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Raising the Bar The Effect of New and More Appealing Alternatives on User Satisfaction with Incumbent Information Systems

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Raising the Bar

The Effect of New and More Appealing Alternatives on User Satisfaction with Incumbent Information Systems

Completed Research Paper

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Abstract

With more and more employees in organizations being digital natives, a workforce emerges, which is familiar with the adoption of new and innovative technology in its private life. Applying the negative cybernetic feedback loop model as our research model, we argue that the knowledge and experience with private alternative system raises the bar for organizational systems. To this end, we address the following question in our study: How is user satisfaction with an incumbent system affected by the introduction of a more appealing alternative? To answer this question, we conducted an online experiment with a representative sample of 292 participants. We show that user satisfaction with an incumbent system is lower when users are familiar with a more appealing system.

Keywords: IT Consumerization, BYOD, User Satisfaction, Adoption, Postadoption

Introduction

Explaining the acceptance and adoption of new technology is probably the most researched area in the IS literature (Venkatesh et al. 2003). One underlying assumption of this research is that employees are resistant towards the adoption of new technology (Venkatesh et al. 2003; Vodanovich et al. 2010). However, this assumption is challenged by phenomena like consumerization, bring your own device (BYOD), and shadow IT. The umbrella term consumerization describes the diffusion of private information systems (IS) into organizations (Harris et al. 2012), whereas bring your own system/device programs are policies approving the use of private IS in organizations (Baskerville and Lee 2013; Köffer et al. 2014). In contrast to that, shadow IT describes the use of unauthorized, often privately owned, IS at work (György et al. 2012; Köffer et al. 2014; Silic and Back 2013, 2014). With an increasing number of digital natives (Prensky 2001) entering the workforce of organizations (Vodanovich et al. 2010), there is also an increasing number of employees that are already familiar with new technologies (Yoo 2010) that are currently not proliferated into the corporate environment. Research on consumerization indicates that a workforce is emerging which is, instead of being resistant, actively introducing new technologies to their organizations (Harris et al. 2012; Köffer et al. 2014; Leclercq-Vandelannoitte 2015). Thereby, the direction of technology diffusion changes from a top-down to a bottom-up process (Junglas et al. 2014; Köffer et al. 2015; Leclercq-Vandelannoitte 2015). Traditionally, management decides to introduce and implement new technologies and new information systems (IS) while employees must adapt to the change. However, consumerization flips that relationship with employees introducing new technologies into organizations while the organization faces the challenge to react to that trend.

To gain a deeper understanding of how this conversion of resistant to active employees takes place, our study aims to identify the reason that triggers behavioral change and makes employees want to use private IS for work. To this end, we employ the cybernetic negative feedback loop model (Wiener 1948) as our high-level theoretical framework. Building on this theory, we argue that employees, familiar with digital and technological innovations, compare organizational IS with their private IS. As employees perceive consumer IS as being more advanced, their satisfaction with mandatory and sometimes outdated organizational IS will decrease. To examine this relationship, our research question is:

> *RQ: Does the availability of a new system, which is perceived as more appealing compared to a functionally equivalent incumbent system, have an effect on user satisfaction?*

To shed light on a possible shift in the perception of organizational IS due to experience with more appealing information systems and a resulting effect on user satisfaction, we designed and conducted an online experiment with 292 participants. We find that users are less satisfied with an incumbent system if they have been introduced to a more appealing alternative. With these findings, we contribute to the consumerization and BYOD literature by arguing that dissatisfaction with organizational IS is driven by the familiarity with a more appealing available technology.

The remainder of our paper is structured as follows. In Section 2, we discuss the related literature and theoretical framework. In Section 3, we develop our hypothesis. In Section 4, we outline our research methodology and the design of our experiment. In Section 5, we present the results of our analysis. Section 6 concludes with a discussion, as well as the implications and limitations of our work.

