

# Investigating the Factors for Using One vs. Two Devices for Work and Private Life

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**Abstract.** Because of the increasing performance and affordability of consumer IT such as smartphones or tablets, more and more employees are using the same device for work and private purposes. On the one hand, this behavior can increase productivity. On the other hand, the dual use of one device makes it more difficult to separate work and private life. Since existing BYOD and consumerization literature deals extensively with the relative advantage of private devices, we investigate the factors influencing the decision to use one or two devices. To answer our research question, we conducted a web-based study and used structural equation modelling.

**Keywords:** Dual use, multihoming, BYOD, consumerization

## 1 Introduction

Over the last years, the diffusion of consumer technologies into organizations has become apparent [1]. This phenomenon is referred to as consumerization [2] and includes the usage of devices like smartphones and tablets, but also software and services for work related tasks [1, 2]. Consumerization has gained practitioners attention in particular [3], as it flips the established direction of IT diffusion in organizations from top-down to bottom-up and challenges the work of IT departments [4, 5]. For organizations, Bring your own device/system (BYOD/S) programs are one possible response to the trend of consumerization [6]. Employees can use their private IT, while the organization can establish guidelines and policies to prevent data loss and security breaches [7]. Hence, BYOD is the allowed subset of consumerization [2].

The increasing number of organizations that allow private IT and introduce BYOD programs leads to more and more employees that use the same device for both work and private life [8]. This behavior is termed ‘dual use’ [9]. On the one hand, dual use can simplify communication as employees are able to work wherever and whenever necessary [8]. On the other hand, dual use of one device can have negative implications such as work overload, job related stress, and work life conflicts [8, 9]. Employees who do not want to expose themselves to these negative effects can instead use two separate devices for work and private life. In our study, we use the term multihoming to describe this behavior.

Existing literature on consumerization and BYOD primarily deals with the influence of a relative advantage of consumer IT to explain employees intention to use private IT for work [10–14]. To add to existing research, we use multihoming as an analogy to examine how the preference for one or two devices influences the decision to take part in a BYOD program. To understand this decision process, our research question is:

*RQ: Which factors influence the preference to use just one device instead of separating work and private life by using two devices?*

To answer our RQ, we conducted a web-based survey with 200 participants. Based on a hypothetical scenario, respondents had to choose between

- two devices vs. one device for both work and private life which they privately own (BYOD)
- two devices vs. one device for both work and private life which is provided by their company

Our contributions to the field is the following. We apply covariance based structural equation modelling (CB-SEM) to assess the effect of inconvenience of two devices, work life conflict concerns, perceived privacy risks and perceived financial risks on the two aforementioned tradeoffs. Validating previous qualitative research [2, 15, 16], our analysis implicates that the inconvenience of two devices drives employees to dual use one device. Moreover, we find that privacy concerns drive employees to multihome.

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

## **2 Related Work**

### **2.1 BYOD and the Preference for Using Only a Privately Owned Device**

The case where employees receive approval to use privately owned devices such as smartphones, tablets, or notebooks for work is known as BYOD [2, 6, 7]. According to consumerization and BYOD literature, the relative performance advantage over a corporate device is one major reason for employees to use a privately owned device. As employees think that their private device is more useful or will increase their performance, they are more likely to use it for work [10–12, 14, 17]. Another reason to choose a privately owned device over a corporate device, can be more intuitive handling and better ease of use [10, 12]. Generally speaking, employees' satisfaction decreases, if they have to use inferior technology for work [1, 2, 15]. Furthermore, the results of Dernbecher et al. (2013) imply that habitual usage of private IT can lead to consumerization behavior [18]. In addition, related research suggests that early adopters and highly innovative employees rather use private IT for work in comparison to late adopters and “laggards” [12]. The same applies for employees with high degrees of self-efficacy [18]. On the contrary, concerns about possible risks while using private IT for work, are a potential inhibitor of BYOD and consumerization [13].

