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How System Complexity and Organizational Culture Affect AIS Misuse

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Abstract

The demands for more studies on precarious practices in the AIS environment indicate that employees pose greater threats than outsiders. Addressing internally-bred security pandemonium with external-threat-oriented solutions further complicates the matter. The real issue is obscured rather than solved. Based on theory of planned behaviour (TPB), organisational culture and complexity of an accounting information system (AIS) were introduced to see how these factors affect employees' mal-intention when working with an organisation AIS. Using partial-least-square structural equation modelling (PLS-SEM) approach, it was found that culture and complexity acting as pure moderating variables affecting certain forms of predictor-criterion relationship in TPB model. Within the context of this study, the results explain how culture and system complexity induce or reduce the predictors' effects on intention to misbehave.

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1. Introduction

As early as 1970s researchers such as Hopwood (1972) and Otley (1978) to name a few, have found that even with tightly monitored accounting procedural controls, the dysfunctional behaviours of the subordinates are still

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prevalent or even induced by the control mechanisms itself. This is partly due to limitations of incomprehensive understanding between the dysfunctional behaviours and individuals and the performance of the organisations (Jaworski & Young, 1992). Combating the threats to accounting information system (AIS) by merely focusing on either technical aspect or solely on the accounting procedural control (Otley & Fakiolas, 2000) is not entirely sufficient (Martinez-Moyano, Conrad, & Andersen, 2011; Pfleeger & Caputo, 2012). Factors beyond these elements have to be investigated and subsequently addressed to bring intention to commit mal-practices under control.

A large number of studies (e.g. Heinze & Hu, 2009; Jimmieson, Peach, & White, 2008; Yan & Sin, 2013) use theory of planned behaviour (TPB) as a basis to understand a complex formation of intention. Attitude, subjective norms and perceived behaviour control are found to affect intention, which is the nexus of the theory. In a classic predictor-criterion validation model, the findings reaffirm what has been understood. Others (e.g. Jimmieson et al., 2008; Workman, 2005) however, find the effects of these three predictors are inconsistent. The phenomena lead researchers to look for other explanations for these variations.

Sharma, Durand, and Gur-Arie (1981) suggest variations in predictive efficacy of an independent variable and/or the form of relationship can vary due to systematic influence of other variables. As such, a classic validation model in some instances does not provide sufficient understanding of the phenomenon being studied. That influence comes from interactions of a third factor with the predictor variables - moderating variables. In the current study, two moderating variables are introduced into TPB equation to examine their moderating effects. The variables are organisational culture (hereafter referred as culture) and information system complexity (hereafter referred as complexity). The inclusion of moderating variables is important to enhance understanding of the predictor-criterion relationship and to provide further insights into a seemingly established relationship (Walsh, Evanschitzky, & Wunderlich, 2008).

2. Proposed Model

TPB postulates that intention (INTENT) is central to actual behaviour. Intention on the other hand, is affected by three antecedences – attitude (ATT), subjective norm (SN) and perceived behaviour control (PBC). These three predictors can predict intention with a high accuracy across different behaviours (Ajzen, 1991; Armitage & Conner, 2001). Attitude defines a degree of favourable or unfavourable evaluation of a person upon a given behaviour, while subjective norm refers to perceived social pressure to perform or not to perform behaviour being studied (Ajzen & Madden, 1986). Each of these predictors influences intention hence the actual behaviour. In a complete volitional control, a person with positive attitude towards the behaviour and with good perception of the importance of other's evaluation on behaviour (SN) will increase intention and subsequently drive to perform behaviour.

Unlike ATT and SN, perceived behaviour control (PBC) has attracted considerable amount of scholarly attentions. PBC is argued to compose of two distinct components (Kidwell & Jewell, 2003) – self-efficacy (internal control) and controllability (external control). This is in spite of Ajzen (2002) conclusion that PBC at its higher order is a single construct "…and the extent to which they (internal and external controls) reflect one or the other is an empirical question (Ajzen, 2002, p. 680)." On a basis of discriminant and convergence factorial empirical test, PBC in this study is maintained as two distinct components because PBC in the context of this study is operationalised as the perception of control over resources to engage in actual behaviour (CRES) and perception of control over outcome of intended behaviour (COUTCOME).