Related Work

Use of Private IS in Organizations and Satisfaction

The existing consumerization and BYOD literature identifies 'relative advantage' as one of the main drivers for the use of private IS in organizations. As employees perceived their private technology as being more useful, they become more likely to use it for work purposes as well (Hopkins et al. 2013; Ortbach 2015). Likewise, 'ease of use' of private IS has been found to affect the intention to use private IS for work (Hopkins et al. 2013; Ortbach 2015; Weeger et al. 2015). Moreover, employees expecting higher work performance with their private IS has been identified as an antecedent for consumerization intentions (Loose et al. 2013; Ortbach et al. 2013; Weeger et al. 2015). Furthermore, expecting an increase in satisfaction due to use of private IS has been found to be one of the most important benefits and advantages of consumerization and BYOD (Giddens and Tripp 2014; Harris et al. 2012; Köffer et al. 2014; Niehaves et al. 2012). Köffer, Ortbach, et al. (2014) even propose an effect

of satisfaction on work performance. On the other hand, Ostermann and Wiewiorra (2016) find that there is a relationship between dissatisfaction with organizational IS and the actual participation in a BYOD program. In our study, we propose that employees will become dissatisfied, as soon as they are introduced to an alternative system which they perceive as being more appealing compared to an incumbent system. Therefore, allowing employees to use a more appealing system is merely a way of increasing satisfaction up to or beyond the previous level of satisfaction with the incumbent system.

Cybernetic Negative Feedback Loop

To explain possible changes in satisfaction and user behavior, we adopt the cybernetic negative feedback loop model (Wiener 1948) as our high-level theoretical framework. In IS research the feedback loop model has already been applied by e.g. Burton-Jones and Grange (2013) and Liang and Xue (2009). The model describes the following process: The perceived value of e.g. a system (perception) is compared (comparator) against a goal, standard or reference value (from now on reference point) (Carver and Scheier 1998). If the comparator detects a difference between the perception and reference point, the output function determines resulting actions of the individual. This means an individual's behavior changes to eliminate the discrepancy between perception and reference point. The feedback loop is typically triggered by a disturbance that has an effect on the environment of individuals. This alters their perception and leads to discrepancy. Figure 1 illustrates the cybernetic negative feedback loop model.

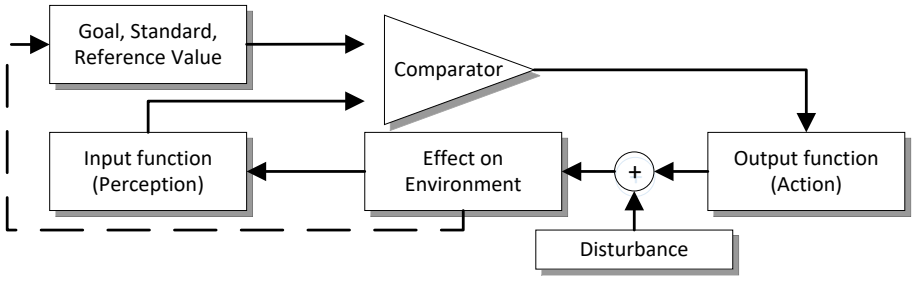

Figure 1. Negative Feedback Loop Model
(Adapted from Carver and Scheier (1998))

As proposed by Ostrom (2005), we apply our high-level framework to a specific phenomenon. We assume that with an increasing number of employees being digital natives, more and more employees are aware of alternative and often more appealing systems from their private lives. The knowledge about and experience with more appealing systems induces a desire (Rogers 1995) and creates a disturbance which in turn has an effect on the environment. We propose that the effect on the environment does not only alter the perception of organizational systems but shifts the reference point to which employees compare the incumbent system to (dashed line in Figure 1). If the alternative private system is indeed perceived as being more appealing, this system replaces the old reference point. Comparing the organizational system to the private, more appealing system, the new reference point, leads to a difference. Consequently, the described feedback loop is triggered.

As a result, the perceived discrepancy decreases employees' satisfaction with the incumbent system (Bhattacherjee 2001; Oliver 1980). This is also in line with Rogers (1995) statement that "human behavior change is often motivated by a state of internal disequilibrium or dissonance" (Rogers 1995, p. 189). According to Rogers, dissonance may occur when an individual knows about something new, but has not adopted it yet. In an organizational context, adoption is often restricted by budgets for technology, security concerns and standardized IT to allow for easier support. To dissolve discrepancy and dissatisfaction, employees can change their behavior (Carver and Scheier 1998; Rogers 1995). These actions can range from complaining and demanding new technology to using their private technology without permission. Behavioral change in turn, influences the organization, as the organization is part of the environment. Therefore, the interactions of the employees as human agents within in the organization can have an influence on the organizational structure itself (Orlikowski 1992).