## 2.2 Multihoming and Preference for Using One Device

The term multihoming originates from the domain of telecommunication networks and network industries. In the domain of economics multihoming is described as “[...] agents purchas[ing] two competing products in order to reap maximal network benefits” [19]. Playing on different game platforms [20, 21] or holding different credit cards [20, 19] are popular examples for multihoming in the economics literature. Customers/users multihome due to missing compatibility. Some games are released exclusively for one gaming platform; some shops only accept a certain credit card. One way to overcome these incompatibilities is to multihome. However, multihoming multiplies costs for initial purchases, operating, and managing effort [19]. We take multihoming as an analogy to analyze the reasons for one or two devices. While work and private life is incompatible for certain employees, multihoming is useful to strictly separate work and private life by using two distinct devices [9, 16].

In accordance with this analogy, qualitative consumerization literature shows that managing, carrying, and charging two separate devices is inconvenient and annoying [2, 15, 16]. For those employees who find that work and private life is compatible, dual use of one device is a possibility to avoid additional effort and costs. However, dual use bears the risk of work interfering with private life, leading to a potential work life conflict [2, 9, 16]. This conflict in turn can induce job stress leading which intensifies the resistance to use only one device for both work and private life [8, 22, 23]. Dual use might also blur the boundaries between work and private life. This creates concerns that private information might be revealed to the employer, or private data may be lost, because the employer has to remotely wipe a device [13, 24].

## 3 Research Model and Hypotheses

To examine the decision between dual use and multihoming, we considered a situation where a company provides a corporate device to its employees and employees are allowed to dual use the device. On the other hand, the company also allows employees to bring their private device and use it for work (BYOD).

Although not every employee is faced with this many options in real life, we intentionally designed this scenario in a way that participants have to consider the two possible alternatives to using two separate devices. Hence, we assessed participants’ decisions concerning the two following trade-offs:

Multihoming *against* dual use of a company owned device (Corp)

Multihoming *against* dual use of a private device (Priv)

To this end, our research model has two distinct dependent variables. We operationalized both variables as a trade-off between multihoming and the respective dual use variant (the corresponding scales are described in section 4.2).

### 3.1 Intention to Use One Device

As the reasons for the two choices might differ from each other and may not exclusively depend on the tendency to use one instead of two devices, we further developed the

variable *intention to use one device* (ITU1D). According to the theory of reasoned action [25] and the theory of planned behavior [26], intention is supposed “[...] to capture the motivational factors that influence a behavior” [26]. In our study, we suggest ITU1D captures the factors that influence the decision to use one device instead of two. Thus, we propose ITU1D as the antecedent for both decisions and hypothesize:

*H1a – b): ITUD1 will have a positive effect on a) Priv; b) Corp*

Besides the direct effect of ITU1D on the two decisions, we further incorporate ITU1D as a mediating variable into our research model.

### **3.2 Inconvenience of Two Devices**

According to qualitative research in the domain of consumerization, it is inconvenient for some employees to manage respectively handle multiple devices [2, 15, 16]. This is, amongst other things, because of time-consuming tasks such as synchronizing, charging, and carrying.

Multihoming occurs usually because of insufficient compatibility or required redundancy [19, 27]. As users want to overcome incompatibilities and benefit from separate networks they have to multihome, leading to multiple investments and increasing effort [19]. We suggest the need for separation of work and private life is comparable to incompatibility. Consequently, using multiple devices for different purposes also causes an increase in maintenance and handling efforts. Thus, we propose that employees that perceive high degrees of inconvenience in handling two devices (INCON), will have the general intention to dual use. Moreover, they will rather decide in favor of one company or one private device over multihoming:

*H2 a) - c). INCON will have a positive effect on a) ITU1D; b) Priv; c) Corp*

*H2 d) - e). ITU1D mediates the effect of INCON on d) Priv; e) Corp*

### **3.3 Work Life Conflict Concerns**

With dual use of one device the likelihood of permeable boundaries between work and private life increases [16, 28, 29]. This especially affects employees that are concerned that dual use will make them neglect their family and friends [9, 16]. One strategy to strengthen the boundaries is to multihome, because employees are able to lay aside or turn of one of the devices [30]. In a study with 300 participants, Yun et al. (2012) demonstrate that distinct work-life conflict concerns (WLC) lead to a negative attitude towards the use of a single smartphone. Hence, we hypothesize:

