiness Index (TRI), which is considered a comprehensive index (Kleijnen et al., 2004) of relevant personality traits. Albeit the original TRI covers four dimensions, we stick to the main influential dimensions optimism and innovativeness as those proved to be stable and reliable as independent dimensions (Liljander et al., 2006) and thereby avoid reported problems with the dimensionality of the TRI (Yi et al., 2003). Customers with a high personal predisposition to technology will be less concerned with the Ease of Use:

> H2a: The technology readiness dimension optimism attenuates the relationship Perceived Ease of Use → Attitude.
>
> H2b: The technology readiness dimension innovativeness attenuates the relationship Perceived Ease of Use → Attitude.

Beyond this, we consider another personality trait directly connected to the research domain: the desire to retain personal contact with others during service encounters expresses the need for interactions (Dabholkar, 1992). Encounters with bank personnel allow for the development of interpersonal relationships between customer and clerk. By definition, using an SST eliminates the interactions with a human bank clerk or at least reduces it. Many consumers value the interpersonal interaction (Bateson, 1985; Curran and Meuter, 2005) and therefore might reject SST, whereas others choose to use SST in order to avoid human contact (Meuter et al., 2000). This is structurally the same with sales interaction as it is the case with advanced SSTs; therefore we assume that for those with a strong need for interaction, the perceived usefulness has to have a significant higher influence:

> H2c: The need for interaction strengthens the relationship Perceived Usefulness → Attitude.

Customer Relationship Characteristics

Previous research identified a relevant influence of the customer relationship determinants on the adoption of banking channels (Black et al., 2002). We focus on the scope and the scale of the relationship (Scott, 2006) in the following. Regarding the scope of the banking relationship, we take the number of purchased products into consideration. One major driver for product purchases in finance is an intrinsic primary need addressed by the specific financial service (saving money, managing risks etc.). With every product, the intrinsic demand for additional products to cover primary needs decreases. Hence, the need for bank interactions (in the sense of the sales functions provided by the advanced SST) decreases and we assume that a strong perception of usefulness is needed to motivate the trial and use of advanced SST functions:

> H3a: The Scope of the relationship strengthens the relationship Perceived Usefulness → Attitude.

The scale in contrast, has an opposite effect: a high-scaled customer relationship would mean that the customer has more financial resources to manage and thus a stronger need for banking channels that offer a high level of flexibility (Wan et al., 2005), which includes the SST. Thus, we conclude with the hypothesis:

> H3b: The Scale of the relationship attenuates the relationship Perceived Usefulness → Attitude.

METHODOLOGY

The constructs were operationalized using established indicators whenever possible. The constructs and the relevant sources are depicted in Table 1. The constructs were used in the survey in a respondents' native-language version (German) using the back-translation method (Brislin, 1970). When applying a positivist approach and testing a set of hypotheses in a structural equation model, a strong underlying theory is recommended (Dibbern, 2004). Therefore, all hypotheses are well-grounded in the existing literature.

To determine the adoption behavior by testing those hypotheses, an empirical study among customers in cooperation with a European retail bank has been conducted in Germany. The survey was conducted using a written questionnaire, distributed in paper form in November 2007.

The participants were given a detailed scenario description (Dabholkar and Bagozzi, 2002) as well as precise examples of which sales-related functions (e.g. purchase, prolongation, initiation of call center contact) for which products (e.g. fixed-income deposits or travel health insurances) are to be expected. The data set gathered was enriched by account and static data from the bank's data warehouse.

