

How Experience with Private IS Affects Employees' Satisfaction with Organizational IS

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Abstract. Most traditional IS adoption and acceptance research assumes that a majority of employees are resistant to the adoption of new technologies for work. However, phenomena like IT consumerization, bring your own device, and shadow IT illustrate that some employees actively introduce private IS to their organizations and thereby shape their own workplace. In this study, we investigate what leads employees to use alternative (private) IS for work. We draw on the cybernetic negative feedback loop as our theoretical framework to develop our research model. Our analysis indicates that satisfaction with organizational IS drives behavioral change. Further, our results show that not only the perceived performance of organizational IS predicts the employees' satisfaction with organizational IS but also the perceived performance of private substitutes.

Keywords: File sharing, satisfaction, intention to use private IT, post-adoption

1 Introduction

More and more digital natives [1] are entering the workforce [2]. This new generation of employees has grown up in a digital and connected world [3] and is used to being surrounded by ubiquitous information systems (IS) [4]. This extensive experience with technology gives employees the knowledge and ability to compare organizational IS with alternatives/substitutes. Phenomena like consumerization, bring your own device (BYOD), or shadow IT [5, 6] describe that various employees have the desire to use private IS instead of business/organizational IS for work. On the one hand, these phenomena challenge an underlying assumption of traditional adoption and acceptance research. Traditionally, most IS adoption and acceptance research assumes that the majority of employees/users are resistant and inert towards the adoption of new technologies for work [2, 7, 8]. However, we see that some employees actively shape their workspace instead of being hesitant or resistant towards new technology. On the other hand, this behavior challenges the established top-down approach of technology diffusion in organizations and affects organizational structures to a large extent [9, 10]. Until recently, the IT department decided to purchase new technology and thereby introduced organizational change. However, currently employees are taking the initiative and are introducing IS into the organization, while the organization itself has

to react [5, 9]. With our study, we want to identify the underlying mechanism that leads employees to actively introduce new (private) technology into their organizations. Therefore, our research questions are:

RQ1: What leads employees to introduce new (private) IS into their workspace?

RQ2: How does knowledge and experience with private IS affect the attitude towards organizational IS?

Drawing on the cybernetic negative feedback loop [11] as our theoretical framework, we argue that employees are getting more critical and demanding towards their organizational information systems, since they use new and innovative technology in their private lives [6]. To empirically validate this relationship, we develop a research model linking *perceived performance of organizational and private IS* with *satisfaction with organizational IS*, and the *intention to use private IS for work*. We use satisfaction and intention as dependent variables of our research model as post-adoption research has shown that satisfaction is a good predictor for employees' (dis)continuance intention [12, 13]. To test our hypotheses, we conducted an online survey with 154 employees from different organizations. As a setting for our study, we chose document and file sharing, as we think that there are relatively mature consumer systems, which can substitute conservative and traditional ways of file sharing in organizations. Especially cloud-based services like Dropbox or Google Drive are widely spread and accepted among private users [14, 15]. To analyze our data, we use covariance-based structural equation modelling (CB-SEM). We contribute to business informatics and information systems by demonstrating that the familiarity with private alternative IS alters personal standards and decreases satisfaction with organizational IS.

The remainder of our paper is structured as follows. In Section 2, we introduce the related work and our theoretical framework. In Section 3, we develop our hypotheses and research model. In Section 4, we describe our research methodology. In Section 5, we present the data analysis and results of our evaluation. In Section 6, we conclude with a discussion, give implications, and outline limitations of our work.

2 Related work

2.1 Private IS in Organizations

Over the last years, phenomena describing employees that use private IS for work, gained much attention in IS research. These phenomena are called consumerization, BYOD, and shadow IT. The term consumerization was first mentioned by Moschella et al. (2004) and since then has been assigned several definitions. In our study, we adopt the characterization of Harris et al. (2012) who describe consumerization as “[...] the adoption of consumer devices and applications in the workforce [...]” [5, p.99]. Bring your own system strategies, on the other hand, are a way for organizations to formally approve and regulate consumerization behavior [6, 17, 18]. Non-approved usage of (private) IT in organizations has been termed shadow IT [6, 19, 20]. Whether allowed

or not, the usage of private IS challenges the established top-down approach of introducing IT to an organization [9, 10]. Traditionally, IT systems were chosen and implemented by the organization, whereas users/employees were expected to merely adopt these systems [2, 9, 21]. However, with employees using private IS for work the direction of the diffusion of IT systems into the organization shifts from a top-down to a bottom-up approach [9, 22–24]. Passively adopting employees turn into employees taking action and challenging their IT department [10, 25]. We see an increasing dissatisfaction with organizational IT as the major cause for this evolution [5, 6, 26] and as a precondition for behavioral change. To assess the emergence of dissatisfaction, we use the cybernetic negative feedback loop [11] as our theoretical framework and describe it in the following section.