*H3 a) – c) WLC will have a negative effect on a) ITU1D; b) Priv; c) Corp*

*H3 d) – e) ITU1D mediates the effect of WLC on d) Priv; e) Corp*

### **3.4 Perceived Privacy Risk**

Consumerization and BYOD literature describe privacy concerns as a fear of surveillance or the disclosure of private information [13, 31, 32]. Using one device for both work and private life might entail that personal information such as location, photos, and emails are revealed to the employer [24]. In addition, the loss of private

information is possible. As employers usually use mobile device management systems on both company and private devices, they are able to remotely wipe data on a smartphone in case of a compromised device [13]. Further, Lebek et al. executed a quantitative study in 2013 with 151 employees and found an indirect effect of privacy concerns on the intention to use a private device for work [24]. Thus, we assume that perceived privacy risk (PR) negatively affects the decision to dual use one device for both work and private life.

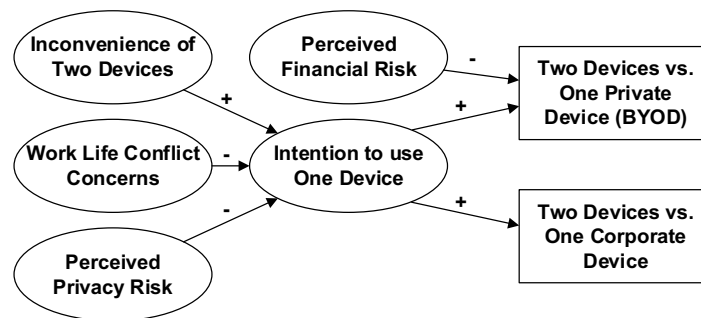
*H4 a) – c) PR will have a negative effect on a) ITUID; b) Priv; c) Corp*

*H4 d) – e) ITUID mediates the effect of PR on d) Priv; e) Corp*

### 3.5 Perceived Financial Risk

Grewal et al. (1994) describe financial risk as “the potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost” [33]. Also, qualitative research in the domain of consumerization and BYOD finds evidence that perceived financial risk (FR) inhibits employees from taking part in BYOD programs [2, 15]. This is because employees expose their privately purchased device to additional risks when using it for work. To test this relationship quantitatively, we hypothesize:

*H5. FR will have a negative effect on Priv*



To ensure clarity, we do not illustrate the hypothesized direct relationships between INCON, WLC, and PR on the two tradeoffs

Figure 1. Research Model

## 4 Research Methodology

### 4.1 Data Collection

We collected the data for our study conducting a web-based survey in fall 2016. Our survey targeted participants that possessed and used a smartphone during the runtime of our survey. While 200 initially began to fill out the survey, only 128 completed it. We further deleted 18 observations of participants, who failed to answer an attention question. Table 1 displays the sociodemographic data of our study sample.

**Table 1.** Sample Characteristics

<i>N</i> = 110	Count	%		Count	%
<b>Gender</b>			<b>Profession</b>		
Female	50	45.45	Student	23	20.91
Male	60	54.55	Working Student	30	27.27
<b>Education</b>			Part Time Employee	3	2.73
High School graduate	18	16.36	Full-Time Employee	53	48.18
Bachelor’s Degree	61	81.67	Unemployed	1	0.91
Master’s Degree	30	18.33	<b>Mean</b>	<b>SD</b>	
Doctorate Degree	1	0.91	<b>Age</b>	25.55	5.51

**4.2 Survey Design and Measurement Scales**

We presented the following hypothetical scenario to the study participants:

*“Imagine you start a new job. In order to fulfill this job, you will need a smartphone to make phone calls, to write emails or to browse the web. Your company offers you the following:*

- *You can use your own smartphone for work. If you do this, the company will pay your phone contract.*
- *You could also get a company smartphone for work and use it for private purposes.”*