In the context of human-computer interaction, complexity of a computer system can affect the nature of predictor-criterion relationship. System complexity (COMPLEX) introduces a relative difficulty level (Thompson, Higgins, & Howell, 1991) to users, prompting them either to engage in or abandon behaviour. Although similar to the notion of internal and external controls captured by perceived behaviour control, system complexity differs in a way that it specifically measures human-computer interaction presented by the technology. Where the amount of resources (e.g. time, money and effort) to engage in a given behaviour is already captured by CRES, and the severity of subsequent complications following negative behaviour measured by COUTCOME, complexity introduces another external phenomenon that modifies the intensity of ATT, SN as well as CRES and COUTCOME have on intention. Therefore, COMPLEX is said to be moderating the effect of all intention antecedences rather than directly effecting intention.

Similarly, where social pressure is already captured by SN, the environment where the social pressure originates moderates the influence of ATT, SN, CRES and COUTCOME on INTENT. The environment which is identified as organisational culture (CULTURE) exists independently of SN. CULTURE helps to shape ATT, SN, CRES and

COUTCOME but does not necessarily affect INTENT because intention is a direct result of complex articulation and cognitive assessment of an actor. Therefore, CULTURE interacts with ATT, SN, CRES and COUTCOME in the formation of INTENT.

3. Methodology

Four vignettes were designed for the study, each with different theme of dysfunctional behaviour. These were *intentional destruction*, *dangerous tinkering*, *detrimental misuse* and *naive mistake* which were based on dysfunctional behaviour taxonomy developed by Stanton, Stam, Mastrangelo, and Jolton (2005). The taxonomy was included in the model as a control variable because each of the four different vignettes in this study had a different severity level of anticipated outcomes.

Vignette approach was chosen as the study looked into unwarranted employee behaviours that can entail negative consequences. Through the vignettes, a 'comfortable' distance between respondents and actors in the vignette were maintained, thus encouraging feedbacks (Schoenberg & Ravdal, 2000) and providing valuable data patterns (Hughes & Huby, 2002) which could not be fully captured by a standard questionnaire.

The latent constructs of theory of planned behaviour (TPB) were measured using instruments adapted from those developed by Chatterjee (2008), Venkatesh, Morris, Gordon, and Davis (2003), Ajzen (n.d.), Ajzen (1991), and Thompson et al. (1991). Specifically, five questions were designed to capture intention (INTENT), three for subjective norm (SN), two for attitude (ATT) and five for perceived behaviour control (PBC). PBC 5-item questions were measured at its lower-order factors with two measuring perceived control over the outcome of behaviour (COUTCOME) and three measuring control over resources to perform behaviour (CRES). This is consistent with Ajzen (2002) that PBC comprises of two separate construct although "…can be considered as unitary latent variable in a hierarchical factor model" (Ajzen, 2002, p. 665).

Organisational culture (CULTURE) was measured from four different dimensions using an instrument developed by (Muijen et al., 1999). These dimensions were support (6 items), innovation (6 items), practice (3 items) and performance (6 items). Using WarpPLS, these four dimensions were keyed into the software as first-order factors, and later aggregated at a higher order factor to form a second-order latent construct CULTURE. Accounting information system complexity (COMPLEX) was measured using 4 scales which were adapted from an instrument developed by Thompson et al. (1991) and Venkatesh et al. (2003).

In total, 1380 surveys were sent to middle managers of medium size companies in Malaysia. 387 responses were later collected and used for the analysis. This represented 28% response rate which is acceptable in a survey-based study (see Baruch & Holtom, 2008; Taskin, 2011).

