CHAPTER FIVE

DATA ANALYSIS

5.1 Introduction

This section presents the data analysis for the survey in accordance with the analysis techniques presented in the previous chapter. As discussed in Chapter Four, which describes the research design, an eleven-page questionnaire was used to measure the theoretical constructs of intellectual capital (IC), knowledge sharing (KS), innovation (INV) and organizational performance (OP). After the content and face validity of the questionnaire was established, the questionnaire was sent to the respondent firms. The following section discusses the analysis of the data collected.

5.2 Data Collection

5.2.1 The Response Rate

A questionnaire was sent to the CEO/managing director, owners or manager of the firms. A stamped return envelope was included with the questionnaire. A total of 257 responses were received after the first mailing. A follow-up mailing to non-respondents was done about six weeks after the first mailing. Another 79 responses were received, giving a total of 336 respondents (a response rate of 33.6 per cent). This response rate is similar to other surveys in Malaysia, which tend to obtain a response of between 15-25 per cent (Sarachek and Aziz, 1983; Rozhan, 1998; Nordin and Arawati, 1993, p. 60; Hazman, 1998; Kanapathy and Jabnoun, 1998). This response rate is also considered satisfactory since accessing the CEO/managing director of SMEs is usually difficult. In surveys, response rates commonly range between five and thirty per cent, depending on the efforts made (Diekmann, 2005; Meffert, 2000 as in Durst, 2008).

In the following sections, the results from the survey conducted using this questionnaire are presented. All analysis (excluding structural equation modelling, SEM) was performed using SPSS version 16. Amos version 16 was used to analyze the proposed research framework through SEM.

5.2.2 Non Response Bias

In this research, the non-response bias was addressed by splitting the respondents into two groups representing the early and the late wave of returned surveys, as suggested by Lambert and Harrington (1990), and put in use by authors including Kraus et al. (2007); Chen and Paulraj (2004). The early wave was 257 respondents and the late wave was made up of 79 respondents. The t-test performed on the study items yielded results that indicated no significant difference (at $\alpha = 0.05$) between the two groups of responses. The sample and population means were compared for any significant difference. The t-test performed on these two values yielded no statistically significant difference (at $\alpha = 0.05$) on the sample means. In the t-test analysis, as no difference was found between the group mean differences at the 5% level for any of the variables in the study it may be concluded that non-response bias is not a particular influence in this research (Sakarmesas, Katsikeas and Schlegelmilch, 2002, as cited in Ramayah et al. (2009).

5.2.3 Normality Test

This study tests for the symmetric nature and peakedness/flatness for the data set using the shape descriptors, skewness and kurtosis, respectively. The skewness values for measurement items ranges from – 0.902 to +0.302, are well within the recommended range of-1 to +1 (Hair et al., 2006). Kurtosis ranges from -0.146 to +1.036 are well within the recommended limit from -2.0 to +2.0 (Coakes and Steed, 2003).

To uphold the validity and reliability of analysis, the normal probability plot is examined. Hair et al. (2006) also suggested using P-P plots to check the linear relationship of variables. Appendix 8 indicates a histogram of a normal P-P plot of regression standardized residual. The normal plot of regression standardized residuals for the dependent variable indicates a relatively normal distribution. Although convenience sampling belongs to non-probability sampling, the normal distribution indicates that the analysis method for probability sampling can be carried out for this study.

Table 5.1 shows the correlations among the independent variables in excluding the multicollinearity assumptions.

Table 5.1 Correlations among independent variables

	IC	**KS**	**INV**
IC	1		
KS	0.636	1	
INV	0.639	0.617	1

The presence of high correlations, generally above 0.9, is the first sign of collinearity (Hair et al., 2006). Examining the correlations among independent variables, the intercorrelations were found to be generally well below the recommended correlation coefficient value of r = 0.9 (Table 5.4). A visual inspection of the correlation matrix between the measurement items was performed and the results show that all coefficients are positive and that most of the values are above 0.3 (medium to large strength) and significant at 0.05.

5.2.4 Demographic Profiles

The respondent Table 5.2 shows the respondents' organization profile. Respondents' profiles are based on the type of industry, number of employees, annual sales turnover, type of ownership and length of business. Most respondents are from the manufacturing industry, which is the biggest industry player in Malaysia SMEs, with 40.4% of SMEs in partnership and 34.8% have been operating more than ten years. Based on the number of employees and annual turnover, 45.2% and 51.8% of respondents are in small enterprises, respectively.

Table 5.2 Demographics Profiles (Organization)

Profile	Frequency	%
Type of Industry		
• Manufacturing	213	63.3
• Services	123	36.7
No of employees		
• Small (Between 5 to 19 employees)	141	45.2
• Medium (Between 20 to 150 employees)	195	54.8
Annual Turnover		
• Small (between RM200,000 and less than RM1 million)	197	51.8
• Medium (between RM1 million and RM5 million)	128	48.2
Type of Ownership		
• Sole-proprietor	53	15.8
• Family-owned	57	17.0
• Partnership	136	40.4
• Others	90	25.8
Length of Business		
• Less than 2 years	24	7.2
• 2 – 4 years	71	21.1
• 5 – 8 years	87	25.9
• 8- 10 years	37	11.0
• More than 10 years	117	34.8

Table 5.3 shows the demographic profile based on the individual, which are based on the current position, education level, previous working experience, years of working experience and area of expertise.

Most of the respondents are owners (25.3%) followed by executives (23.2%) and managers (22.3%). Most of them are degree holders (42.3%) who have previous working experience (76.8%) and 41.7% have more than 5 years of working experience in business (17.3%).

Table 5.3 Respondents Individual Profile

Profile	Frequency	%
Current position		
• Owner	85	25.3
• Co-Owner	42	12.9
• Partner	39	11.6
• Manager	75	22.3
• Executive	78	23.2
• Director	16	4.8
Education level		
• SPM/STPM	57	17
• Certificate	14	4.2
• Diploma	76	22.6
• Degree	142	42.3
• Master	26	7.7
• Professional Qualification	14	4.2
Years of previous working experience		
• No working experience	78	23.2
• With working experience	178	76.8
Years of working experience		
• Less than 1 year	41	12.2
• 1-2 years	32	9.5
• 2-5 years	31	9.2
• More than 5 years	131	41.7
Area of experience		
• Business	58	17.3
• Finance	15	4.5
• Accounting	16	4.8
• Engineering	19	5.7
• Science	4	1.2
• IT	6	1.8
• Engineering	15	4.5
• Operation	6	1.8
• Architecture/Design	2	0.6
• Construction	1	0.3
• Logistic	3	0.9
• Others	1	71.4

5.3 Univariate Analysis

5.3.1 Test of Collinearity and Linearity

Multicollinearity is checked using the variance inflation factor (VIF) and tolerance level (Pallant, 2005). Kleinbaum (2007) suggests that if the value of VIF of any variable exceeds 10, that variable is said to be highly collinear and will pose a problem for multivariate analysis. The calculated values for the two indicators are presented in Table 5.4. The results show that the problem of multicollinearity does not exist as the VIF values are less than 10 and the tolerance level values are above 0.1, but < 1.0.