To control for the multitude of possible devices provided by an employer and possible brand preferences, participants were offered one out of four different smartphones as a hypothetical company smartphone. Applying randomization, we presented participants an iPhone 4 (26.36%), an iPhone 6S (20.00%), a Samsung Galaxy S4 (29.09%), and a Samsung Galaxy S7 (24.55%). The devices represent the current models of the two market leaders (at the time we conducted the survey) and one model each from an older generation. We presented each device using a picture and a list of the following technical details: memory capacity, display size & resolution, weight, camera details, and battery life. Based on this scenario, participants had to decide whether they would dual use the company owned device, dual use their private device (BYOD) or multihome. We assessed participants’ decision using two distinct six-point scales. The first ranged from (1) *“I would use two separate smartphones”* to (6) *“I would only use my personal smartphone”* (Priv). The second ranged from (1), *“I would use two separate smartphones”* to (6) *“I would only use the company smartphone”* (Corp). In addition, we asked participants to rate the quality of their private device in comparison to the corresponding company smartphone on a seven-point scale from (1) *“Strictly worse”* to (7) *“Strictly better”* with (4) as *“My smartphone has the same quality”*.

To capture the latent variables WLC, PR, FR, ITU1D and INCON we used established multi-item scales (see Table 8 in the Appendix). All latent constructs are measured on seven-point Likert scales using reflective items.

## 5 Data Analysis and Results

### 5.1 Measurement Model

To test the factor structure of the five latent constructs, we conducted an exploratory principal factor analysis with promax rotation. Based on the Kaiser-criterion (Eigenvalue > 1) the analysis extracted five factors. A Kaiser-Meyer-Olkin (KMO) measure of 0.817 indicates “meritorious” sampling adequacy [34]. Moreover, we ran a confirmatory factor analysis and computed Cronbach’s alpha ( $C\alpha$ ) as well composite reliability (CR) to test reliability. Table 2 illustrates that the measures of the latent constructs exceed the recommended threshold of 0.7 [35]. Thus, we do not see any reliability issues. Moreover, Table 2 shows that the latent constructs have sufficient convergent validity, as the average variance extracted (AVE) of all constructs is higher than 0.5 [36]. Discriminant validity was assessed using the Fornell-Larker criterion. The results are listed in Table 2 and confirm that discriminant validity is not an issue, as the square root of the AVE of each construct exceeds the correlations with any other construct [37].

**Table 2.** Evaluation of Latent Constructs

	$C\alpha$	CR	AVE	(1)	(2)	(3)	(4)	(5)
(1) <i>ITU1D</i>	0.974	0.974	0.926	<b>.963</b>				
(2) <i>INCON</i>	0.904	0.907	0.766	.600	<b>.875</b>			
(3) <i>WLC</i>	0.764	0.766	0.522	-.182	-.091	<b>.722</b>		
(4) <i>PR</i>	0.877	0.879	0.709	-.334	-.160	.441	<b>.842</b>	
(5) <i>FR</i>	0.921	0.921	0.796	-.029	.023	.444	.604	<b>.892</b>

The diagonal represents the squared AVE values. Off diagonal elements are the correlations among latent constructs.

Because all our survey data is self-reported, we controlled for common method bias using Harman’s single factor test [38]. We conducted a principal factor analysis without rotation. The analysis extracted five factors, while the first factor accounts for 33.59% of the variance. As the analysis did extract a single factor and no general factor accounts for the majority of the variance, a common method bias is unlikely [38].

### 5.2 Structural Model and Test of Hypotheses

Subsequent to the confirmatory factor analysis, we conducted a CB-SEM to test our hypotheses. The model fit indices indicate that the data fits our research model excellently ( $Chi^2/df$ : 1.123;  $CFI$ : 0.987;  $SRMR$ : 0.053;  $RMSEA$ : 0.034;  $PClose$ : 0.850) [39]. Our research model explains 42.5% of the variance of *ITU1D* ( $R^2 = 0.425$ ), 38.6% of the variance of *Priv* ( $R^2 = 0.386$ ), and 33.8% of the variance of *Corp* ( $R^2 = 0.338$ ). Our results show that *ITU1D* has a positive significant effect on decisions *Priv* and *Corp*, thereby confirming hypothesis H1a and H1b. Our analysis further supports that *INCON* has a positive effect on *ITU1D*. It also confirms a positive effect of *INCON* on both decisions. Thus, H2a, H2b, and H2c are supported by our results. We cannot