Hypothesis Development

In our study, we choose satisfaction as our outcome variable, as existing research indicates that satisfaction is a good predictor for (dis)continuance, user migration and customer loyalty (Bhattacherjee 2001; Bhattacherjee and Park 2014; Bhattacherjee and Premkumar 2004; Fang et al. 2014; Kim and Son 2009; Ray et al. 2012). We adopt Oliver's definition, who defines satisfaction as a function of expectation and disconfirmation (Oliver 1980). In the context of IS, Bhattacherjee (2001) built on this understanding of satisfaction to explain IS continuance with the expectation confirmation model. According to these theories, a user/consumer forms an expectation of product performance before he/she purchases or uses it. Disconfirmation emerges if the actual belief about performance upon purchase/use does not meet the prior expectations. Subsequently, disconfirmation lowers the user's/consumer's satisfaction (Bhattacherjee 2001; Oliver 1980). Following this logic, disconfirmation and therefore dissatisfaction is caused by two different reasons: (1) decreasing believes about performance and/or (2) increasing expectations.

(1) Drawing on the expectation confirmation theory, users compare their pre-consumption expectations of a system with their post-consumption belief about the performance of the same system (Bhattacherjee 2001). This means, that beliefs towards performance of a system after the actual usage have a positive influence on user satisfaction. Therefore, we hypothesize:

> *H1: Users that use a more appealing system will be more satisfied than users that use an incumbent (less appealing) system.*

(2) We further argue, that with more employees being digital natives (Vodanovich et al. 2010), organizational IS will not only be compared to expectations but also to actual experience with (private) more appealing substitutes. Considering our theoretical framework, this means an alternative IS can shift the reference point to which employees compare their organizational IS. If the comparison between the organizational system and the shifted reference point leads to discrepancy, employees satisfaction is negatively affected (Michalos 1985; Oliver 1980). This is in line with expectation confirmation theory, proposing that increasing disconfirmation leads to decreasing satisfaction (Bhattacherjee 2001; Oliver 1980). Furthermore, this relationship is supported by the finding of Rogers (1995) who suggests that those users wanting to adopt a new technology, but are not able to do so, will experience "an uncomfortable state of mind" (Rogers 1995, p. 189). In the context of our study we therefore assume that users who are familiar with a more appealing system from their private lives, which they are, however, not allowed to use for work, will more likely be dissatisfied with the situation. Therefore, we hypothesize:

> *H2: Users that have experience with a more appealing system, but must use an incumbent system instead, are less satisfied than users who use an incumbent system but do not have experience with a more appealing system.*

Research Method

Experimental Design

To test our hypotheses, we implemented an online experiment applying a between groups design. The idea of our experiment is to implement a situation that abstractly resembles the existence of an organizational incumbent system and the appearance of a more appealing consumer system. Therefore, we randomly assigned the participants of our study to one of three groups. These groups are: control group, treatment group 1 and treatment group 2. The main task of the experiment for all participants was to sort ten numbers from small to large. The numbers presented in the task ranged from one-digit numbers to five-digit numbers.

Prior to the main sort task, every group had to fulfill a first learning task, to familiarize all participants of every group with the incumbent system (System A). The sorting with System A was done by manually typing numbers into a form field. In the learning phase, participants had to sort names of animals by the height of the respective animals. Thereby, participants familiarized themselves with the incumbent system without practicing the main number sort task of the experiment. In the following treatment phase of the experiment participants of treatment group 1 and treatment group 2 were familiarized with the more appealing system (System B). This was achieved, by a second sorting

task, where participants could use a drag and drop mechanism to again sort animals by their height. In our experimental design, System B reflects a more modern and appealing system in comparison to System A. By knowing System B, treatment group 1 and treatment group 2 can compare two systems with each other with respect to the specific sorting task. Figure 2 displays the functionalities of System A and System B.

