

# Investigating Continuous Security Compliance Behavior: Insights from Information Systems Continuance Model

Full Paper

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## Abstract

In this Modern organizations have to utilize proper methods for ensuring the employees' compliance with security policies. Investigating the employees' compliance behavior is important issue for IS security management success. Several researchers have studied the compliance behavior by using different conceptual models including technology acceptance model (TAM), theory of planned behavior (TPB), deterrence, neutralization and etc. However, there is no study for investigating continuance of the security compliance. It is very important for organizations that employees comply with IS security policies and continue complying. This study aims to fill this gap on IS security research and to probe the important factors that lead employees to have continuous security compliance behavior by using IS continuance model. The analysis of data collected from 270 employees in banking organizations shows that employees' perceived satisfaction, perceived usefulness, security awareness and normative believes directly influence continuance intention to comply with IS security policies.

## Keywords

Compliance behavior, Security policy, IS continuance model, Continuous compliance.

## Introduction

Organizations often invest heavily just on technological or technical aspects of information security solutions, However, failures related to the information security breaches and incidents are still the most important problem for them (Ifinedo, 2012) (B.-Y. Ng, A. Kankanhalli, Y.C. Xu, 2009). The most important reason for this issue is that employees are the weakest link in the security chain and actually they are potential threats within the organization (J.M. Stanton, 2005). For achieving success from information systems security policy (ISSP) it is important to study the behavior of employees because without their compliance the ISSP will be unprofitable. There are several studies in IS filed those investigate the employee's compliance behavior whit the ISSP (e.g. (Bulgurcu et al., 2010) (Herath, 2009) (Ifinedo, 2012) (A. Vance, 2012). These studies help to know how the intention to comply with ISSP or intention to resist with ISSP can be generated in employees. It is obvious that deploying new IS/IT in organization just as new ISSP should be with the anticipation of its potential user's behavior. It means that if an organization deploys a new information system and if the potential users resist using it or after initial acceptance they discontinue using it, the new IS will be unfruitful for that organization. From the adoption perspective studies are divided in to two stages including pre adoption or initial acceptance of new IS/IT and post adoption or continuance usage of IS/IT.

This study uses the IS continuance model for investigating the continuous compliance intention of employees. This model examines the continuous intention of IS/IT users and indicates main constructs that make such intention in users (Bhattacharjee, 2001). The initial acceptance of IS/IT is very important toward IS/IT success, however, the continuous usage determines the long term success of IS (Bhattacharjee, 2001). So promoting continuous IS usage and preventing the stoppage of IS usage is a key

point in IS success. Furthermore, it is important to mention that Users beliefs and attitudes change during the usage period (Bhattacharjee, A. & Premkumar, G, 2004). Regarding that IS continuance model investigates users post adoption behavior and determines the main constructs those lead to continuance intention to use information system or information technology, we can utilize this model to investigate continuance employee's intention to comply with ISSP. Just as IS usage, compliance intention can be changed over the time and it should be continuous for ensuring IS success. Prior researchers have focused just on utilizing IS pre adoption theories, but investigating the continuous compliance intention is unclear. In addition, some studies have investigated the influence of awareness and normative beliefs on intention to comply with ISSP (Bulgurcu et al. 2010). However there is no study to investigate how these constructs directly or indirectly affect the continuance intention to comply with ISSP. This study aims to examine these constructs alongside with IS continuance model in post compliance phase.

## **Research Hypothesis and Theoretical Model**

For further investigating the employees' compliance behavior, studying the continuous intention to comply with ISSP is compulsory. As it is mentioned earlier initial security compliance is not enough for assuring about the successful implementation of ISSP. Previous research about IS adoption confirms that new IS/IT success completely depends of the initial acceptance of its users as well as continuance intention to use. Modern organizations are increasing their investment in new information systems because of competitive advantage and better management of information. Thus, organizations should utilize methods for predicting or increasing adoption of new IS/IT users in order to predict or increase the IS success. Literature review in the ISSP compliance field reveals that several studies utilize usage adoption theories or models for explaining employee's compliance behavior. They also confirm that these models and theories are suitable for ISSP compliance study because adoption to new information systems and comply with new ISSP are very close conceptions. However, previous studies just have used the pre-adoption theories or model and they have not focus on continuance theories. So this study utilizes one of the widely used models in order to explore continuous compliance.