Table 5.4 Multicollinearity Test Results

Variables tested	Variance Inflation Factor	Tolerance	Condition Index	Remarks
IC and KS	1.771	0.565	11.447	No Problem
IC and INV	2.608	0.414	.649	No Problem
KS and INV	2.416	0.225	11.590	No Problem

Note: The condition index cut off point is 30 whereby any values below 30 indicate no problem of multicollinearity.

5.4 Multivariate Analysis- Structural Equation Modelling

The Structural Equation Modelling approach will help to validate the research model. It was chosen because of its ability to test causal relationships between constructs with multiple measurement items (Joreskog and Sorbon, 1996). It involves a two-stage model-building process, namely, a measurement model and an analysis of the structural model.

5.4.1 Measurement Model

The measurement model was first examined for instrument validation (Lin, 2007) and for the purpose of searching for model specification (Hair et al., 2006). The measurement model with all four constructs was assessed using confirmatory factor analysis. Confirmatory Factor Analysis (CFA) is employed in evaluating the construct validity, which includes unidimensionality, reliability, convergent validity, discriminant validity and nomological and predictive validity of the constructs. Due to the large number of items involved, it is necessary to employ an approach that requires variables to be evaluated individually using different measurement models (Moorman, 1995, Athuaene-Gima and Evangelista, 2000, Chen and Paulraaj, 2004). It is also good practice to assess the fit of each construct and its items individually to determine whether there are any items that are particularly weak (Hooper et al. 2007). Modifications can be made locally, which can substantially improve the results of the model. The modification index ($MI \geq 4$); standard residuals ($< |4.0|$); squared multiple correlations ($SMC \geq 0.3$); path estimates ($\lambda \geq 0.5$) and Heywood cases are adhered to in the process of validating the items.

Items that had a loading of less than 0.55 were not significant at the 0.01 level and/or cross-loadings of more than 0.35 were discarded as an indication of a very high level of error. Table 5.5 details the results of item validation. In the process, 4 items were dropped from human capital, 5 items from structural capital, 4 items from relational capital, 5 items from knowledge sharing, 4 items from innovation and 1 item from organizational performance, all the items totalling 23 were first order constructs and dropped from further analysis as they could not survive the model diagnostic procedure. However, the researcher considered both the statistical criteria and the theoretical issues before removing any items. The following sub-section presents the four measurement models from the above process.

Table 5.5 Summary of Items Dropped in Confirmatory Factor Analysis

Variables		Original Number of Items	Final (CFA) Number of Items	Number of Items Dropped in CFA	Description of Items Dropped in CFA
Intellectual Capital	HC	10 items	6	4	HC2: Our employees always come up with new ideas
					HC3: All employees are given an opportunity to be creative
					HC5: Our employees are willing to take responsibilities
					HC8: In our company, employees are free to voice their views
	SC	12 items	7	5	SC1: In our company, information is always available
					SC2: Everybody shares their knowledge in this company
					SC7: Our company encourages creative ideas by employees
					SC10:Our company's operation is efficient
					SC12:Knowledge is recognized as an outcome for the company and sharing is promoted
	RC	11 items	7	4	RC1: Our company is aware of customer complaints
					RC4: Our company's survival depends on a small number of customers
					RC6: Our company's customers are satisfied with the services provided
					RC10: We are competing primarily based on product or service differentiation
Knowledge Sharing		14 items	9	5	KS2: Informal dialogues and meetings are used for knowledge sharing in our company
					KS3: Knowledge is acquired by one-to-one mentoring
					KS11: I share my knowledge with someone that I trust
					KS12: Our employees are generally trustworthy
					KS14:Our company values employees with creative ideas
Innovation		11 items	7	4	INV2: Our product offers unique, innovative features to customers
					INV4: We produce high quality products
					INV5: We offer new products/services from time to time
					INV8: We often reposition existing products/services
Organizational Performance		5 items	4	1	OP2: In the past 3 years, we have improved our product/service innovation

Table 5.6 shows the result of fit for each measurement. The final measurement models for two second-order latent variables and two first-order variables in this study are presented in Figure 5.1. The Normed χ^2 ranges from 2.079 to 2.793 (all below the recommended threshold of 3.0; (Hair et al. 2006)). RMSEA values (from 0.057 – 0.077) are below the recommended cut-of-points of 0.08 (Hair et al.2006). The values of GFI (from 0.948 – 0.988), CFI (from 0.072 – 0.996) and TLI (from 0.961 – 0.991) are all above the recommended threshold of 0.90 (Hair et al. 2006). The intellectual capital (IC) is made up of three constructs, namely, human capital (HC), structural capital (SC) and relational capital (RC), which is a second-order latent variable. Innovation is also another second-order latent variable of process innovation and product innovation while knowledge sharing and organizational performance are first-order variables. These results show that the models under consideration exhibit good fits. Figures 5.1 (a), (b), (c) and (d) show the measurement model for the study variables. The results from these models show that based on modification indices and standardized error, a few items were deleted to get the data to fit the model. Generally, removal of problematic items and re-specifications may result in a better fit of a model (Bollen, 1989). Although there are a number of items were dropped, there are justifications for dropping the items. Firstly, the scales were integrated from various researchers and considered exploratory in nature. Therefore, in this study, dropping items were considered legitimate reasons in order to seek parsimony and fitness (Klein et al. 2006). Most of the studies particularly exploratory studies need to delete certain items originally included in scale to improve their fitness, validity and reliability (Nyambegera et al., 2001). Another possible justification for dropping the items was that the integrated items had never been used in Malaysia sample before (Hasliza and Norbani, 2009).