2.2 Cybernetic Negative Feedback Loop

The cybernetic negative feedback loop [11] is applied as a high-level framework to establish the variables for our research model (Figure 1). The negative feedback loop has already been applied in IS research, for instance by Burton-Jones and Grange (2013) and Liang and Xue (2009), and enables us to explain behavioral change of employees. It consists of an input function (perception), a goal/standard/reference value (from now on referred to as reference value), a comparator, and an output function (action) [29]. According to Ashby (1956), difference is the fundamental concept in cybernetics. In the negative feedback loop, the comparator detects this difference. The comparator compares a sensed value (perception) against a reference value. In case of a difference between perception and reference value actions are carried out to reduce this difference. Usually the feedback loop is triggered by a disturbance in the environment which alters the perception.

Applying the negative feedback loop to the phenomenon that employees introduce private IS into their organizations, we assume that the emergence of innovative IS in private life corresponds with a disturbance affecting the environment of an employee. We theorize that this experience with superior alternative IS in private life increases employees' reference value (dashed line in Figure 1). This new experience and knowledge creates needs [31] and shifts the reference value to which employees compare their organizational IS to [6]. Assuming a constant perception of organizational IS an upshift of the reference value creates a discrepancy and triggers the feedback loop. Discrepancy in turn affects the satisfaction of employees [32, 33]. To reduce this discrepancy and dissatisfaction employees become active and change their behavior until their perception and standard are aligned again. Hence, discrepancy and satisfaction are preconditions for action, employees can change their behavior for instance by demanding new technology at work or using their private IS for work tasks even if the organization does not allow this practice. This employee driven change in turn affects the environment. As employees and their organization are mutually interdependent, a change in employees' behavior can have an impact on the organization and its structure [29, 34]. In our study, we do not empirically investigate the impact of behavioral change on the organization, but at this point, we want to emphasize the relevance.

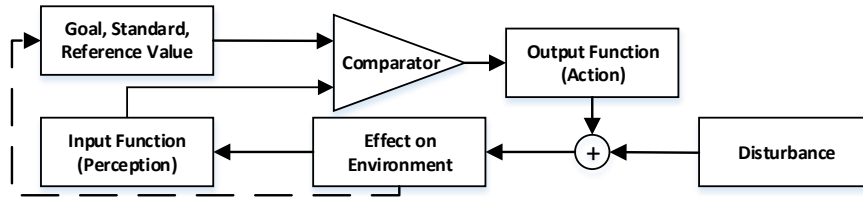


Figure 1. Negative feedback loop (adapted from Carver and Scheier (1998))

3 Hypothesis Development

3.1 Satisfaction

Oliver (1980) defines satisfaction as a function of expectation and disconfirmation. Accordingly, disconfirmation results from the comparison of expectations with actual experiences of a product [32]. In the IS context, Bhattacharjee (2001) uses this conceptualization of satisfaction to explain IS continuance with the IS continuance model [13]. Both assume that a consumer/user builds up expectations before the actual usage of a product/system. Subsequently, he/she compares his/her actual experience to prior expectations. When a consumer senses a discrepancy between expectation and experience he/she feels dissatisfied [12, 13, 32]. We translate this relation to the negative feedback loop and assume that a sensed discrepancy between a personal standard and actual experience leads to dissatisfaction which in turn leads to an action/change in behavior [29]. Existing research has shown that satisfaction is a good predictor for (dis)continuance, migration, and loyalty [12–14, 35–37]. In our research model, we operationalize action/behavioral change by measuring the intention to use private IS for work. Consequently, we argue that low satisfaction with organizational IS increases the intention to use private IS for work.

H1: Satisfaction with organizational IS will have a negative effect on the intention to use private IS for work.