confirm H3a, H3b, and H3c, as we did not find any significant effects of WLC altogether. However, our results show a significant negative relationship between PR and ITU1D, confirming H4a. H4b and H4c are not supported by our analysis. In addition, our results do not show a significant effect of FR on Priv. Thus, we cannot confirm H5.

**Table 3.** Results of Hypothesis Testing

<i>IV</i>	<i>DV</i>	<i>Hypothesis</i>		<i>SC</i>
<b>ITU1D</b>	Priv	H1a	✓	0.387 ***
	Corp	H1b	✓	0.353 ***
<b>INCON</b>	ITU1D	H2a	✓	0.582 ***
	Priv	H2b	✓	0.279 *
	Corp	H2c	✓	0.238 *
<b>WLC</b>	ITU1D	H3a	x	-0.023
	Priv	H3b	x	0.046
	Corp	H3c	x	-0.009
<b>PR</b>	ITU1D	H4a	✓	-0.215 *
	Priv	H4b	x	-0.016
	Corp	H4c	x	-0.053
<b>FR</b>	Priv	H5	x	-0.083
<b>Quality</b>	Corp			-0.175 *

IV: Independent Variable; DV: Dependent Variable; SC: Standardized Coefficients;  
 \* Significant at a .05 level; \*\* Significant at a .01 level; \*\*\* Significant at a .001 level

We also included the following control variables into our analysis: gender, age, quality of the private smartphone in comparison to the provided company smartphone, and a dummy indicating whether the operating system (OS) of the company smartphone and the personal smartphone is identical. Among control variables, we found a significant relationship between the relative quality of participants' private devices and Corp.

**Table 4.** Indirect Effects with ITU1D as Mediator

<i>IV</i>	<i>DV</i>	<i>Hypothesis</i>		<i>SC</i>
<b>INCON</b>	Priv	H2d	✓	0.225 **
	Corp	H2e	✓	0.205 *
<b>WLC</b>	Priv	H3d	x	-0.009
	Corp	H3e	x	-0.008
<b>PR</b>	Priv	H4d	✓	-0.083 *
	Corp	H4e	✓	-0.075 *

IV: Independent Variable; DV: Dependent Variable; SC: Standardized Coefficients; \* Significant at a .05 level; \*\* Significant at a .01 level

To determine whether ITU1D mediates the effect of INCON, WLC, and PR, we tested the corresponding indirect effects following the approach of Zhao et al. (2010). Applying bootstrapping with 2000 samples, our results indicate that the relationships



between INCON and the two decisions are mediated by ITU1D. These indirect effects are complementary mediations as the product of all three relationships is positive [40]. Thereby, we can confirm H2d and H2e. We cannot find indirect effects of WLC and support for H3d and H3e. However, our analysis also reveals a complementary mediation of ITU1D on the relationships between PR and the two dependent variables, confirming H4d and H4e. Table 4 summarizes the results of the mediation analysis.

## **6 Discussion**

While existing qualitative studies suggest a negative relationship between the inconvenience of multiple devices on the decision to take part in a BYOD program [2, 15, 16], our study contributes to research by quantitatively validating this correlation. The results of our analysis verify that INCON affects the ITU1D and significantly influences the employees' decision concerning BYOD, even while controlling for relative quality differences and OS preferences. Hence, we found support that our measurement of INCON and ITU1D are good predictors for multihoming and dual use. Additionally, our results validate that ITU1D mediates the effects of INCON and PR on the two decisions.