Table 5.6 Fit Results for Measurement Models after Instrument Validation

Construct		Number of Items Dropped	Fits						
			χ^2	Df	χ^2/df	RMSEA	GFI	CFI	TLI
IC	HC	4	104.758	41	2.555	0.068	0.947	0.978	0.971
	SC	5							
	RC	4							
KS		5	27.785	13	2.137	0.058	0.978	0.992	0.987
INV		4	25.889	12	2.157	0.059	0.980	0.989	0.980
OP		1	10.393	5	2.079	0.057	0.988	0.996	0.991

Figure 5.1(a)
Measurement Model for Intellectual Capital

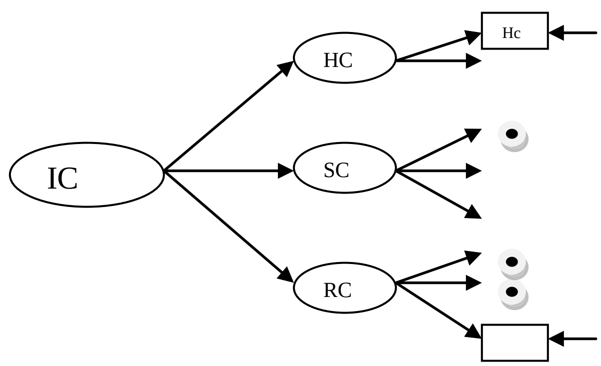


Figure 5.1(b)
Measurement Model for Innovation

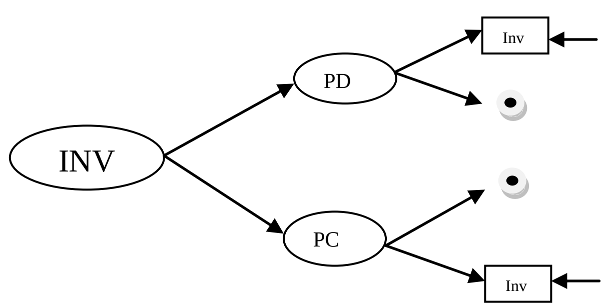


Figure 5.1(c)
Measurement Model for Knowledge Sharing

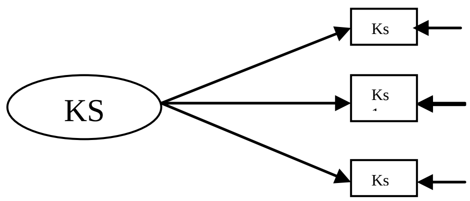
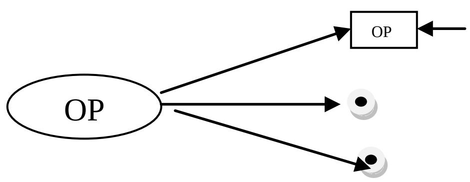


Figure 5.1(d)
Measurement Model for Organizational Performance



Key: IC – Intellectual Capital; HC – Human Capital; SC – Structural Capital; RC – Relational Capital; KS – Knowledge Sharing; INV – Innovation; OP – Organizational Performance

In addition, Table 5.7 presents the summary of the measurement model showing the values for the standard regression weights ranging from 0.512 to 0.908, all were above the 0.5 lower level limit recommended by Hair et al. (2006, Tabarnick and Fidell, 2007). The t-values (critical ratios) range from 13.013 to 25.902, all greater than 2 and significant with p = 0.000 (Hair et al. 2006). The construct reliability, ranges from 0.81 to 0.94, higher than the recommended value of 0.7 by Hair et al. (2006) and Byrne (2001). The variance extracted is from 0.55 to 0.74. The lower side of the variance extracted is just above the threshold of 0.5 recommended by Hair et al. (2006).

Table 5.7 Summary of Other Results of the Measurement Models

Variable/Construct	Range of Regression Weight for 1st Order Latent Variable	Range of Critical Ratios (t-values) for Regression Weights	Construct Reliability (CR)	Variance Extracted (VE)
IC	0.572 – 0.876	10.661 – 17.479	0.78	0.56
HC	0.572 – 0.813	10.661- 16.205	0.85	0.53
SC	0.789 – 0.876	12.064 – 17.479	0.85	0.58
RC	0.666 – 0.774	12.535 – 15.242	0.84	0.56
KS	0.525 – 0.868	9.866 – 17.588	0.83	0.62
INV	0.656 - 0.915	11.279 – 12.459	0.81	0.64
PD-INV	0.709 – 0.867	11.279 – 14.875	0.88	0.67
PC-INV	0.656 – 0.915	11.279 – 12.459	0.82	0.61
OP	0.731 – 0.880	18.751 – 23.390	0.92	0.72

5.4.1.1 Confirmation of Second Order Latent Variables in this study

The relevance of the study variable being considered as second order factors emanates from the fact that each construct reflects several first order factors. This is verified by the reviewed literature, which was used to identify the study constructs, enumerate the relationships that exist between the first order LVs and their corresponding second order LVs. As suggested by Chin (1998) other tests such as examination of strengths of the paths connecting the second order LVs to the first order LVs need to be performed. The requirement is to have a large percentage of these paths having the parameter estimate λ greater than 0.70 as well as adequate model fits. Also, the variables were subjected to nomological network with other study LVs. In this study both tests were performed. The strength of the paths connecting the first and second order of LVs is in the range from 0.572 to 0.876 (Appendix 9).

Considering the nomological networking with other LVs in the study, it shows that the strength of the relationships between first order LVs and their corresponding second order LVs are strong as evidenced in the nomological validity test in section 5.4.1.7. Furthermore, Widaman (1985) used three models (see section 5.4.1.5) for the purpose of determining whether a study construct is suitable as a first order LV or as second order LV for IC in this analysis. This is also in-line with the suggestion of Hunt and Morgan (1995), and Uncles (2000), where relational capital (on market orientation) was operationalized as a second-order construct.

Basically the test looks into the fits of model 1 and model 2. Model 1 loads study items to the final construct as a first order one while model 2 loads items to their corresponding first order LVs, which are then loaded to their corresponding second order LVs (refer to Figure 5.9). The difference in the Chi-square values between model 1 and model 2 is calculated (with the degree of freedom df=df1 – df2). If the change in Chi-square is significant, it shows that the LVs are suitable to be used as second order LVs. The results show that all three constructs are suitable as second order LVs in this study.

5.4.1.2 Construct Validity Assessment

Construct validity involves the assessment of the degree to which a measure (items in a scale) correctly measures the abstracts or theoretical constructs (O'Leary-Kelly and Vokurka, 1998; Garver and Mentzer, 1999; Chen and Paulraj, 2004; Hair et al. 2006). The procedure for performing the assessment of construct validity is performed in the following sequence: unidimensionality, reliability, convergent validity, discriminant validity, and nomological and predictive validity.