3.2 Performance of Organizational IS

Following the logic of the cybernetic negative feedback loop, a perception is compared to a standard, reference value or goal. In our research model, perceived performance is operationalized by the established construct perceived usefulness (PU) of the technology acceptance model (TAM) [38]. In our research setting, this perception is a post-adoption belief in a mandatory setting based on actual experience. With employees perceiving their organizational IS as useful, a negative discrepancy between private and organizational IS is less likely. We further argue that employees will be dissatisfied if they have to use IS, which they believe does not enhance their work performance. In accordance with Bhattacharjee (2001), we propose a positive relationship between PU of organizational IS and satisfaction with organizational IS.

H2: PU of organizational IS will have a positive effect on satisfaction with organizational IS.

Moreover, existing post-adoption research shows a positive relationship between PU of the incumbent system and continuous intention [8, 12, 13]. With an increasing intention to continue organizational IS use employees' intention to use private IS for work will decrease. Thus, we hypothesize:

H3: PU of organizational IS will have a negative effect on the intention to use private IS for work

3.3 Performance of Private IS

Taking Oliver's (1980) definition, satisfaction is a function of expectation and confirmation. In our model, we replace confirmation with the belief about performance of private IS. Concerning the negative feedback loop, we theorize that this belief represents the reference value. Assuming the perceived performance of organizational IS remains unchanged and perceived performance of private IS increases, a negative discrepancy should occur. This in turn leads to a decrease of satisfaction with organizational IS. Consistent with the performance of organizational IS, we operationalize private IS using PU.

H4: PU of private IS will have a negative effect on satisfaction with organizational IS.

According to TAM one of the main antecedents of intention to use a technology is PU. Consistently, consumerization and BYOD literature show that beliefs about the performance of private IT in the work environment positively affect employees' intention to use private IS for work [39–42]. Therefore, we incorporate this relationship into our model and hypothesize:

H5: PU of private IS will have a positive effect on the intention to use private IS for work.

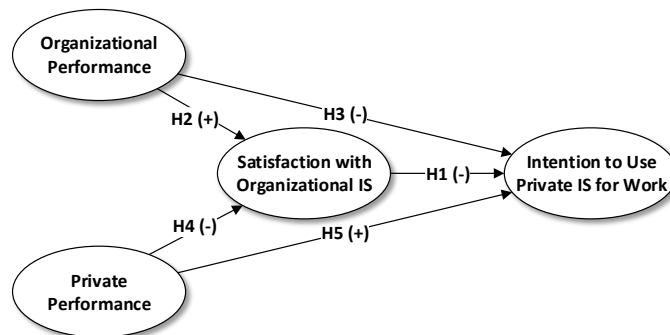


Figure 2. Research model

4 Research Methodology

4.1 Data Collection

To empirically test our hypotheses and capture the individual perceptions of our participants, we conducted a cross sectional online-survey. We distributed the survey during the third quarter of 2016 and received 154 responses. We dropped all responses of participants that do not have a job in which they have to share files with their colleagues/teammates. We further excluded responses of participants that do not use systems to share files in their private lives. Thereby, we ensured that a comparison of both systems is possible for each respondent. Table 1 displays the sociodemographic data of the 120 remaining respondents including gender, education, age, and whether participants are forbidden to use private IT for work.

Table 1. Sample characteristics

N = 120	Count	%		Count	%
			Private IT		
Gender			Forbidden	60	50.00
Female	42	35.00	Not forbidden	60	50.00
Male	78	65.00			
Education					
University Degree	98	81.67	Mean	28.06	Std. Dev.
No University Degree	22	18.33	Age		6.52

4.2 Study Design and Instrument Development

We selected document and file sharing as a setting for our survey, as we are convinced that document and file sharing is a common task for both work and private life with relatively mature and comparable systems. The online survey consisted of three parts. In the first part, we asked participants if they have to share files at work and which system their employer provides (e.g., SharePoint, fileserver, email or organizational cloud solution). Subsequently, we asked the participants if they use a system for document/file sharing in private life and which system they preferred (e.g., Dropbox, iCloud, Google Drive). Both systems for private and work life were automatically inserted into the PU, and intention items. In the second part, participants had to assess their perception towards the performance of their organizational IS and private IS, their satisfaction with their organizational IS, their intention to use their private IS for work. PU and intention to use were rated on a seven-point Likert scale using the established constructs of Davis (1989) and Venkatesh et al. (2003). To measure satisfaction with organizational IS, we used the four-point semantic differential also used by Bhattacharjee (2001). In the third part, we asked the participants for socio-demographic characteristics and included them as control variables into the estimation of our research model.