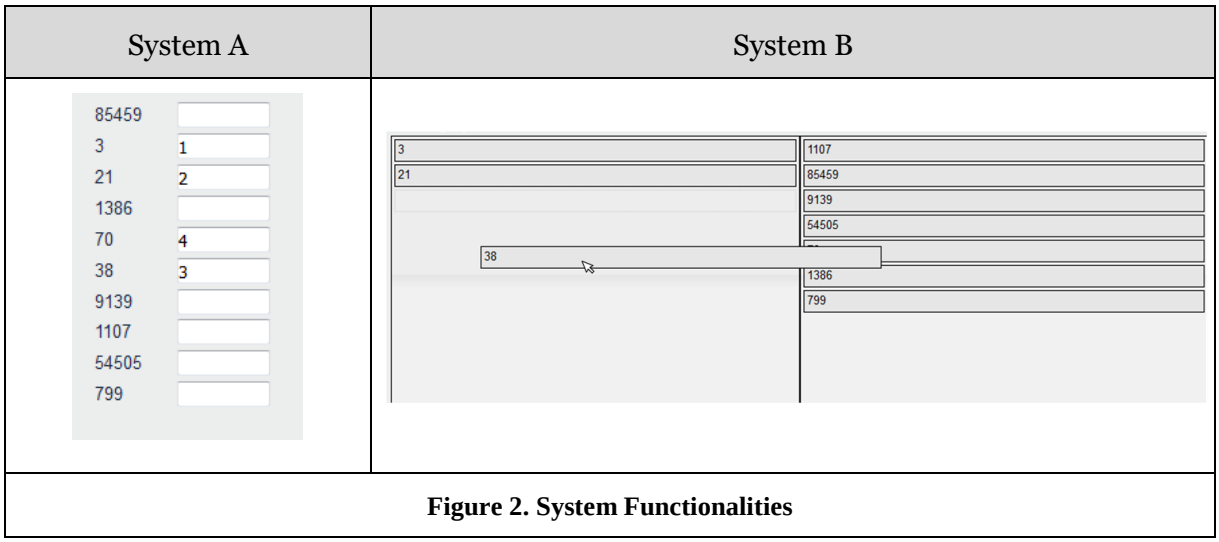

Figure 2. System Functionalities

Following the treatment phase, we asked participants of treatment group 1 and treatment group 2 if they find System B indeed more appealing than System A. This was done to check whether our treatment worked as intended. Only participants who indicate System B to be more appealing than the incumbent System A were considered in our subsequent analysis. After completing the learning tasks and treatment phase, all participants got 60 seconds to fulfill the actual sort-task. Participants in the control group and treatment group 2 had to use System A to fulfill the main sort-task of the experiment, whereas participants of treatment group 1 had to use System B. Figure 3 illustrates the complete experimental design. After the sort-task, we captured participants' satisfaction with the system they had to use in the main sort-task. Subsequently, we asked for demographics, controls and whether participants responded considerate and truthfully.

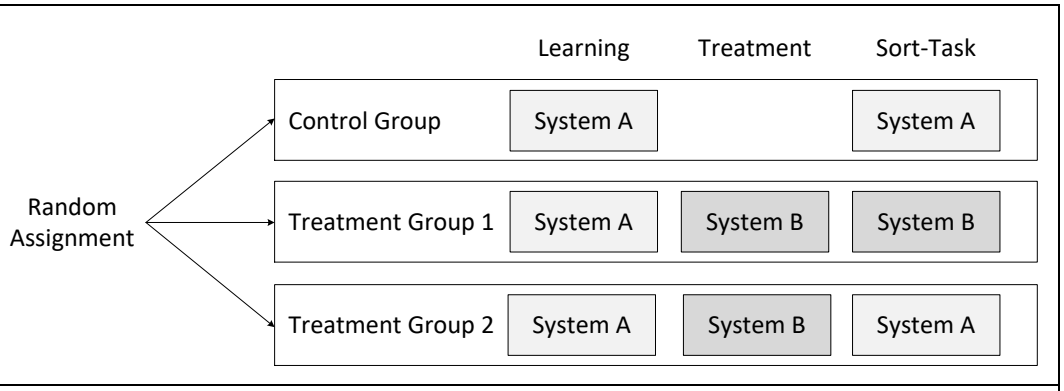

Figure 3. Experimental Setting

Data Collection

We distributed our online experiment among a panel in Germany and collected a representative sample of people between 20 and 60 years. A total of 292 participants completed the experiment. Participants were compensated for participation with a fixed amount of money after completion. We removed observations of those participants, who confessed that they did not respond truthfully or who found System A to be more appealing than System B. This results in 234 remaining observations. The average age in our sample is 36.085 years (Standard Error = 0.709). 40.17 % of the participants are female and 59.83 % are male. In addition, 73.50 % of our sample is employed whereas 26.50 % is currently not employed. Educational degrees obtained were: less than high school 14.10 %, high

school graduate 32.91 %, job training 17.95 % and university degree 35.04 %. Table 1 shows the detailed demographic distribution of each of the three experimental groups.