The researcher chose to use multiple techniques for validity assessment of all constructs, to uphold the rigor of the research, and have rigorously tested measurement items, as recommended in the instrument measurement development procedures.

5.4.1.3 Unidimensionality

The procedures for assessing unidimensionality require an assessment to determine whether the items are significantly associated with an underlying construct. It has to meet two conditions –that an empirical indicator must be significantly associated with the underlying latent variable and that it can be associated with one and only one latent variable (Anderson and Gerbing, 1982; Phillip and Bagozzi, 1986; O'Leary-Kelly and Vokurka, 1998). When the items of a scale estimate one factor then the scale is unidimensional. The scale has to be unidimensional in order to have reliability and construct validity (Gerbing and Anderson, 1988). A multidimensional construct thataids content validity is acceptable as long as the scales are unidimensional (Bharati and Chaudhury, 2004). In this study, the results of CFA, all the regression weights (0.512 to 0.908; with significant t-values) are also ≥ 0.5, the threshold as recommended by Hair et al. (2006). A good fit of measurement model, as measured by the goodness of fit index (GFI) also indicates that all items load significantly on one underlying latent variable. A GFI of 0.90 or higher for the model indicates that there is no evidence of lack of unidimensionality. The full results on this assessment are provided in Table 5.13. The results suggest that all the scales are unidimensional.

5.4.1.4 Reliability

Reliability is the internal consistency of a dimension. Hair et al. (2006) define reliability as "*an assessment of the degree of consistency between multiple measurements of a variable*" (Hair et al. 2006, p. 137). It is also the degree of dependability, consistency or stability of a scale (Gefen et al., 2000). The reliability is assessed in terms of Cronbach's Alpha value coefficient (18). A scale is considered reliable if the alpha coefficient is greater than 0.70 (Hair et al., 2006; Pallant, 2005; Zickmund, 2003, Garver and Mentzer, 1999; Kline, 1998). In this study the results of the CFA Alpha ranges are from 0.78 to 0.92. The construct reliability values calculated from the CFA results indicate that the scale is reliable, as all the Alpha values are above the recommended threshold of 0.7. The details of these and other results are shown in Table 5.13.

5.4.1.5 Convergent Validity

Convergent validity is the extent to which different approaches to the measurement of the construct yield the same result. Convergent validity is checked using the Bentler-Bonett Coefficient (Δ), which was introduced by Bentler and Bonett (1980). The Bentler-Bonett Coefficient (Δ) is the ratio of the difference between the chi-square value of the null measurement model and the chi-square value of the specified measurement model to the chi-square value of the null model (Li et al., 1998) and the for $\Delta \geq 0.9$, it is a demonstration of strong convergent validity (Segar and Grover, 1993, 1998). The results (range: 0.91 – 0.93) demonstrate strong convergent validity (1) as shown in Table 5.8. In this study, convergent validity is also assessed based on the standardized regression. All the R^2s of the observed variables were greater than 0.50, indicating a reasonably good convergent validity of the model (Chinda and Mohamed, 2008). In addition, all the path coefficients are positive and statistically positive at $p < 0.05$, therefore, their significance to the model is augmented.

The Widaman's three comparison models are also used to study the convergent validity. There are significant Chi-square differences between model 0 and model 1 (result ranges from 1270.219 df 6 to 3642.620, df 20) as seen in Figure 5.2 and Table 5.9. All assessment of the results demonstrates strong convergent validity in the study. Details are in Table 5.13**.**

Table 5.8 Convergent Validity Tests (Bentler-Bonett Coefficient ∆)

Model/Coefficient	INNOVATION	INTELLECTUAL CAPITAL
Model 0 ($\chi^2 0$)	1417.783	4240.773
Specified Model ($\chi^2 s$)	132.143	313.487
Coefficient (∆) = $(\chi^2 0 - \chi^2 s)/ \chi^2 0$	0.91	0.93

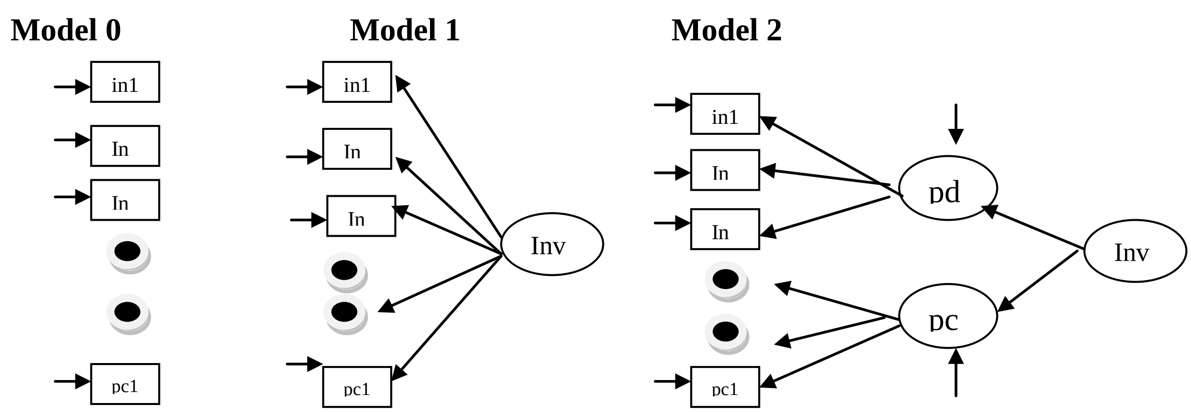


Figure 5.2
Widaman's Three Comparison Models: A simplified Example Using Innovation

Table 5.9 Convergent and Discriminant Validity Tests (Widaman's Three Models Test)