A two-stage procedure (see Anderson & Gerbing, 1988; Mohamadali, 2012) for structural equation modelling approach was used in the analysis. The first stage was an assessment on the measurement model to see if the model can be used for later analyses. In the second stage of the analysis, the full structural model was analysed to investigate the effects of the moderating variables.

Chin (1998b) and Mohamadali (2012) suggested a measurement model to be assessed through an individual item reliability, convergent and discriminant validity. In this study, Cronbach's alpha was used to test for reliability while average variance extracted (AVE) were used to determine validity (Kock, 2011; 2013). Discriminant validity is achieved when measurement items are not a reflection of other variables (Hulland, 1999) which can be measured by comparing square-root of average variance extracted (AVE) of a latent variable with correlations of the variable with other variables (Kock, 2013). If the square-root of AVE of the latent variable is more than its other correlation values, the latent variable is thus said to have sufficient discriminant validity.

The structural model was assessed by examining path coefficients (Hair, Black, Babin, & Anderson, 2010) and the explanatory power, f^2 (Cohen, 1988) of the model. Cohen (1988) suggests effect size of .02 or more as small, .15 as medium and .35 as large. Any value lower than .02 is negligible for a practical purpose. Coefficient of determination, R^2 (Chin, 1998a) and predictive relevant, Q^2 (Fornell & Bookstein, 1982) were also used to assess the structural model. Coefficient of determination, R^2 measures variations in endogenous latent variable accounted by the exogenous constructs. According to Fornell and Bookstein (1982), a positive Q^2 is required for model to have an adequate predictive value.

4. Results

4.1 Measurement Model

Cronbach's alpha for all scales were between 0.84 to 0.90, exceeding 0.7 reliability threshold as suggested by Hair, Black, Babin, Anderson, and Tatham (2006). Convergent validity was confirmed through average variance extracted (AVE) values that exceed minimum cut-off of 0.5 (Fornell & Larcker, 1981). Further, as shown in Table 1, all latent variables in the measurement model demonstrated sufficient discriminant validity.

Table 1. Discriminant validity

	Latent variables						
	COMPLEX	INTENT	ATT	SN	COUTCOME	CRES	CULTURE
COMPLEX	**(.745)**	(.086)	(.055)	(.069)	(.100)	(.062)	.319
INTENT	(.086)	**(.924)**	.770	.772	.711	.643	.064
ATT	(.055)	.770	**(.975)**	.772	.642	.574	.148
SN	(.069)	.772	.772	**(.954)**	.681	.636	.105
COUTCOME	(.100)	.711	.642	.681	**(.980)**	.806	.094
CRES	(.062)	.643	.574	.636	.806	**(.872)**	.071
CULTURE	.319	.064	.148	.105	.094	.071	**(.802)**
Cronbach's alpha	.731	.957	.947	.951	.958	.841	.815

Square-root of average variance extracted (AVE) is in bracket and on the diagonal.

COMPLEX = system complexity, INTENT = intention, ATT = attitude, SN = subjective norm, COUTCOME = perceived behavioural control over outcome, CRES = perceived behavioural control over resources, CULTURE = organisational culture.

4.2. Structural Model

It was found that R^2 in this study was .81, which was substantial according to the threshold values suggested by (Chin, 1998a, 1998b). The model in this study also exhibited sufficient predictive relevance with Q^2 = .76. The effects of ATT, SN COUTCOME and CRES on INTENT were all significant as shown in **Error! Reference source not found.**. The results in the table also shows that the effect size of each predictor-criterion relationship convey practical significance with attention (ATT) demonstrates the largest effect size, (f^2 = .365), and perceived behaviour control over outcome (COUTCOME-INTENT) as the least substantial, (f^2 = .066).Error! Reference source not found. shows the moderating effects of organisational culture (CULTURE) and system complexity (COMPLEX) on predictor-criterion relationship. Both CULTURE and COMPLEX has no significant effect on the relationships between two perceived behaviour control components on intention. CULTURE significantly moderates ATT-INTENT and SN-INTENT relationships but does not exhibit significant moderating effect on COUTCOME-INTENT nor CRES-INTENT relationships. COMPLEX on the other hand only, significantly moderates ATT-INTENT relationship but does not affect other predictor-criterion relationships. Although significant, the effect sizes of these significant moderating effects are mostly weak. Nevertheless, plotting these relationships at different segments of COMPLEX and CULTURE shows how the regression slopes change.