	Control Group (N=84)	**Treatment Group 1 (N=76)**	**Treatment Group 2 (N=74)**	**Total (N=234)**
Gender				
Female	32	33	29	94 (40.17 %)
Male	52	43	45	140 (59.83 %)
Education				
Less Than High School	13	12	8	33 (14.10 %)
High School Graduate	30	38	19	77 (32.91 %)
Job Training	18	10	14	42 (17.95 %)
University Degree	23	26	33	82 (35.04 %)
Occupation				
Unemployed	25	19	18	62 (26.50 %)
Employed	59	57	56	172 (73.50 %)
Mean Age	36.440	34.579	37.230	36.085

Table 1. Sample Characteristics

Measurement

We asked all participants to evaluate their satisfaction with the system they had to use to execute the main sort-task of the experiment. To ensure validity and reliability we assessed satisfaction using the well-established satisfaction construct with four items on a 6-point semantic differential scale also used by Bhattacherjee (2001) and Bhattacherjee and Premkumar (2004). To further evaluate the reliability of the construct we assessed Cronbach's α, which should exceed the threshold of 0.7 to indicate acceptable construct reliability (Peterson 1994). Table 2 shows, that Cronbach's α of our measurement construct is sufficient.

	Items	**Mean**	**Std. Error**	**Cronbach's α**
Sat1	Very dissatisfied / Very satisfied	3.675	0.099	0.937
Sat2	Very displeased / Very pleased	3.615	0.096	
Sat3	Very frustrated / Very contented	3.675	0.091	
Sat4	Absolutely terrible / Absolutely delighted	3.611	0.084	

Table 2. Descriptive Statistics of Satisfaction

Results

Randomization Check

Prior to hypothesis testing, we assessed whether all experimental groups are drawn from the same population to check whether the randomization procedure worked properly. As shown in Table 3 we found no significant differences in the control variables. Therefore, we draw the conclusion that participants in our study were effectively randomized across all experimental groups.

Variable	Test	P-Value
Gender	Pearson's chi-square	0.773
Education	Pearson's chi-square	0.277
Occupation	Pearson's chi-square	0.695
Age	ANOVA	0.305

Table 3. Randomization Check

Group Comparisons: Satisfaction

To compare user satisfaction between groups, we used the average score of all four satisfaction items in our analysis. Prior to each group comparison, we assessed whether the normality assumption for conducting a t-test is violated (Field and Hole 2003). The results of Shapiro Wilk normality-tests of the variable satisfaction for each group do indicate that the distributions do not significantly differ from a normal distribution (P-values – Control Group: 0.880; Treatment Group 1: 0.141; Treatment Group 2: 0.635). We further conducted a Levene's test to check for homogeneity of variances (Field and Hole 2003). The results indicate that the variance of the experimental groups do not significantly differ from each other (P-value: 0.430).

To test H1 we compared the satisfaction score of both groups that had to use the incumbent System A to the satisfaction score of treatment group 1 using the more appealing System B using an independent t-test with equal variances. Table 4 shows that the means of satisfaction in the control group and in treatment group 2 are significantly lower compared to treatment group 1. This implies participants using the more appealing System B in the final sort-task are in general more satisfied than participants that must use the incumbent system. Therefore, hypothesis 1 is supported.

Experimental Group	Mean Satisfaction	P-Value	Experimental Group	Mean Satisfaction	P-Value
Treatment Group 1	4.079	0.0115*	Treatment Group 1	4.079	0.000***
Control	3.619		Treatment Group 2	3.226	
Difference	0.460		Difference	0.853	
P-value: * p ≤ 0.05; ** p ≤ 0.01;*** p≤0.001					

Table 4. Comparison of Satisfaction of Participants using System A or System B

To test the second hypothesis, we compared the means of both groups that had to use the incumbent System A also using an independent t-test with equal variances. As depicted in Table 5, the mean satisfaction of treatment group 2 is significantly lower than the mean satisfaction of the control group. This implies that participants who have had to use the incumbent System A, but were then familiarized with a more appealing System B in the treatment phase of the experiment, are significantly less satisfied than participants who had to use System A but were not familiarized with System B. Consequently, our results support hypothesis 2.