In the research model, based on IS continuance model and ISSP compliance behavior seven hypothesis are developed. These hypotheses explain relationship among four constructs of the continuance model including perceived usefulness of ISSP, confirmation of expectation about ISSP, overall satisfaction with ISSP and finally, continuance intention to comply with ISSP. In addition, relationships between information security awareness and normative believes are examined.

### ***Confirmation & Perceived Usefulness***

The initial conception of users about usefulness might be low because they may have not explicit expectation about the new IS (Bhattacharjee, 2001). Users may accept to use a new information system just because they want to gain concrete perception about the usefulness of IS. So through the confirmation of the initial or subsequent expectations about information system, users may develop a higher degree of usefulness perception.

Based on cognitive dissonance theory (Festinger, 1957) users may experience psychological tension when their expectations about usefulness of information systems do not be confirmed during the actual usage of information system. Thus, the increase of confirmation perception causes the increase of perceived usefulness and the decrease of confirmation causes the decrease of usefulness. So there is a causal relationship between confirmation of expectation and perceived usefulness.

We can describe the compliance behavior based on conceptions of usage adoption because perceived usefulness and confirmation of expectation is applicable in security behavior of the employees (Xue et al., 2011). For example, an employee has initial expectation about the ISSP compliance including job performance, rewards or degree of usefulness. So after actual compliance behavior confirmation of expectation may cause the increase of the perceived usefulness. Contrarily if expectation about ISSP is disconfirmed during the actual compliance, the degree of perceived usefulness of ISSP compliance will decrease. Furthermore, it is important to know that employees' initial usefulness perception is one of the expectations that should be confirmed during the actual compliance.

According to the information above this study develops first hypothesis:

Hypothesis 1: Confirmation of compliance expectations has a positive relationship with perceived usefulness of employees.

### **Confirmation & Satisfaction**

Based on the ECT (Oliver, 1980) confirmation of expectations is determinant of users' satisfaction with actual usage. Confirmation is related to the expected IS usage benefits and therefore influences the evaluative response of the employees. Bhattacharjee argues that confirmation directly influences the overall satisfaction of IS users during the post adoption period (Bhattacharjee, 2001). For instance, every user has his or her own expectation about the new information systems and if these expectations are confirmed, overall satisfaction with IS usage will be increased. On the other hand, if expectations of users are disconfirmed, the degree of satisfaction will be decreased during the actual IS usage. So there is a casual relationship between confirmation and satisfaction and confirmation is positively related to the overall satisfaction of IS users.

Several studies have used IS adoption hypothesis and models for investigating ISSP compliance behavior (Ifinedo, 2012; Xue et al., 2011). Hence, we believe that IS post adoption hypothesis also can be utilized through ISSP compliance study. So the relation between confirmation and satisfaction that is related to the post adoption field also can be described in security compliance study. In the initial stage, employees have some expectation about the ISSP compliance. If these expectations would be confirmed during the actual compliance, their overall satisfaction with ISSP will be increased. On the other hand, if their expectations would be disconfirmed, their degree of satisfaction will be decreased.

We can come to the conclusion that confirmation of compliance expectation directly influences the overall satisfaction with ISSP and the relationship between these constructs is positive. The expectations of an employee about ISSP compliance may include usefulness, ease of use, job performance and etc.

Based on the discussion above this study develops second hypothesis:

Hypothesis 2: Confirmation of expectation has a positive relationship with overall satisfaction of employees with ISSP.

### **Perceived usefulness & Satisfaction**

Drawing from the technology acceptance model, perceived usefulness is one of the determinants of technology acceptance (Davis, 1989). This has been confirmed through several studies and through different contexts (Davis, 1989) (Mathieson, 1991) (Taylor & Todd, 1995). According to the IS continuance theory, perceived usefulness alongside the confirmation is another determinant of users satisfaction. For instance, if a user believes that using information system is useful for him or her, he or she will be satisfied with IS usage. The higher degree of usefulness causes the higher degree of satisfaction. On the other hand, if an employee feels that information system is not useful, he or she will resist using it. Briefly, there is a casual relationship between usefulness and satisfaction of the users.

In the ISSP compliance field, relationship between usefulness and satisfaction can be utilized. If an employee believes that complying with ISSP is useful, he or she will be satisfied with complying. Contrarily, if an employee thinks that complying with ISSP is not useful he or she will not be satisfied with complying. So we can conclude that there is a casual relationship between usefulness and satisfaction and perceived usefulness of ISSP compliance positively affects overall satisfaction with ISSP compliance.