5 Data Analysis and Results

5.1 Measurement Model

To test for reliability of our measurement model we conducted a confirmatory factor analysis and calculated Cronbach's alpha ($C\alpha$) and Composite Reliability (CR) of our research constructs. $C\alpha$ and CR both should exceed a threshold of 0.7 to indicate good reliability [44–46]. To check for convergent validity, we measured the Average Variance Extracted (AVE) of each construct. The AVE requires values of 0.5 or higher to indicate sufficient convergent validity [44, 47]. We further tested our constructs on discriminant validity using the Fornell-Larker-Criterion. Accordingly, discriminant validity of a construct is ensured if the square root of the AVE exceeds the correlations with any other construct [44, 47]. Our results, shown in Table 2, indicate that the latent constructs used in our measurement model have sufficient reliability, convergent validity, and discriminant validity.

Table 2. Evaluation of latent constructs

	<i>Cα</i>	<i>CR</i>	<i>AVE</i>	OPU	PPU	Sat	Int
OPU	.914	.916	.786	.886			
PPU	.944	.944	.848	.052	.921		
Sat	.890	.891	.731	.467	-.330	.855	
Int	.972	.972	.921	-.181	.632	-.514	.959

OPU = PU of organizational IS; PPU = PU of private IS; Sat = Satisfaction with organizational IS;
Int = Intention to use private system for work; The diagonal represents the squared AVE values. Off diagonal elements are the correlations among latent constructs.

5.2 Common Method Bias

As all responses of our survey are self-reported, we conducted Harman's single factor test [48, 49] to check for common method bias. We performed a factor analysis with all items of the four latent variables using principal component analysis and no rotation. Based on the Kaiser criterion (Eigenvalues > 1), three factors were extracted. The first factor accounted for about 45.86 % of the total variance. Thus, as no single factor could be derived and no general factor explains the majority of variance in the variables, the chances for common method bias are unlikely [48, 49].

5.3 Structural Model and Hypothesis Testing

After we confirmed the factor structure in our dataset in the CFA, we performed a CB-SEM. The absolute fit indices of our research model indicating an overall excellent model fit (Chi^2/DF : 1.231; CFI : 0.986; $SRMR$: 0.061; $RMSEA$: 0.044; $PClose$: 0.618) [50].

The results of our model show a significant relationship between satisfaction with organizational IS and the intention to use private IS instead (-0.291; p: 0.003). Thereby,

confirming H1. Further, our data confirms H2, hence a positive relationship between PU of organizational IS and satisfaction with organizational IS (0.487; p: 0.000). Our model could not verify a direct negative effect of PU of organizational IS on the intention to use private IS for work (-0.070; p: 0.387). Consequently, we are not able to confirm H3. However, our model reveals a significant negative relationship between PU of private IS and the satisfaction with organizational IS (-0.353; p: 0.000), thereby confirming hypothesis H4. Moreover, our results confirm a significant positive relationship between PU of private IS on the intention to use private IS for work, IS (0.536; p: 0.000), confirming H5.

In our analysis, we controlled for gender, age, education, income, and a dummy variable indicating whether the participants are not allowed to use private IS for work. None of the control variables have a significant effect on the satisfaction with organizational IS or the intention to use private IS for work. Our research model explains 35.5% of the variance of satisfaction with organizational IT, and 51.3% of the variance of intention to use private IS for work with control variables excluded. The R² values for the model including control variables are 41.5% for satisfaction with organizational IT, and 51.6% for intention to use private IS for work.

Table 3. Results of hypothesis testing

<i>Hypothesis</i>	<i>SC</i>	<i>P-value</i>	<i>Result</i>
H1	-.291**	.003	Supported
H2	.487***	.000	Supported
H3	-.070	.387	Not supported
H4	-.353***	.000	Supported
H5	.536***	.000	Supported
<i>Indirect effects</i>			
	<i>SC</i>	<i>P-value</i>	
OrgPU → Sat → Int	-.168*	.012	
PrivPU → Sat → Int	-.110**	.006	

SC: Standardized Coefficients; * Significant at a .05 level;
 ** Significant at a .01 level; *** Significant at a .001 level

In addition, we tested for indirect effects following the approach of Zhao et al. (2010). Applying bootstrapping with 2000 samples our data reveals a significant indirect effect of perceived performance of organizational IS on the intention to use private IS mediated by satisfaction. Since there is no direct effect of perceived business performance on intention, we consider this an indirect only mediation.

