Appendix B –Construct Reliability and Validity Analysis

Reflective Construct Reliability and Validity Analysis

Initial assessment of convergent and discriminate validity was conducted using factor analysis (Varimax rotation). The results indicate clear convergence and divergence of the reflective indicators along construct lines as shown below in Table 1.[1]

In addition, there are three commonly used metrics for assessing convergent reliability of reflective scales. One test of scale reliability involves examining whether items have an item loading of at least 0.70 from PLS, which demonstrates that the items share more common variance with the construct than error variance (Carmines et al. 1979). A second test is a measure of internal consistency developed by Fornell and Larcker (1981) and preferred in PLS analysis (Chin 1998);the goal of this analysis is to achieve a score greater than 0.70. The third, and final, common way to assess reliability is to examine Cronbach's coefficient alpha (Nunnally et al. 1994), where alpha scores that exceed 0.70 are considered reliable. Convergent reliability analyses were performed using all three tests (see Table 2) and all three criteria were exceeded for the constructs that were measured using reflective indicator items.

[1]Formative indicators are included in this table (online forum participation, awareness of client security policies, and awareness of employer security policies). Although the traditional notions of validity do not apply to formative measures, those items are included in the factor analysis to facilitate a comparison of the relative effects of client and employer policies.

TABLE 1- Factor Analysis Results (Varimax Rotation)

	Factors						
Constructs and Items	1	2	3	4	5	6	7
Online Forum Commitment							
Online Loss				0.97			
OnlineFate				0.95			
OnlineLoyalty				0.96			
Online Forum Competence							
OnlineConfidence					0.98		
OnlineKnowledge					0.96		
OnlineCapabilities					0.96		
Online Forum Benevolence							
OnlineConcern			0.97				
OnlineAdvantage			0.96				
OnlineCapacity			0.95				
Online Forum Participation							
ReadPosts						0.71	
RespondtoPosts						0.66	
Rate Threads							0.86
PostQuestions							0.16
Awareness of Employer Policies							
EmployerGuidelines	0.96						
EmployerRules	0.91						
EmployerTerms	0.89						
EmployerThreats	0.90						
EmployerTraining	0.94						
Awareness of Client Policies							
ClientsGuidelines		0.85					
ClientsRules		0.96					
ClientsTerms		0.92					
ClientsThreats		0.86					
ClientsTraining		0.84					
Eigenvalues	4.31	4.18	2.99	2.94	2.91	1.12	1.09
% Variance	18.75	18.18	13.00	12.79	12.66	4.86	4.72

Discriminant validity was tested by examining the correlation coefficients of each item within and among constructs. Each item should correlate highly with its intended construct, but not with other constructs. Acceptable discriminant validity is evidenced when the correlations

within each construct exceed the correlations with all other constructs. As shown in Table 3, (with the bolded variable scores) this condition holds for all items, suggesting that the scales or constructs themselves have a high degree of discriminant validity.

TABLE 2- Reliability Analyses for Reflective Constructs and Items

Constructs and Items	Loading	Internal Consistency	Chronbach's Alpha
Online Forum Commitment		***0.98***	***0.96***
OnlineLoss	0.98		
OnlineFate	0.97		
OnlineLoyalty	0.95		
Online Forum Competence		***0.99***	***0.98***
OnlineConfidence	0.99		
OnlineKnowledge	0.98		
OnlineCapabilities	0.98		
Online Forum Benevolence		***0.98***	***0.97***
OnlineConcern	0.99		
OnlineAdvantage	0.97		
OnlineCapacity	0.96		
Likelihood to Post		***0.97***	***0.95***
Likely to Recommend Posting	0.98		
Likelihood of Similar People to Post	0.94		
Likelihood of me to Post	0.94		