Table 2. Path coefficient, significance values and effect size of predictor variables

	Path coefficient, β	Sig., p	Effect size, f^2
ATT-INTENT	0.45	< .001	0.365
SN-INTENT	0.23	< .001	0.177
COUTCOME-INTENT	0.09	0.019	0.066
CRES-INTENT	0.13	0.002	0.085

COMPLEX = system complexity, INTENT = intention, ATT = attitude, SN = subjective norm, COUTCOME = perceived behavioural control over outcome, CRES = perceived behavioural control over resources, CULTURE = organisational culture.

A steeper regression slope between ATT-INTENT is evidenced in an environment where AIS is more complex, suggesting a stronger effect of attitude on intention to engage in mal-practices. Beyond 1 standard deviation above the mean however, the effect of attitude is reversed. As for CULTURE, the effects of attitude on intention in weak and strong organisational culture environments show almost a similar pattern with identical regression slopes. The effects of attitude on intention in both segments start to reverse beyond 1 standard deviation away from the mean. In the context of SN, the regression slope in a strong organisational culture is steeper than those in a weak culture. Again, the effect of SN on INTENT starts to reverse beyond 1 standard deviation away from SN mean.

Table 3. Moderating effects on predictor-criterion relationship

	Predictor-criterion relationship			
	ATT-INTENT	SN-INTENT	COUTCOME-INTENT	CRES-INTENT
CULTURE	β = .08, p = .05 f^2 = .02	β = .14, p < .001 f^2 = .04	β = .03, p = .24 f^2 = .01	β = -.08, p = .43 f^2 = .003
COMPLEX	β = .12, p = .004 f^2 = .03	β = .02, p = .37 f^2 = .003	β = .05, p = .14 f^2 = .01	β = -.03, p = .23 f^2 = .01

COMPLEX = system complexity, INTENT = intention, ATT = attitude, SN = subjective norm, COUTCOME = perceived behavioural control over outcome, CRES = perceived behavioural control over resources, CULTURE = organisational culture, Moderating variables: CULTURE = organisational culture, COMPLEX = system complexity.

5. Discussion and Conclusion

Using theory of planned behaviour (TPB) to predict intention to engage in dysfunctional behaviour, this study proves that attitude, subjective norm and both perceived behaviour control components affects intention at varying degree. However, from practical standpoint, attitude appears to be the strongest predictor of intention followed by moderate effect of subjective norm, while perceived behaviour control components only demonstrate weak effect.

Nevertheless, based on the results above, it can be concluded that in the higher the employees' attitude towards dysfunctional behaviour, the higher their intention will be, thus leading to a higher likelihood of an actual engagement in mal-practices. This is also true when the employees feel others will 'approve' their action as confirmed by the statistical significance of subjective norm. Similarly, when there is an increase in employees' sense of control over resources to commit and outcome of their actions, their intention grows stronger, a pattern which is also observed in Rhee, Kim, and Ryu (2009).

In practice however, the employees do not work in isolation. Organisational culture interferes in their cognitive aspect (Ifinedo, 2014; Posey, Bennett, & Roberts, 2011). The influence of organisational culture defines varying degrees of subjective norm, attitude and perception of control affecting intention. This is apparent, particularly on subjective norm and attitude. It was found that organisational culture significantly moderated attitude-intention and subjective norm-intention relationships but did not exhibit significant moderating effect on perceived controls over

resources, behavioural outcome-intention relationships. In essence, this helps organisations to focus their attention on shaping organisational culture to efficiently affect employees' attitude and reliance on others (subjective norm). This is because organisational culture is a conduit that helps to shape attitude and subjective norm of employees on their intention to engage in dysfunctional behaviour. Similar findings were observed by Barlow, Warkentin, Ormond, and Dennis (2013), and Kolkowska and Dhillon (2013).