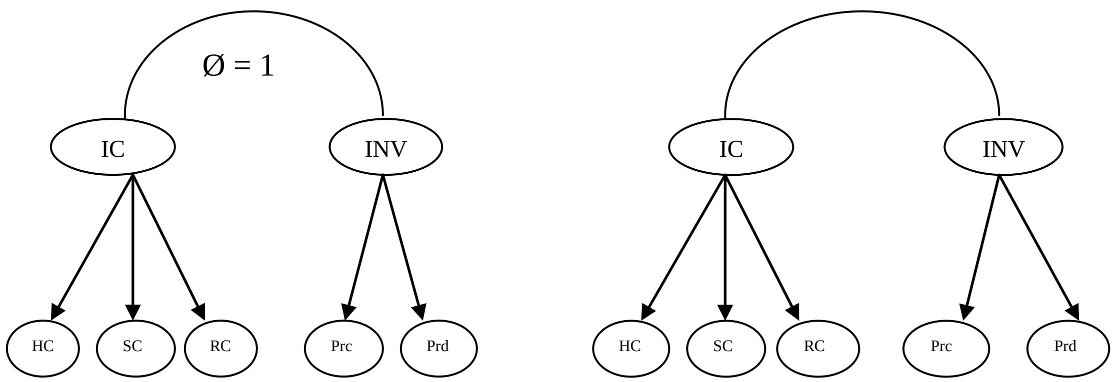
	INNOVATION	INTELLECTUAL CAPITAL
Model 0		
$\chi^2 0$	1417.783	4240.773
***df*0**	21	190
Model 1		
$\chi^2 1$	147.564	598.153
***df*1**	15	170
Model 2		
$\chi^2 2$	15.421	284.666
***df*2**	11	167
Model 0 – 1		
$\chi^2 0$ - $\chi^2 1$	1270.219	3642.620
***df*0 – *df*1**	6	20
Model 1 – 2	132.143	313.487
$\chi^2 1$ - $\chi^2 2$	1	3
***df*1- *df*2**		

5.4.1.6 Discriminant Validity

The goal of discriminant analysis is to predict group membership from a set of predictors (Tabarnick and Fidell, 2007). Three approaches to discriminant validity assessment are Widaman's three model test, comparison of fits in pairs of the constrained, and the unconstrained models; and the comparison of variance explained, and squared correlation, among two variables. Table 5.10 shows the Widaman'sthree model test on discriminant analysis.

Figure 5.3 demonstrates the models of constrained and unconstrained and Table 5.10 shows the comparison of constrained and unconstrained models. The comparison of constrained and unconstrained models yields results in Chi-square difference ranging from 13.804 to 24.657 (df = 1), all being significant.

Table 5.11 shows the test of discriminate validity by comparing the average variance extracted and the square of correlations. All respective average variance extracted are larger than the squared correlation between the corresponding constructs, which demonstrates the strong support of discriminant criterion. The details of these results are in Table 5.13.



Constrained Pair Model　　　　　　　　Unconstrained Pair Model

Figure 5.3
Models for Discriminant Validity Test (Simplified Example of Intellectual Capital and Innovation Constructs)

Table 5.10 Assessment of Discriminant Validity (Constrained and the Unconstrained models)

Description	**Model Fit Indices**				**Model χ² statistic**		**Δχ² at 1 Df**
	Unconstrained		**Constrained**		**Unconstrained (df)**	**Constrained (df)**	
	TLI	CFI	TLI	CFI			
IC with KS	0.938	0.944	0.936	0.941	798.073 (399)	814.035 (400)	15.962 (1)*
IC with INV	0.921	0.929	0.919	0.926	751.832 (318)	768.455 (319)	16.623 (1) *
IC with OP	0.948	0.954	0.946	0.951	497.196 (248)	511.390 (249)	14.194 (1) *
KS with INV	0.939	0.949	0.933	0.943	321.314 (114)	345.971 (115)	24.657 (1) *
KS with OP	0.964	0.970	0.958	0.966	172.792 (74)	189.866 (75)	17.074 (1) *
INV with OP	0.941	0.956	0.936	0.951	151.945 (41)	165.749 (42)	13.804 (1) *

Table 5.11 Test of Discriminant Validity

		1	2	3	4
1.	Intellectual Capital	0.56*			
2.	Knowledge Sharing	0.40	0.63*		
3.	Innovation	0.38	0.34	0.64*	
4.	Organizational Performance	0.40	0.35	0.42	0.72*

Notes:*Diagonal elements are the average variance extracted for each of the four constructs. Off-diagonal elements are the squared correlations between constructs. For discriminant validity, diagonal elements should be larger than off-diagonal; All of the correlations are significant at the p<0.001 level

5.4.1.8 Nomological validity and predictive validity

Defining a construct and operationalizing it does not suffice in the determination of its conceptual meaning. It is important to examine the relationships of the construct with its antecedent and consequences (Bagozzi et al., 1991). This is a test of nomological validity, which is achievable through correlating constructs to other constructs that they should predict (Garver and Menzter, 1999). When the constructs are correlated, the correlations between the two constructs should be substantial in magnitude and statistically significant. Bivariate correlation among the measurement items is presented in Appendix 10. The results indicate the existence of significant and positive relationships of large magnitude ($r \geq 0.5$) between each second order variable and the corresponding first order variable as well as between each first order variable and its corresponding measurement items. Moreover, the results indicate the existence of a significant and positive relationship of large magnitude among intellectual capital, knowledge sharing and innovation.

Regarding individual relationships, there is an indication of significant positive relationships among variables but of varying strengths. For example, in looking at the relationship in the link IC $\longrightarrow$ KS, there is a significant and positive relationship of large magnitude. Similarly, in the relationship in the link IC$\longrightarrow$INV, there is a significant and positive relationship of large magnitude. The relationship in the link of IC$\longrightarrow$OP is significant and of large magnitude. The relationship with items for the first order variables of IC shows strong strengths that are significant and positive. In addition, the relationships of all first order variables of KS and INV and their corresponding items reveal the existence of significant and positive relationships having strong strengths. Therefore, these results reveal that all correlation values between second order latent variable are of substantial magnitude and in the appropriate direction. Also higher values are observed between the first order latent variables and their corresponding items. This provides evidence of nomological validity in this set of constructs. Figure 5.4 illustrates the testing of the individual relationships between the exogenous and the endogenous constructs.

Table 5.12 presents the results of predictive validity between the exogenous and endogenous constructs. All relationships show a positive impact (λ) ranging from 0.735 to 0.993, and t-value ranging from 9.425 to 15.476, all at $p = 0.00$. These results support the predictive validity criterion.