Our results do not support the findings of Yun et al. (2012), who find that work-life conflict concerns increase the resistance to use one device for both work and private life. This deviation might be due to differences in the study sample. As the average age of our study participants is 25.55 (SD: 5.51), most of the participants are digital natives. This is not the case for the sample of Yun et al., as the study was published in 2012 and the average age was 33.93 (SD: 6.34). We assume that digital natives do not have concerns of a work to life conflict due to multiple devices as they are familiar with ubiquitous technologies in their everyday lives [41]. Lebek et al. (2013) show that privacy concerns negatively influence employees' intention to bring their own mobile device. Our analysis supports these findings, as PR has a significant negative impact on ITU1D. Further, the indirect effect of PR and ITU1D does not only increase the likelihood of multihoming with a private device (BYOD), but also the likelihood of multihoming with a corporate device. In accordance with Weeger and Gewald (2014), we cannot confirm an influence of FR on Priv. Interestingly, we find that the relative quality assessment of the private smartphone in comparison to the hypothetical corporate smartphone only affects Corp and not Priv. As Priv resembles the decision to take part in a BYOD program, our results concerning relative advantage of a private device do not confirm the findings of previous BOYD and consumerization literature [10–14]. This discrepancy might be due to the use of the two distinct dependent variables for each possible decision.

### **6.1 Implications and Limitation**

Driven by increasing accessibility and decreasing prices, the emergence of redundant IT in the different parts of users' lives is inevitable. Our results suggest that certain employees perceive it as inconvenient and annoying to manage, carry, and charge

multiple devices. However, employees do not only manage redundant devices, but also non-physical IS such as email or messaging services with multiple accounts, usernames and passwords. Future research could investigate whether our results can be further generalized to non-physical IS as inconvenience of redundant IS may be a reason for noncompliant IS use at work. In addition, our results imply that a corporate smartphone that is state of the art and has relatively high-quality characteristics increases the likelihood of employees making dual use with their corporate device. Thus, if an organization wants to drive dual use, providing excellent devices is an option. On the other hand, our analysis documents that privacy concerns are the main reason for multihoming and the resistance against dual use. If organizations want to foster dual use, this could be addressed by providing more transparency with respect to data protection and privacy policies.

Our study is prone to the following limitations: First, even though most of the study participants are in a working relationship, our results are based on a convenience sample with 48.18% students. Moreover, the sample size of 110 valid observations is relatively small. Concerning external validity, participants assessed their preferences for one or two devices in a hypothetical setting. However, this special setting allowed us to control for relative advantage and OS/brand preferences.

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## Appendix

**Table 5.** Items of Latent Constructs

Items	Reference
<b>itu1d1:</b> Assuming I have the choice, I will intend to use only one smartphone ...	Adapted from Venkatesh et al. (2003)
<b>itu1d2:</b> If I have the choice, I will try to use only one smartphone ...	
<b>itu1d3:</b> Given that I have the choice, I plan to use only one smartphone... ... for both work and private life.	
<b>wlc1:</b> The work use of one smartphone interferes with my home and personal life.	Adapted from Yun et al. (2012)
<b>wlc2:</b> The amount of time my work use of one smartphone takes up makes it difficult to fulfill home/personal responsibilities.	
<b>wlc3:</b> Things I want to do at home or personally do not get done because of the demands the work use of one smartphone puts on me.	
<b>incon1:</b> Managing two distinct smartphones is inconvenient.	Ostermann et al. (2017)
<b>incon2:</b> Carrying two smartphones is cumbersome.	
<b>incon3:</b> Operating two smartphones is tedious.	
Using only one smartphone for both work and private life...	Adapted from Featherman and Pavlou (2003)
<b>pr1:</b> ... causes me to lose control over the privacy of my personal data.	
<b>pr2:</b> ... leads to a loss of privacy, because my personal information might be used without my knowledge.	
<b>pr3:</b> My company might take control of my personal data because I use only one smartphone for both work and private life.	Adapted from Featherman and Pavlou (2003)
Using my private smartphone for both work and private life...	
<b>fr1:</b> ... exposes me to an additional risk of losing money.	
<b>fr2:</b> ... could lead to a financial loss for me.	Adapted from Featherman and Pavlou (2003)
<b>fr3:</b> ... exposes me to financial risk.	