Construct	Indicator	Loading	t-statistic
Attitude towards using SST (Dabholkar and Bagozzi, 2002)	ATT-1: How would you describe your attitude towards using the additional banking terminal functions described? [endpoints: bad/good]	0,904620	106,368668
	ATT-2: … [endpoints: unpleasant/pleasant]	0,901879	93,058648
	ATT-3: … [endpoints: harmful/beneficial]	0,927286	131,65269
	ATT-4: … [endpoints: unfavorable/favorable]	0,905814	104,947011
Intention to Use (Dabholkar and Bagozzi, 2002)	INT-1: Would you intend to use the described functions? [endpoints: unlikely/likely]	0,949481	269,896253
	INT-2: … [endpoints: impossible/possible]	0,950437	222,254018
PU (Davis, 1989)	PU-1: The additional banking terminal functions would enable to accomplish my banking business more quickly.	0,856603	67,628860
	PU-2: The additional banking terminal functions would improve the quality of processing my banking business.	0,882799	91,667647
	PU-3: The additional banking terminal functions would facilitate, doing more banking business.	0,829322	45,099488
	PU-4: The additional banking terminal functions would improve my efficiency in doing my banking business.	0,883602	90,917904
	PU-5: The additional banking terminal functions would make it easier to do my banking business.	0,903512	96,908447
	PU-6: All in all, I would find the additional banking terminal functions useful for doing my banking business.	0,895466	107,369136
PEU (Davis, 1989)	PEU-1: Learning the additional functions of the banking terminal would be easy for me.	0,851625	58,461756
	PEU-2: I would find it easy, to do what I intend with the additional functions of the banking terminal.	0,896576	86,720115
	PEU-3: Using the additional functions of the banking terminal would be clear and understandable.	0,905504	102,898651
	PEU-4: I would find the usage of the additional functions of the banking terminal flexible to do my banking business with.	0,705062	34,456769
	PEU-5: It would be easy for me to become skillful at using the additional functions of the banking terminal.	0,882753	69,733920
	PEU-6: All in all, I would find the additional functions of the banking terminal easy to use.	0,897092	92,021963
Optimism *(Technology Readiness Dimension)* (Liljander et al., 2006)	OPT-1: Technology gives people more control over their daily lives.	0,730909	20,446904
	OPT-2: Products and Services that use the newest technologies are much more convenient to use.	0,805327	41,016299
	OPT-3: You like the idea of doing business via computers because you are not limited to regular business hours.	0,736636	22,835880
Innovativeness *(Technology Readiness Dimension)* (Liljander et al., 2006)	INN-1: Other people come to you for advice on new technologies.	0,849505	52,339990
	INN-2: In general, you are among the first in your circle of friends to acquire new technology when it appears.	0,839285	39,423752
	INN-3: You can usually figure out new high-tech products and services without help from others.	0,797429	28,567231
Need for interaction (Dabholkar and Bagozzi, 2002)	NFD-1: Human contact in providing services makes the process enjoyable for the consumer.	0,837778	35,898502
	NFD-2: I like interacting with the person who provides the service.	0,875235	48,645367
	NFD-3: It bothers me to use a machine when I could talk to a person instead.	0,827656	33,970577
Relationship Scope (Scott, 2006)	SCOPE: Number of products used [data provided by bank]	*1,00*	—
Relationship Scale (Scott, 2006)	SCALE: Total Sum of Assets [data provided by bank]	*1,00*	—

Table 1: Constructs and related indicators

The research model was operationalized as a structural equation model and estimated using the Partial Least Squares (PLS) approach (Chin, 1998; Wold, 1982) with the software implementation SmartPLS (Ringle et al., 2006). The moderator effects were estimated using the built-in product indicator approach, where measures of constructs are crossmultiplied to form interaction terms that are used to estimate the underlying interaction construct within the estimation algorithm (Kenny and Judd, 1984). The approach is established with PLS structural equation model estimation (Chin et al., 2003; Henseler and Fassott, 2005)., and in this case feasible as there are only reflective modeled constructs in the model (Chin et al., 2003) and the sample size is moderate (Goodhue et al., 2007).
Each behavioral construct in the research model is represented by a set of indicators being measured on a fully anchored 5-point Likert scale, ranging from "strongly disagree" to "strongly agree". The questionnaire was pre-tested independently with retail banking customers from several banks which have not been included in the final sample. Based on the insights acquired in these pre-tests, the questionnaire was modified and finalized.