Therefore the following hypothesis can be proposed:

Hypothesis 3: Perceived usefulness has a positive relationship with overall satisfaction with ISSP compliance.

### **Perceived Usefulness & Continuance Intention to Comply With ISSP**

According to the TAM, perceived usefulness is one of the direct determinants of technology acceptance (Davis, 1989). Perceived usefulness is related to the instrumentally consideration and plays an important role in motivating intentions. Bhattacharjee confirms that perceived usefulness can be used in continuance usage context and he believes that usefulness can also determine the continuance intention

If an employee feels that using the information system is useful he or she will continue to use it (Bhattacharjee, 2001). So perceived usefulness directly influences the user's intention to continue using information system.

The relation above is also applicable in ISSP compliance context. Assume an employee who is in actual compliance stage. If the employee believes that compliance is useful for him or her, he or she will continue to ISSP compliance. So perceived usefulness of ISSP compliance directly affects continuance intention to comply with ISSP. The higher degree of usefulness perception results in a higher degree of the continuous complying.

Thus, based on the discussion above this study develops following hypothesis:

Hypothesis 4: Perceived usefulness has a positive relationship with continuance intention to comply with ISSP.

### ***Satisfaction & Continuance Intention to Comply with ISSP***

Drawing from the expectation confirmation theory (ECT) satisfaction is the primary determinant of the continuance intention to use information system (Bhattacharjee, 2001). Satisfaction includes positive feeling, but it can be changed to dissatisfaction that includes negative feeling. If an employee is dissatisfied with using information system (because of a low degree of usefulness or disconfirmation of expectations), he or she will not continue to use it. It means that if employees have a high degree of satisfaction they will be more motivated to continuance usage. Briefly overall satisfaction with information system directly influences intention to continue it (Bhattacharjee, 2001).

Based on the information above, we can utilize the relationship between satisfaction and continuance intention in ISSP compliance context. Overall satisfaction with ISSP compliance results in continuance intention to comply with ISSP. For example, if an employee is dissatisfied with ISSP compliance, most probably he or she will not continue to comply with ISSP and he or she will break some rules and guidelines. Therefore it can be deduced that overall satisfaction with ISSP directly affects continuance intention to comply with ISSP.

According to the information above the following hypothesis is proposed:

Hypothesis 5: Overall satisfaction with ISSP compliance has a positive relationship with continuance intention to comply with ISSP.

### ***Information security awareness and continuance intention to comply with ISSP***

According to the Bulgurcu et al. study awareness can be one of the key determinants of intention to comply with ISSP (Bulgurcu et al. 2010). However, they have studied just initial intention to comply and there is a need to investigate the effect of awareness to continuance intention to comply with ISSP. For successful information security compliance there is a need for continuous awareness of employees. Consequently, this continuous awareness can influence the continuance intention to comply with ISSP.

Hypothesis 6: Information security awareness has a positive relationship with continuance intention to comply with ISSP.

### ***Normative Believes and Continuance Intention to Comply with ISSP***

As it is mentioned earlier, normative believes can influence the intention to comply with ISSP. Furthermore, we know that normative believes are always exist in organization. For instance, social pressure caused by important referents like managers and colleagues are also existed in post compliance phase. It means that these believe can cause an employee to stop or continue compliance with ISSP. So Normative believes can directly influence the continuance intention to comply with ISSP.

Hypothesis 7: Normative believes have a positive relationship with continuance intention to comply with ISSP

In summary, this study hypothesis that constructs of IS continuance model as well as awareness and normative believes can be utilized in ISSP compliance contexts in order to investigate continuous intention of employees to complying with ISSP. This study suggests that compliance behavior contains two stages namely as initial compliance and continuous compliance. Initial compliance with ISSP is

investigated through several studies, but it is a need to analyze the next stage for assuring about the success of the ISSP and IS security.

## Research Methodology

### Item Development

Four constructs should be measured for further analysis. All constructs of the research model are related to the IS continuance model. So this study, by using feedback from IS professionals tries to refining two measurement items of IS continuance model (confirmation and Continuance intention) and adopting them in ISSP compliance context. Table 1 illustrates the measurement references. For the awareness and normative believes constructs measurement items are used from Bulgurcu et al. study.