An interesting finding of this study is that there is an optimal point where attitude affects intention. At the higher end of attitude, intention to engage in mal-practices declines. As interesting as the result is, this perplexing phenomenon sets a venue for future research to explore what and why stronger attitude refrains one's intention; a mixed result as once observed in the work of Cheng, Li, Li, Holm, and Zhai (2013).

System complexity on the other hand, significantly moderated attitude-intention relationship but did not affect other predictor-criterion relationships. Based on this result, system complexity is said to be affecting employees' attitude towards their intention to commit dysfunctional behaviour when dealing with information system. In a highly complex accounting information system environment, diminishing effect of attitude on intention was also observed. The finding further explains why information system control mechanisms help to reduce unwarranted behaviours in studies such as Albrechtsen and Hovden (2009), and why the control feature itself induces such behaviour (see Herath & Rao, 2009; Workman, Bommer, & Straub, 2008).

This study demonstrates the moderating effects of organisational culture and AIS complexity on conventional predictor-criterion relationship. On top of adding new insight to the proliferation of knowledge in AIS discipline, this study also helps the organisations to re-think their approach to control the employee threats to AIS.

References

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179-211.

Ajzen, I., 2002. Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior1. Journal of Applied Social Psychology, 32(4), 665-683.

Ajzen, I. (n.d.). Constructing a theory of planned behaviour questionnaire Retrieved 20 Feb 2012, 2012, from http://people.umass.edu/aizen/pdf/tpb.measurement.pdf

Ajzen, I., Madden, T. J., 1986. Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. Journal of Experimental Social Psychology, 22(5), 453-474.

Albrechtsen, E., Hovden, J., 2009. The information security digital divide between information security managers and users. Computers & Security, 28(6), 476-490.

Anderson, J. C., Gerbing, D. W., 1988. Structural equation modeling in practice: A review and recommended two-step approach. Psychological Bulletin, 103(3), 411-423.

Armitage, C. J., Conner, M., 2001. Efficacy of the theory of planned behaviour: A meta-analytic review. The British Journal of Social Psychology, 40, 471-499.

Barlow, J. B., Warkentin, M., Ormond, D., Dennis, A. R., 2013. Don't make excuses! Discouraging neutralization to reduce it policy violation. Computers & Security, 39, Part B(0), 145-159.

Baruch, Y., Holtom, B. C. 2008. Survey response rate levels and trends in organizational research. Human Relations, 61(8), 1139-1160.

Chatterjee, S., 2008. Unethical behavior using information technology. (Ph.D. 3370378), Washington State University, United States -- Washington.

Cheng, L., Li, Y., Li, W., Holm, E., Zhai, Q., 2013. Understanding the violation of is security policy in organizations: An integrated model based on social control and deterrence theory. Computers & Security, 39, Part B(0), 447-459. doi:

Chin, W. W., 1998.(a)Issues and opinion on structural equation modeling. MIS Quarterly, 22(1), VII-XVI.

Chin, W. W., 1998.(b)The partial least squares approach to structural equation modelling. In G. A. Marcoulides (Ed.), Modern methods for business research (pp. 295-336). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Cohen, J. 1988. Statistical power analysis for the behavioural sciences (2nd ed.). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Fornell, C., Bookstein, F.,1982. Two structural equation models: Lisrel and pls applied to consumer exit-voice theory. Journal of Marketing Research, 19, 440-452.

Fornell, C., Larcker, D. F., 1981. Evaluating structural equation models with unobservable variables and measurement error. JMR, Journal of Marketing Research, 18(1), 39.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., 2010. Multivariate data analysis (7 ed.). Upper Saddle River, NJ, USA: Prentice-Hall, Inc.