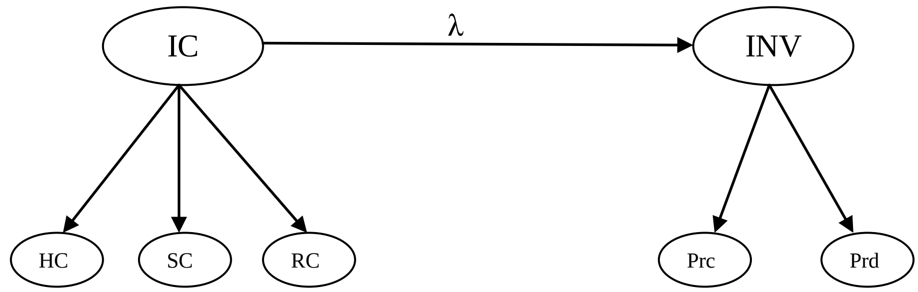


Figure 5.4
Illustrative Example of Testing Predictive Validity

Table 5.12 Results of Predictive Validity Test

Relationship			**λ- value**	***t*- value**	**p-value**
IC	→	KS	0.766	15.476	***
IC	→	INV	0.735	13.086	***
IC	→	OP	0.780	12.170	***
KS	→	OP	0.741	10.951	***
KS	→	INV	0.969	11.542	***
INV	→	OP	0.993	9.425	***

The structural model is used to assess the nomological validity (Min and Mentzer, 2004) as well as predictive validity (Garver and Mentzer, 1999). In this approach, the estimation of the structural model involves a procedure for empirical estimation of the strengths of each relationship between exogenous (intellectual capital (IC)) and the endogenous (knowledge sharing (KS) and innovation (INV) and organizational performance (OP)) variables as depicted in the theory. The structural model is analyzed, based on the modified measurement models using the maximum likelihood estimation (MLE) method.

The results of the fits provided by the path IC → KS/INV → OP in the structural model (Figure 5.9) are quite reasonable if one considers the complexity of the model, the limitation of response rate and the number of observed items (Min and Mentzer, 2004). The normed χ^2 is 1625.465, CFI is 0.910 and the TLI is 0.904 while the RMSEA is 0.060. The normed χ^2 meets the threshold requirement of less than 3, while the CFI and TLI values are above the 0.9 threshold value. The RMSEA fulfils the requirement of the respective thresholds (less than 0.08) according to Hair et al., (2006). As the theory suggests, there are positive paths IC → OP; KS → OP; INV → OP as evidenced by the respective significant critical ratios and standardized regression weights. At this point, it is concluded that positive impacts of IC on OP, on KS as well as on INV exist, supporting the nomological validity (as well as predictive validity) of the measurement scales. The results for the nomological and predictive validity tests are included in Table 5.13.

5.4.1.9 Testing Common Method Variance/ Common Method Bias

For this study, few statistical tools have used to avoid and reduce CMV/CMB. From the findings, it showed that there is no CMV or CMB exist in this study as shown in results such as:

1. Correlation values are between 057 – 0.72 indicated that the variables are not highly correlated therefore the variables are distinctive and exclusive (Table 5.11).
2. Discriminant Validity is to predict group membership from a set of predictors. The findings showed that construct are unique (Table 5.10 and Table 5.11)

3. Unidimensionality test. In this study, the results of CFA, all the regression weights (0.512 to 0.908; with significant t-values) are also ≥ 0.5, the threshold as recommended by Hair et al. (2006) as shown in Table 5.13. A good fit of measurement model, as measured by the goodness of fit index (GFI) also indicates that all items load significantly on one underlying latent variable. Table 5.16 has shown that model 5 which integrated independent variable, mediating variables and dependent variable is the best model with the lowest chi-square and lowest RMSEA indicated the model fit. Beside, the nomological network tests had shown the theoretical relationships of the variables as suggested by Meade et al. 2007). In addition, Table 5.10 of discriminant validity test has proven statistically that each variable differ.
4. The reliability and validity tests (Table 5.13) have shown that the items used in the study are reliable and valid.

Conway and Lance (2010) argue that structural equation model is theoretically sound to reduce common method bias and has not been tested empirically. However, in this study has shown that structural equation model empirically can reduce the bias as done by William and Anderson (1994). From these findings, it shown that every construct is unique and distinctive. .

Table 5.13 Result of Construct Validity Assessment

Validity Aspect/Test	Requirement	Construct				Remarks
		IC	KS	INV	OP	
1. Unidimensionality						All accepted
CFA : Regression Weight	$\Lambda \geq 0.5$	0.666 – 0.843	0.656-866	0.656-0.915	0.731-0.880	All accepted
: Critical Ratio	$t \geq 1.96$ at $\alpha = 0.05$	10.661-17.479	13.213-19.204	11.279-14.875	18.751-23.390	All accepted
: Multiple Fits Criteria	GFI ≥ 0.9; RMSEA ≤ 0.080	0.924;0.046	0.960;0.0623	0.987;0.035	0.989;0.069	All accepted
2. Reliability						
Cronbach's Alpha	$\alpha \geq 0.7$ (also 0.5 0r 0.6)	0.911-0.958	0.943	0.816 – 0.940	0.920	All accepted
CFA : Construct Reliability	CR ≥ 0.7	0.78-0.85	0.83	0.82-0.88	0.92	All accepted
: Proportion of variance in observed variable	$R^2 \geq 0.3$	0.327 – 0.795	0.431 – 0.750	0.404 - 0.838	0.539 - 0.777	All accepted
3. Convergent Validity						
CFA : Critical Ratio	$t \geq 2.0$	10.661-17.479	13.213-19.204	11.279-14.875	18.751-23.390	All accepted
: Variance Extracted	VE ≥ 0.5	0.53-0.58	0.62	0.61-0.67	0.72	All accepted
: Construct Reliability	CR ≥ 0.7	0.78-0.85	0.83	0.82-0.88	0.92	All accepted
: Bentler-Bonnet Coefficient	$\Delta \geq 0.90$	0.93		0.91		All accepted
: Widaman's three comparison Models	Significant change in χ^2 between model 0 and model 1 (Table 2)	3642.620 at 20 df		1270.219at 6 at 7 df		All accepted

Table 5.13 Result of Construct Validity Assessment (continued)