ANALYSIS

Demographics

In 2007, the questionnaire was sent out to 5,000 representative customers of a European retail bank in Germany. 831 returned questionnaires lead to a response rate of 16.6%. The (self-explicated) average usage probability for SSTs within the sample analyzed was 31.1%, with a median of 20%.

Model validation

Measurement model specification

The complex behavioral constructs used in the model are derived from other studies (see Table 1) and adapted to the specific research domain. All constructs are measured in reflective mode as the indicators meet the criteria postulated in Jarvis et al. (2003) for reflective measurement models. Indicators for the relevance constructs were adapted and validated accordingly.
Relationship scope was operationalized by the total sum of products used and relationship scale by the total sum of assets under management, as such constructs were used as proxies to capture the nature of bank relationships in previous studies (Scott, 2006). To avoid common method variance for these indicators, data was drawn from the retail bank's customer database.

Reflective measurement model

The quality of the reflective measurement model is determined by (1) convergent validity, (2) construct reliability and (3) discriminant validity (Bagozzi and Youjae, 1988).
Convergent validity is analyzed by indicator reliability and construct reliability. In the model tested, all loadings are significant at least at the 0.1 level and above the recommended 0.707 parameter (Chin, 1998).

Construct reliability was tested using the composite reliability (CR), estimated indices were above the recommended threshold of 0.6 (Bagozzi and Youjae, 1988).

Discriminant validity of the construct items was analyzed by examination of the cross-loading. The loadings of the indicators resp. Pearson's correlation of the specific construct are always higher with this construct than with others (Bollen and Lennox, 1991). Furthermore, the Average Variance Extracted (AVE) is always higher than the recommended threshold of 0.5 (Fornell and Larcker, 1981).

Structural model

In addition to the review of the measurement model, the explanatory power of the structural model is evaluated. The squared multiple correlations (R^2) for the dependent variable attitude of 0.459 and the variable intention of 0.468 indicates explanatory power, which can be rated between "moderate" and "substantial" (Chin, 1998)
The Stone-Geisser test (Q^2), measuring the quality of each structural equation by the communal validity redundancy (cv-redundancy index), is positive and therefore the model has predictive relevance (Tenenhaus et al., 2005).

Note that all paths' significance is above the criterion of 0.1 (Sellin and Keeves, 1994), the relevant paths are depicted in Figure 2. The analysis of overall effect size (f^2) reveals that all constructs in the core attitudinal model have strong effects, the constructs on significant paths for the moderating effects have moderate or at least weak effects (Chin, 1998).

Results

We estimate the results using PLS, the results are shown in Figure 2 to save space. As expected, the core attitudinal model is highly significant and shows good explanatory power. Both drivers, Perceived Usefulness and Perceived Ease of Use have positive impact on the attitude towards using SST, with a slightly higher coefficient value for Perceived Ease of Use (.448 vs. .406). Also, the link between attitude and intention is considerably strong; therefore H1a, H1b and H1c are supported.

Coming to the less obvious moderating effects, we can find significant attenuating influence from the technology readiness dimension optimism. This supports our hypothesis, as optimism lowers the influence of Perceived Ease of Use. The moderating influence of innovativeness is not significant. A small attenuating effect of the moderating variable need for interaction on the relationship from Perceived Usefulness to attitude can be discovered. This contradicts our hypothesis as we expect a strengthening influence from theory and prior discussions with branch experts. Thus, the hypotheses H2a is supported, whereas H2b is not significant and H2c is significant but opposite direction.

The characteristics of the customer relationship both have an effect on the same relationship and lower the influence of Perceived Usefulness on attitude. Scope shows the expected strengthening influence, whereas Scale has a (smaller) attenuating impact on the relationship. Hence, H3a and H3b are supported.

As the majority of aspects related to personality traits and customer relationships have significant (albeit not always positive) impact on the adoption, we regard this conceptual model of moderating effects useful for explaining of SST adoption.