Measurement Items	References
Perceived Usefulness	(Bhattacharjee, 2001) (Davis, 1989)
Confirmation	(Bhattacharjee, 2001)
Satisfaction	(Bhattacharjee, 2001)
Continuance Intention	(Bhattacharjee, 2001)
Information security awareness	(Bulgurcu et al. 2010)
Normative believes	(Bulgurcu et al. 2010)

**Table1- References of Measurement Items**

Measurement of perceived usefulness and satisfaction consist of four items for each. Measurement of confirmation and continuance intention to comply with ISSP, awareness and normative believes consist of three items for each. All of the constructs are measured in multiple items based on the five point Likert scale. In Likert scale items are scored from strongly disagree (1) to strongly agree (5). So if a respondent chooses 1, it means that he or she is completely disagree with the statement. On the other hand, if he or she chooses 5, it means that he or she completely agrees with that statement.

### Sample and Data Collection

There were two criteria for selecting sample and subjects for survey. First of all employees should directly deal with ISSP in their organizations. It means that there should be mandated compliance with ISSP in order to explicit investigating the compliance behavior. So employees in banking organizations can be suitable sample according to this criterion. Second, all of the employees should be in post compliance phase. They should be in a situation that ISSP has been established for a while and they are in actual compliance phase. So the target employees may have gotten trainings or education about security threats or compliance. They also may have some degree of security awareness during the ISSP establishment. .

After searching among different organization it is confirmed that Data were collected for further analysis from employees of several private or public banking organizations in Iran. Because distributing the questionnaire among the employees and getting feedback from them were time consuming, a web-based questionnaire was conducted. Because all of target employees had access to internet they could easily reply to the questionnaire. An invitation that included original e-books as incentives to participation in survey was sent for 350 employees. Finally, after one month 287 employees participated in survey. Among the responses, 275 were valid and complete with the validity rate of 96%.

### Data Analysis

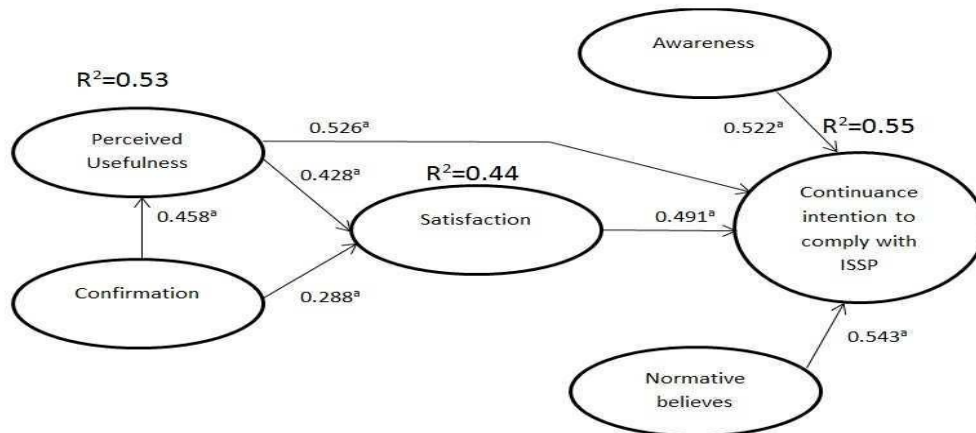
First of all in order to test the hypothesis of research model the goodness of fit indices is estimated. According to Bentler and Bonnet (1980) Chi square/Degree of freedom ratio is a good indicator of the research model fit. If this ratio is lower or equal to 5, the research model is fit.

Fit indices	Recommended Value	Actual Value
$\chi^2$		347.218
df		127
$\chi^2 / df$	$\leq 5$	2.734
RMSEA	$\leq 0.8$	0.057
P value	$\leq 0.5$	0.000
GFI	$\geq 0.9$	0.940
CFI	$\geq 0.9$	0.970

**Table 2- Fit Indices**

The chi square/ degree of freedom ratio for the research model is 2.734. So this is goodness of fit indicator of research model. The Structural equation with AMOS presents other goodness of fit factors including RMSEA, P value, GFI and CFI. RMSEA or root mean square error of approximate shows whether structural model with given estimate parameters is well fit to the matrix of population covariance or not (Byrne, 2001) (Hair et al., 2006). Results show that RMSEA of for research model is 0.057 and is lower than 0.8. According to the Hair et al. study parameter estimates of structural model is fit to matrix of population covariance. GFI or goodness of fit, estimates the proportion of the variance that is considered by the covariance of the estimated population (Tabachnick & Fidell, 2007). Regarding hair et al. study the GFI factor should be greater than 0.9 and therefor GFI factor of the research model is significant. Lastly, CFI or comparative fit indicates that whether hypothesis fit to the observed data. Hair et al. suggest that CFI should be greater than 0.9 and therefor CFI factor for research model is significant.