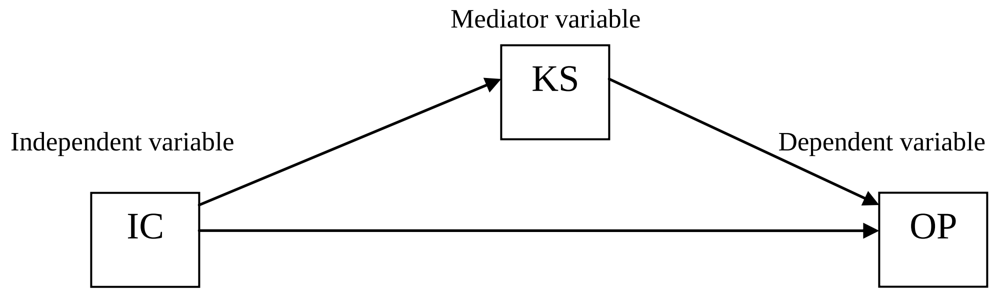
Validity Aspect/Test	**Requirement**	**Construct**				**Remarks**
		IC	KS	INV	OP	
4. Discriminant Validity						
CFA: Widaman's three comparison Models	Significant change in χ^2 between model 1 and model 2	313.487at 3 df		132.143at 1 df		All accepted
: Pair-wise comparison of models	Significant change in χ^2 between constrained model (φ =1) and unconstrained model (φ =0)	The change of χ^2 ranges from 4.006 to 28.84 at 1 df. All values are significant at $\alpha < 0.05$. Details of the results are in Table 3				All accepted
: Variance Extracted compared to squared correlation between two variables	Variance Extracted be greater than squared correlation	All accepted				
5. Nomological Validity						
CFA: Correlations in the measurement theory	Should make sense	A visual inspection of the correlation of matrix (Table 4) shows all the correlations are in the correct direction as posited in theory				All accepted
Predictive Validity		Table 3				
Correlating constructs to other constructs they are supposed to predict	Correlations be substantial in magnitude and significant	Correlations values are greater than 0.3, in the correct directions; higher between 1st order variables and their corresponding 2md order.				All accepted
Test relationship between exogenous and endogenous variables	A significant positive impact should exist	Positive significant impact exist for the links of : IC → KS; IC → OP; IC → INV; KS → OP; INV → OP, KS → INV				All accepted
Significant links in the Structural Model	Regression weights, λ, be significant and acceptable. Critical ratios, t ($\geq$2.0)	Positive and significant values of Regression				All accepted

5.4.2 The mediating role of knowledge sharing and innovation

A variable is said to be a mediator, if it accounts for the relation between the predictor and the criterion variables (Hair et al., 2006; Baron and Kenny, 1986). The authors designate the requirement that all variables (predictor, criterion and mediator) be significantly correlated. To demonstrate the mediating effects, the following conditions must exist as suggested by Baron and Kenny (1986):

1. The independent variable (IC) must be significantly related to the mediating variable (KS)
2. The independent variable (IC) must be significantly related to the dependent variable (OP).
3. When the effect of the mediating variable (KS) is added in the relationship between the independent variable (IC) and the dependent variable (OP), the path coefficient must be significantly decreased.
4. The relationship between the mediating variable (KS) and the dependent variable (OP) must be significant.

Figure 5.5 illustrates the mediating effects in the direct relationship. If the direct relationship of IC and OP is reduced and remains significant after the KS is included in the model, then partial mediation is supported. If the direct relationship is reduced to a point where it is no longer statistically different from zero after the KS is included, then full mediation is supported. The important indicators include the regression weights (significant) and the model fit as indicated by the change in the χ^2 statistics ($\Delta\chi^2$).



IC-Intellectual capital; KS- Knowledge Sharing; OP- Organizational Performance

Figure 5.5
Illustration of Mediating Effect

If there is a significant improvement in the fit of the model (as indicated by $\Delta\chi^2$) because of the addition of the direct relationship, then mediation is not supported. If the two models exhibit similar fits, then mediation is supported. This approach to the analysis of the mediation effect is similar to that proposed by Kelloway (1995). Several authors have applied the procedure including Prajogo and Sohail (2006).

This study performs tests on the mediation role of KS and INV on the relationship between IC and OP. The literature shows that there have been studies that obtained results confirming the direct relationship between the study variables as identified in Table 5.14. To accomplish the tests, the study assumes variations of the links in the baseline model, which represent the fully mediated model (Model 1 in Figure 5.8). Basically the model is constructed following the existence of the direct relationships between IC and KS, KS and OP, IC and INV, INV and OP. Model 2 in Figure 5.8 presents an additional direct link in the fully mediated model, i.e. the direct link between IC and OP. This may be interpreted as a representation that assumes the existence of a partially mediated model on the relationship between IC and OP. Similarly, the addition of the direct link between IC and

OP on the fully mediated model may be interpreted as representing a partial mediation effect of INV on the relationship between IC and OP.

Table 5.14 Direct Relationships between Study Variables

Relationship/Link	**Author(s)/Study**	**Remarks**
IC → OP	Nahapiet and Ghosal (1998); Bontis (2000, 1998); Deshpande et al. (1993); Gold et al. (2001); LeeandChoi (2003); Montequin et al. (2006); Wang and Chang (2005); Cohen and Kaimenakis (2007); Yaosheng et al. (2005)	A significant, direct positive relationship prevails
IC → KS	Widen-Wuff andSuomi (2003);Darroch (2005); Nahapiet and Ghosal (1998) ;Gold et al. (2001) ; Lee andChoi (2003)	A significant, direct positive relationship prevails
IC → INV	Gopalakrishnan (2000); Subramaniam and Nilakanta (1996); Lee and Choi (2003); Lee and Sukoco (2007); Scozzi and Garavelli (2005)	A significant, direct positive relationship prevails
KS → OP	Du et al (2007);Hoffman et al. (2005); Saint-Onge (2003); Darroch and Naughton (2001); Alony and Whymark 2006; Alavi and Leidner (2001); Gold et al. (2001)	A significant, direct positive relationship prevails
INV → OP	Oke et al. (2004); Liao and Chuang (2006); Lin and Chen (2007); Terziovski (2001); Deshpande et al. (1993); Lee and Choi (2003); Calatone et al. (2002)	A significant, direct positive relationship prevails
KS → INV	Alwis and Hartmann(2008); Harlow (2008); Leonard and Sensiper (1998); Du et al (2007); Hoffman et al. (2005) Darroch and Naughton (2001)	A significant, direct positive relationship prevails

In line with the discussion on constructing the mediation test shown earlier, the models in Figure 5.8 (Models 1, 2, 3, 4, 5, and 6) were compared to the non mediated model (Model 0) in terms of the parameters for the direct links IC $\rightarrow$ OP. This test was carried out to test and compare the fits (Chi-square differences) between the baseline model (Model 1) and each of the other models (Models 2, 3, 4, 5 and 6). A significant difference in the Chi-square ($\Delta\chi^2$) between Model 1 and any of these models means that the mediation effect is present. To ascertain whether the mediation is full or partial, the corresponding parameters for the direct link IC $\rightarrow$ OP were compared with those obtained in the non-mediated model (Model 0). If the parameter in the link of IC $\rightarrow$ OP in the test model (Model 2,3,4,5, 6) is significant, but less than the one in the non-mediated model, it implies that partial mediation is supported; but if the parameter is non-significant or equivalent to zero, then full mediation is supported. In this study, the existence of significant correlation is confirmed, Appendix 10. The fits for Models 1,2,3,4 and 5 are as shown in Table 5.15 while the regression weights for each path are as shown in Figure 5.6. All significant paths are significant at $p < 0.05$.