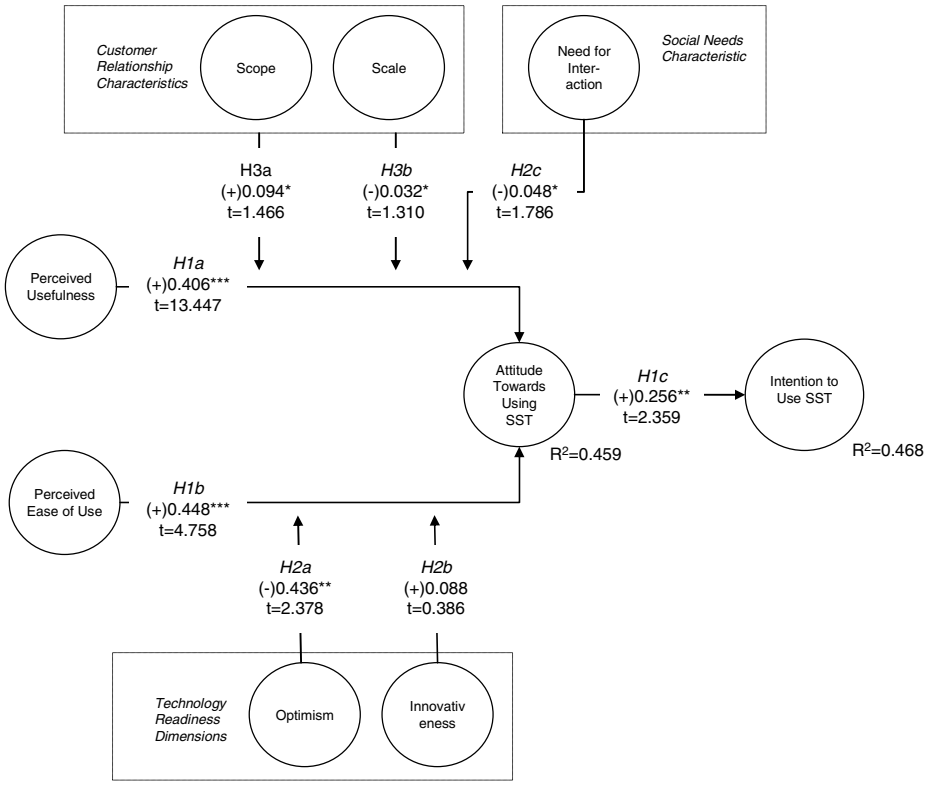

Figure 2. Path model with results (* p < 0.01 ** p < 0.05 * p < 0.1)**

DISCUSSION / LIMITATIONS AND CONCLUSIONS

Using data from a customer survey of a European retail bank in Germany, our analysis reveals significant explanatory power of the moderating effects of personality traits and relationship characteristics on the adoption of SST for bank product sales. The characteristics of relationship scale and scope as well as the technology readiness dimension optimism are of high influence. This corroborates prior statements in literature, that adoption models should not neglect moderating effects as it allows for valuable theory extensions as well as industry applications.

The study is limited so far, as it includes only customers of one retail bank in one country at the moment. Therefore the results cannot be generalized, as the adoption behavior may differ in other countries. For example, it has already been shown that cultural affinities have a higher impact on adoption behavior (Phillips and Calantone, 1994). Modeling social influence on the adoption decision, as Kleijnen et al. (2004) suggests, can maybe help to explain our surprising result of the small moderating effect of need for interaction and, in addition, would be an interesting avenue for further research.

The study contributes to the existing research threefold: At first, we provide an explanation of SST adoption behavior, transferred to the research domain of sales functions instead of traditional transaction processing with SST. Second, we identify moderating effects from the two fields of personality traits and customer relationship characteristics; in addition, we analyze our model by integrating survey responses and external account data. The study is also of high relevance for industry practitioners as it supports investments decisions on how to implement SST sales functions and communicate them to the customers and open up new customer segments with technology.

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