In the next step path significance and the R<sup>2</sup> value (Path coefficient) for all relationships are estimated. Figure 1 illustrates R<sup>2</sup> values and path significance for all of the relationships.



**Figure 1- Path Significance and Coefficient Values**

Regarding table 2, all of the hypothesis paths of research model are significant at  $P \leq 0.001$ . R<sup>2</sup> indicates that whether variation of the data has a good fit or not. For instance, R<sup>2</sup>=0.56 shows that the fit explains the 56% of the variation in collected data. Among the constructs, continuance intention has the greatest R<sup>2</sup> value and satisfaction has the lowest R<sup>2</sup> value. The relationship between perceived usefulness and continuance intention to comply with ISSP compliance has the highest degree of significance and the relationship between confirmation and satisfaction has the lowest degree of significance among the other relationships. For calculating regression weights confirmatory factor analysis is conducted. This analysis through maximum likelihood estimation, investigates values such as regression weight, standard deviation, and critical ratio. These values also help to find the significance of pairwise relationships of research model. Table 3 shows the regression weights (B) of relationships based on maximum likelihood estimation.

Paths	Standard Regression Weights (B)	Standard Error S.E.	Critical Ratio	P
Usefulness-Satisfaction	0.428	0.052	12.714	***

Confirmation-Satisfaction	0.288	0.019	26.549	***
Confirmation-Usefulness	0.458	0.039	8.231	***
Usefulness-Continuance Intention	0.526	0.064	9.517	***
Satisfaction-Continuance Intention	0.491	0.027	18.816	***
Awareness-Continuance Intention	0.522	0.054	11.265	***
Normative Believes-Continuance Intention	0.543	0.016	23.814	***

**Table 3- Regression Weights**

B values are range from 0.289 to 0.543. Regarding table 3, All of the paths are significant at  $P < 0.001$  and therefore the all hypothesis are supported. Critical ratios ranged from 8.231 to 26.549. According to the hair et al. study critical ratios should be greater than 1.96 and results show that all of the critical ratios are acceptable (Hair et al., 2006). The greatest critical ratio is for the relationship between satisfaction and continuance intention. The lowest critical ratio is for relationship between confirmation and usefulness.

Standard error indicates the precision of likelihood estimation and the lower standard error shows the more precise estimation. Standard errors for all of the pairwise relationship are close to zero. It means that estimations are precise and errors are acceptable for all B values of relationships. Among the relationships Normative Believes- Continuance Intention has the lowest standard error and usefulness-continuance intention has the greatest standard error. In order to assuring about the reliability of constructs and getting the descriptive data a confirmatory factor analysis presents values such as Skewness, Kurtosis and alpha. Table 4 illustrates these values based on CFA.

	N	MIN	MAX	MEAN	SD	SKEW.	KURT.	ALPHA
PUSE	270	2.47	5.00	3.88	.62	-.24	-.07	8.34
SAT	270	2.86	5.00	3.14	.56	-.39	.05	8.90
CONF	270	1.34	5.00	3.90	.58	-.19	.12	9.14
INT	270	1.57	5.00	3.23	.69	-.43	.25	9.36
NORB	270		5.00	3.71	.59	-.27	.19	8.74
ISA	270		5.00	3.19	.66	-.16	.08	8.23

**Table 4- Reliability and descriptive information**

According to the table 4, all of the alpha values are greater than 0.8 and this confirms that all of the coefficients are significant and acceptable. Alpha value for continuance intention to comply with ISSP is the greatest and alpha value for awareness is the lowest among other constructs. Skewness and kurtosis are related to the distribution of observed data and the values indicate that all of the observed data are distributed in normal form. Furthermore, negative skewness values indicate that data distributions are skewed in the same direction. Based on the Tabachnick & Fidell findings, negative values of skewness shows that linearity assumptions are confirmed (Tabachnick & Fidell, 2007).

In the next step correlation matrix of model constructs is calculated by CFA. Correlation between constructs and square roots of average variance extracted (AVE) are presented in table 5.