Experimental Group	Mean Satisfaction	P-Value
Control	3.619	0.022*
Treatment Group 2	3.226	
Difference	0.393	
P-value: * p ≤ 0.05; ** p ≤ 0.01;*** p≤0.001		

Table 5. Comparison of Satisfaction of Participants using System A

Group Comparisons: Performance

We further explored whether the experimental groups differ with respect to different measures of task performance. We ex-post operationalized task performance by the manifest variables task accuracy and task duration. As the participants had to sort 10 numbers, task accuracy can range from 0 to 10. Furthermore, task duration can range from 0 to 60 seconds as the task was limited in time. Prior to

comparing performance of all groups, we assured that the task accuracy is not biased by the imposed time restriction. To this end, we counted the number of participants that made errors in the sort-task and did not complete the task before the time-out at 60 seconds. (Control Group: 7; Treatment Group 1: 12; Treatment Group 2: 9). Applying a Pearson's chi-squared test, we cannot reject the hypothesis that the differences between groups arose by chance (P-Value: 0.348). We therefore assume that the imposed time restriction does not have a crucial influence on the observed task accuracy in our experiment. The Shapiro-Wilk normality test indicates that the distributions of task accuracy and task duration are significantly different from a normal distribution for each experimental group. Therefore, we compare groups using a Wilcoxon rank-sum test (Field and Hole 2003). Table 6 shows that participants of treatment group 1, using the more appealing System B, fulfilled the sort-task less accurately and needed more time than participants in the other groups (control, treatment 2).

Experimental Group	Mean accuracy	P-Value		Mean duration	P-Value
Treatment Group 1	8.776	0.099+	Treatment Group 1	47.117	0.069+
Control	9.119		Control	43.851	
Difference	0.343		Difference	3.266	
Treatment Group 1	8.776	0.020*	Treatment Group 1	47.117	0.072+
Treatment Group 2	9.324		Treatment Group 2	43.989	
Difference	0.548		Difference	3.128	
P-value: + p≤0.10 * p ≤ 0.05; ** p ≤ 0.01;*** p≤0.001					

Table 6. Comparison of Performance of Participants using System A or System B

Moreover, we compared the performance of both groups that had to use incumbent System A. Table 7 shows that there is, in contrast to the variable satisfaction, no statistically significant difference in task accuracy and task duration between control group and treatment group 2.

Experimental Group	Mean accuracy	P-Value	Experimental Group	Mean duration	P-Value
Control	9.119	0.492	Control	43.851	0.990
Treatment Group 2	9.324		Treatment Group 2	43.989	
Difference	0.205		Difference	0.138	
P-value: + p≤0.10 * p ≤ 0.05; ** p ≤ 0.01;*** p≤0.001					

Table 7. Comparison of Performance of Participants using System A

Discussion

We addressed the question of how satisfaction with an incumbent system is affected by the introduction of a more appealing alternative. To this end, we conducted an online experiment with 292 participants. Group comparisons of satisfaction, task accuracy and task duration lead to the conclusion that user satisfaction with an incumbent system decreases, as users become familiar with a new and more appealing alternative.

We argue that our experimental findings shed light on the effect of consumerization within organizations. Rapid dissemination and fast product cycles of consumer IT lead to increasing dissatisfaction with established systems within organizations. This increasing dissatisfaction puts pressure on organizations to adopt new systems or, at least, implement bring your own device/system programs (Köffer et al. 2014; Ostermann and Wiewiorra 2016). With our study, we quantitatively confirm the qualitative findings, that increasing satisfaction can be a major benefit of consumerization and BYOD (Harris et al. 2012; Köffer et al. 2014). Our results further contribute to the field by revealing that dissatisfaction initially arises as employees get to know innovative alternative IS in their private lives. This implies for practitioners that the more an organization lags behind innovative (consumer) IS the more employees will adopt theses IS in their private lives (Rogers 1995). This in turn leads to increasing group of dissatisfied employees. BYOD/s programs are one possibility to

mitigate this dissatisfaction (Harris et al. 2012). Moreover, our results indicate that BYOD/S programs within organizations can lift satisfaction, even above the previous satisfaction level. In addition, we find that our study participants, who use the more appealing system, are also more likely to perform worse. However, we cannot draw any conclusions about consumers' perceived task performance in our experiment, as we did not incentivize task performance.

Limitations and Future Research

Our experimental study is prone to several limitations. Since the participants of our study had to fulfil only one specific task with a specific system, the generalizability of our study is limited. Although we conducted our study with a representative sample, generalizability could be improved by real field studies. Moreover, we did not incentivize task performance in our experiment and therefore cannot guarantee external validity of our task performance results. Furthermore, we cannot draw specific conclusions about participants anticipating or ex-post being aware of any performance loss.

Future work could investigate, whether users would compromise on performance to be able to use more appealing systems. Furthermore, task incentives should be used to increase validity of findings with respect to task performance.

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