Second, our analysis supports an indirect effect of PU of private IS on intention mediated by satisfaction. As the product of the three path coefficients is positive, we consider this a complementary mediation (see Table 3).

6 Discussion

The objectives of this study were to examine how knowledge and experience with alternative private IS affects the attitude towards organizational IS and to uncover the mechanism that drives employees to introduce new (private) IS to their organizations.

We applied the cybernetic negative feedback loop as our theoretical framework to develop our research model. To answer RQ1 we proposed satisfaction with organizational IS as antecedent for behavioural change and the intention to use private IS for work. To answer RQ2 we proposed PU of both personal and organizational IS as antecedent for satisfaction with organizational IS.

First, our results support our assumption that satisfaction is one major driver of behavioral change. Since qualitative consumerization literature already proposed a relationship between satisfaction with organizational IS and the intention to use private IS for work [6, 26], we quantitatively verified this relationship. Second, we find that satisfaction mediates the effects of PU of private and organizational IS on the intention to use private IS for work. Since the relationship between PU of private IS on the intention to use private IS for work may not be surprising [23, 39–42], the mediation analysis also reveals that low degrees of PU of organizational IS indirectly increases the intention of employees to use a private alternative for work. Third, our results show that not only does inferior performance of organizational IS lead to decreased satisfaction with organizational IS, *but positive experience with alternative private IS does too*. This finding is further in line with Rogers (1962), who describes that an individual gets into an “uncomfortable state of mind” when he/she is willing to adopt an innovation but is not able to [52].

Imagine an employee who has privately switched from innovation I to innovation II (Figure 4) at a certain point in time, but is required to use innovation I at work. Hence, this mandatory use at work will make him/her feel uncomfortable respectively dissatisfied because he/she is willing to adopt innovation II. The longer it takes an organization to adopt innovation II, the more employees will migrate from innovation I to II in their private lives, leading to an increasing quantity of dissatisfied employees.

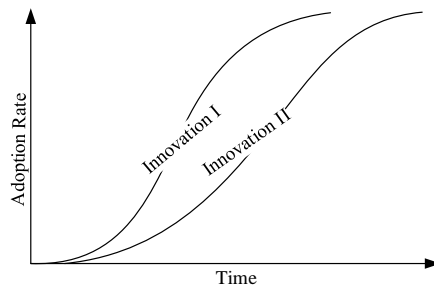


Figure 3. S-curves (adapted from Rogers (1995)).

6.1 Practical Implications

Our results imply that it is important for organizations to monitor developments and trends outside the organization in the consumer market. As employees get to know and used to superior IS in their private lives, their standards for IS will increase in general. Consequently, satisfaction with organizational IS will decrease if the organization cannot keep up with the speed of innovation outside the organization. This may happen, even if employees were satisfied with the work IS at the time of initial adoption. As

satisfaction is a precondition for change in behavior, possible consequences are employees complaining or using alternative IS even without approval (shadow IT) [53]. In the setting of file sharing in an organization, the dissatisfaction with the traditional way of file sharing might lead to employees using private cloud solutions instead and thereby threatening the organizations data security. Thus, organizations must be sensitive concerning innovations in the consumer market and the variation of employees' satisfaction. One way to address these issues is to allow the use of individual and private IS as long as it does not harm the organization. Another feasible way is to mimic consumer systems to provide employees with the standard they are accustomed to from their private lives.

6.2 Limitations and Future Research

This study is subject to several limitations. First, participants of our study were faced with a hypothetical scenario while reporting their intention to use a private IS for work. The actual situation in participants' work life might influence the reported intention. However, our study shows that the effects of perceived performance of private and organizational IS remain the same as we controlled for the actual situation at work using a control variable. Second, our study focusses on a specific kind of system – a system for file sharing. Although, we think that this system is very suitable, as there are comparable solutions in both work and private life, future research could extend this study by investigating different systems or by differentiating for instance between physical and non-physical IS. Furthermore, only employees who had experience with an alternative IS in their private lives participated in our study. Drawing on the cybernetic negative feedback loop, we propose that knowledge and familiarity with a superior system shifts the reference value of users/employees. This implies that employees who do not know alternative IS would be more satisfied with their organizational IS. Subsequent studies could further investigate this causal relationship.

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