	Confirmation	Usefulness	Satisfaction	Normative believes	Awareness	Continuance Intention
Confirmation	0.863					
Usefulness	0.413	0.847				
Satisfaction	0.217	0.326	0.849			
Normative believes	0.331	0.371	0.364	0.825		
Awareness	0.262	0.241	0.316	0.201	0.854	
Continuance Intention	0.384	0.547	0.345	0.452	0.441	0.912

**Table 5- Correlation matrix**

Correlations for all of the pair wise relationships are positive and greater than 0.2. An effect size of  $r = 0.1$  means that the effect size is small. A correlation of 0.3 means a medium effect size and lastly a correlation of  $r = 0.5$  shows a large effect size (Cohen, 1988). Thus, table 5 illustrates that the relationship between perceived usefulness and continuance intention to comply with ISSP has the largest effect size. In addition, results show that the average variance extracted for each of the constructs is greater than shared variance between relationships. This indicates that all of the constructs of the research have discriminant validity.

There are three criteria proposed by Fornell and Larcker for testing the convergent validity. First, all of the factor loading must be greater than 0.7. Second, reliability amounts for all of the constructs should be more than 0.8. Finally, AVE for every construct should be more than the variance caused by measurement error. Table 5 shows that all AVE values (Values in diagonal of the matrix) are more than 0.7 and these values are also more than variance of measurement error. In addition, values of reliabilities for all constructs are more than 0.8. It means that constructs of research model have convergent validity.

Hypothesis	Results
<b>Hypothesis 1:</b> Confirmation of compliance expectations has a positive relationship with perceived usefulness of employees.	Supported
<b>Hypothesis 2:</b> Confirmation of expectation has a positive relationship with overall satisfaction of employees with ISSP.	Supported
<b>Hypothesis 3:</b> Perceived usefulness has a positive relationship with overall satisfaction with ISSP compliance.	Supported
<b>Hypothesis 4:</b> Perceived usefulness has a positive relationship with continuance intention to comply with ISSP.	Supported
<b>Hypothesis 5:</b> Overall satisfaction with ISSP compliance has a positive relationship with continuance intention to comply with ISSP.	Supported
<b>Hypothesis 6:</b> Information security awareness has a positive relationship with continuance intention to comply with ISSP.	Supported
<b>Hypothesis 7:</b> Normative believes have a positive relationship with continuance intention to comply with ISSP	Supported

**Table 6- Summary of results**

## Limitations

First of all this study just uses one of the well-known post adoption models for studying the continuous compliance. There are also other models or theories that can be utilized for this purpose. Second, subjects of this study are limited to the employees of banking organizations however; employees of other kinds of organizations may have different behaviors. Lastly, initial intentions of employees are not examined in this study. However, compliance behavior can be investigated through longitudinal research.

## Conclusion

First of all, according to the SEM and CFA results this study confirms that IS continuance model is suitable and reliable framework for continuous compliance study. It means that by accurate measurement



items this model can be used in ISSP compliance context. Furthermore, SEM and CFA results show that perceived usefulness, satisfaction of employees, awareness and normative beliefs are determinants of continuance intention to comply with ISSP. So these factors can predict post adoption behavior as well as continuous compliance of employees. In addition, Confirmation of expectation positively affects perceived usefulness and satisfaction. It also indirectly affects continuance intention to comply with ISSP.

Organization managers have to study the behavior of employees for designing security plans and frameworks. As discussed earlier success of information systems security policies depend on the compliance of employees. Thus, managers can analyze the employees, behavior in order to estimate and predict the ISSP success. They can utilize the proposed model of this study for assuring about contiguous compliance of employees. This is very important point to protecting the valuable IS assets because if employees continue to comply with ISSP, security incidents will decrease remarkably. Organizations have to consider continuous awareness strategies for successful security compliance. In addition they should consider normative beliefs and social pressures on the employees intentions to continue complying.

This study also offers implications for researchers. Future research can use other conceptual models or theories including UTAUT and Bhattacharjee's two stage adoption model (Bhattacharjee & Premkumar, 2004) in order to explore other aspects of continuous compliance. Previous research in IS adoption field indicates that there are several studies that have extended the IS continuance model. Different researchers have added extra constructs like habit to this model (Kang et al., 2008) (Kim, 2010). Information systems' scholars can utilize these extensions and extra constructs for studying the security behavior.