TABLE 3 - Discriminant Validity for Reflective Constructs and Items

Constructs and Items	Correlations**			
Online Forum Commitment				
Online Loss	.27	.31	.29	**.98**
Online Fate	.31	.31	.31	**.97**
Online Loyalty	.33	.27	.30	**.95**
Online Forum Competence				
Online Confidence	.31	**.99**	.26	.30
Online Knowledge	.33	**.98**	.30	.30
Online Capabilities	.32	**.98**	.30	.32
Online Forum Benevolence				
Online Concern	.29	.29	**.99**	.33
Online Advantage	.32	.30	**.97**	.28
Online Capacity	.25	.26	**.96**	.31
Likelihood to Post				
Likely to Recommend Posting	**.98**	.30	.30	.30
Likelihood of Similar People to Post	**.93**	.27	.24	.32
Likelihood of me to Post	**.95**	.35	.31	.28

** Significant at p-value < .01

Convergent validity is also demonstrated when the average variance extracted (AVE) by a construct's items is at least 0.50 (Chin et al. 1995). Our analysis indicates the following AVE scores: 0.98 (Online forum commitment), 0.97 (online forum competence), 0.94 (online forum benevolence) and 0.90 (likelihood to post). Finally, construct discriminant validity was assessed by comparing correlations between all pairs of constructs with the square root of AVE of each construct. Correlations that are greater than the square root of AVE are indicative of poor discriminant validity between the constructs involved. The results (see Table 4) indicate that the square root of AVE is larger than the correlation between any construct pair as shown by the bolded square root of AVE scores along the diagonal. Based on the results of the analyses of reflective items and related constructs, the survey items indicate satisfactory convergent and discriminant validity.

Table 4 - Discriminant Validity for Reflective Constructs

	Commitment	**Competence**	**Benevolence**	**Likelihood to Post**
Online Forum Commitment	**0.87**			
Online Forum Competence	0.31**	**0.93**		
Online Forum Benevolence	0.31**	0.29**	**0.88**	
Likelihood to Post	0.31**	0.32**	0.30**	**0.90**

** Significant at p-value < .01

Formative Construct Reliability and Validity Analysis

Formative indicators in research have recently received increasing exposure in the marketing, organizational behavior and information systems literatures, particularly relating to studies that employ structural equations modeling (Cenfetelli et al. 2009; Chin 1998; Diamantopoulos et al. 2006; Edwards et al. 2000). Unlike reflective measures, where a construct

causes variance in the indicators, formative measures reverse the direction of causality with the indicators themselves causing variance in the construct (Cenfetelli et al. 2009). Hence, researchers can model constructs whose indicators do not necessarily covary, but are nonetheless conceptually related.

The current model employs two formative constructs (online forum participation and awareness of security policies) for which the typical concepts of reliability are not always meaningful in the way they are for reflective constructs (Chin 1998). With formative constructs, an important factor in reliability is that the construct have an adequate number of dimensional indicators to “form” the construct (Petter et al. 2007). Online forum participation is comprised of four indicators, which cover a wide range of possible activities based on the core features in a typical online forum. The awareness of security policy measures (client and employer) are each comprised of five indicators, extracted from extant literature (D'Arcy et al. 2009; Jones 1986; Victor et al. 1988), which also cover multiple dimensions of security awareness.

To further evaluate the reliability of the formative constructs, tests for multicollinearity were performed by examining the variance inflation factor (VIF) of the items. Items with VIF scores of less than 3.3 are deemed acceptable. The VIF scores for all of the items did not exceed 1.2, demonstrating adequate construct reliability (Diamantopoulos et al. 2006; Petter et al. 2007).

Formative construct validity can also be partially assessed using the results of the factor analysis shown in Table 1. As indicated, the items used to assess "online forum participation" fall into two factors, which appear to reflect two dimensions of participation. The items used to assess awareness of employer security policies fall into a single factor, as do the items used to measure awareness of client security policies.” Hence, the construct of awareness of security policies" is comprised of two distinct dimensions. We chose to retain all of the items within each

reflective construct to preserve content validity, following Bollen and Lennox(1991) and Petter et al. (2007). Based on the results of the analyses of formative items and related constructs, the survey items indicate satisfactory reliability and validity.

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