## References

- Ajzen, I. (1991). The theory of planned behavior and Human Decision Processes. *Organizational Behavior*, 50(2), 179-211.
- Bentler, P. M., Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88(3), 588-606.
- Bhattacharjee, A. & Premkumar, G. (2004). Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test. *MIS Quarterly*, 28(2), 229-254.
- Bhattacharjee, A. (2001). Understanding information systems continuance. An expectation–confirmation model. *MIS Quarterly*, 25, 351-370.
- Bulgurcu, B., Cavusoglu, H., Benbasat, I. (2010). Information security policy compliance: an empirical study of rationality-based beliefs and information security awareness. *MIS Quarterly*, 34, 523-548.
- Byrne, B. M. (2001). *SEM with AMOS: Basic concepts, applications, and programming*. Routledge. Routledge.
- Cavusoglu, H., Cavusoglu, H., Son, J.-Y., and Benbasat, I. 2009. "Information Security Control Resources in Organizations: A Multidimensional View and Their Key Drivers," working paper, Sauder School of Business, University of British Columbia.
- Chin, W., Gopal, A., Slaisbury, W. D. (1997). Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. *Information Systems Research*, 8(4), 342-367.
- Cohen J. (1988). *Statistical power analysis for the behavioral*. Hillsdale: Routledge Academic.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13, 319-340.
- Festinger L. A. (1957). *A Theory of Cognitive Dissonance*. Evanston, IL: Row and Peterson.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., Tatham, R. L. (2006). *Multivariate data analysis*. New Jersey: Prentice Hall.

- Herath, T., Rao, H. R. (2009). Encouraging information security behaviors: role of penalties, pressures and perceived effectiveness. *Decision Support Systems*, 154-165.
- IBM. (2012). The source of greatest risk to sensitive data.
- Ifinedo, P. (2007). An empirical study of ERP success evaluations by business and IT managers. *Information management & computer security*, 270-282.
- Ifinedo, P. (2012). Understanding information systems security policy compliance: an integration of the theory of planned behavior and the protection motivation theory. *Computer & Security*, 31, 83-95.
- Islam, A.K.M. Najmul and Mantymaki, M. (n.d.). Culture And Student Samples As Moderators Of Continued IT Usage. PACIS 2011 Proceedings.
- Kang, Y. S., Hong, S., Lee, H. (2008). Exploring continued online service usage behavior: The roles of self-image. *Computers in Human Behavior*, 25(1), 111-122.
- Kim. B. (2010). An empirical investigation of mobile data service continuance: Incorporating the theory of planned behavior into the expectation–confirmation model. *Expert Systems with Applications*, 37, 7033-7039.
- Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research*, 2(3), 173-191.
- Ng, B.-Y., Kankanhalli, A., Xu, Y. (2009). Studying users' computer security behavior: a health belief perspective. *Decision Support Systems*, 46, 815-825.
- Oliver, R. L. (1980). A Cognitive Model for the Antecedents and Consequences of Satisfaction. *Journal of Marketing Research*, 17, 460-469.
- Piquero, N. L., Tibbetts, S. G., Blankenship, M. B. (2005). Examining the Role of Differential Association and Techniques of Neutralization in Explaining Corporate Crime. *Deviant Behavior*, 26, 159-188.
- Siponen, M. & Vance, A. (2010). Neutralization: new insights into the problem of employee information systems security policy violations. *MIS Quarterly*, 34, 487-502.
- Siponen, M., Mahmood, M. A., Pahnla, S. (2013). Employees' adherence to information security policies: An exploratory field study. *Information*, In press.
- Stanton, J. M., Stam, K. R., Mastrangelo, P., Jolton, J. (2005). Analysis of end user security behaviors. *Computers & Security*, 24, 124-133.
- Sykes, G., and Matza, D. (1957). Techniques of Neutralization: A Theory of Delinquency. *American Sociological Review*, 22, 664-670.
- Tabachnick, B. G. & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th Ed.). Boston: Allyn & Bacon.
- Taylor, S. & Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, 6(2), 144-176
- Vance, A., Siponen, M., Pahnla, S. (2012). Motivating IS security compliance: Insights from Habit and Protection Motivation Theory. *Information & Management*, 49, 190-198.
- Xue, Y., Liang, H., Wu, L. (2011). Punishment, Justice, and Compliance in Mandatory IT Settings. *Information Systems Research*, 22(2), 400-414.