Model 0

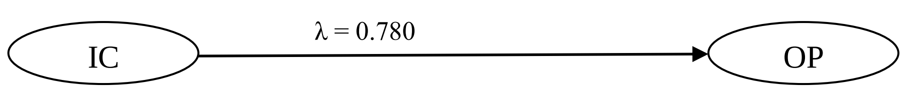


Figure 5.6 (a)
Direct Effect Relationship

This model will be used as the basic model to compare to other models in comparison of the difference of Chi-square. The results of the non-mediated model are observed to have significant regression weights of 0.780 for the link of IC → OP as in Model 0.

Model 1

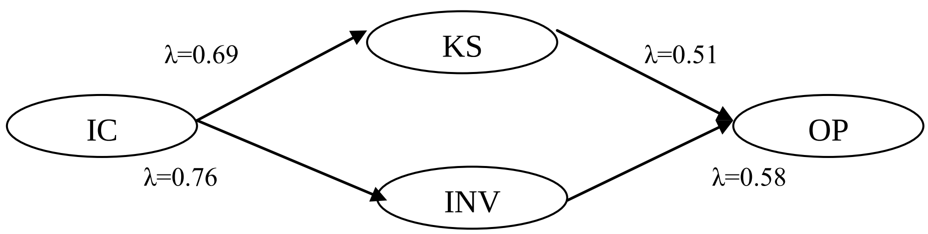


Figure 5.6 (b)
Direct and Indirect Effect Relationships

Model 1 is used as the baseline model for the test.

Model 2

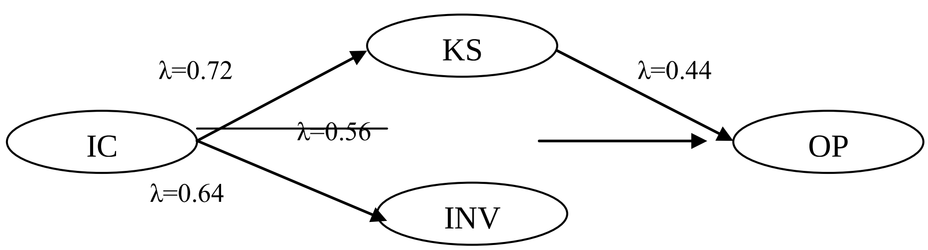


Figure 5.6 (c)
Direct Effect Relationship

Results for Model 2 show that path IC→OP has been reduced slightly to 0.59. The change in χ^2 fit ($\Delta\chi^2 = 10.1$) is greater than 3.84 (tables of critical value), being a significant change in the fit, thus, demonstrating a partial mediation effect.

Model 3

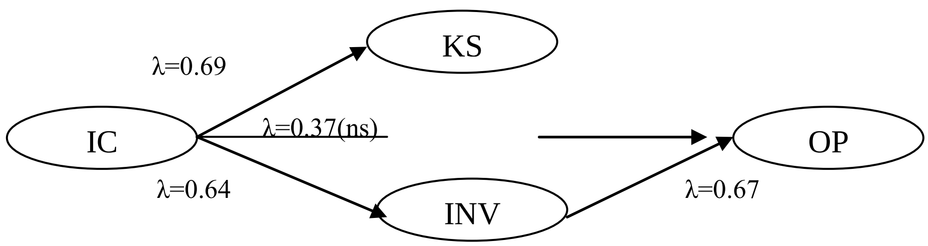


Figure 5.6 (d)
Direct Effect Relationship

In model 3, the result indicates that the path IC→ OP is not significant ($\lambda = 0.37$, t= 2.322, p = 0.020), less than value of 0.780 from Model 0. The change in χ^2 fit ($\Delta\chi^2 = 1.229$) is less than 3.84 (tables of critical value), being a non-significant change in the fit, thus, demonstrating a full mediation effect.

Model 4

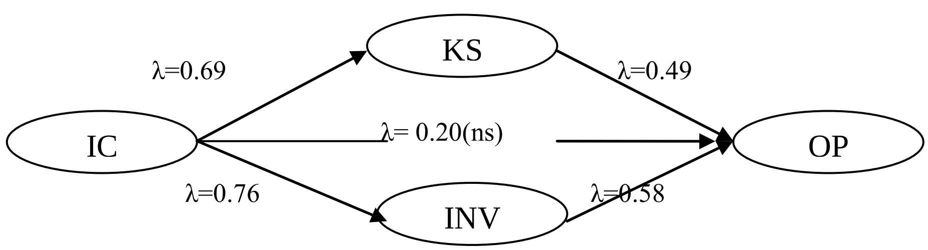


Figure 5.6 (e)
Direct Effect Relationship

The result of the test on Model 4 indicates that the path IC → OP is not significant (λ = 0.20, t= 0.0.056, p = 0.956). The change in χ^2 fit ($\Delta\chi^2$ = 0.003) is less than 3.84 (tables), being a non-significant change in the fit, thus, demonstrating full mediation effect.

Model 5

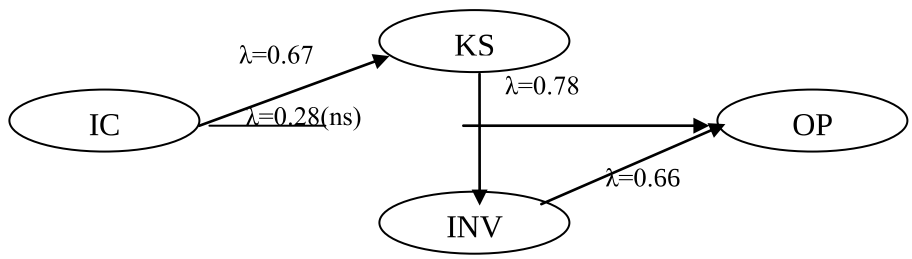


Figure 5.6 (f)
Direct and Indirect Relationship

The results of the test on Model 5 show that the path of IC → OP is not significant with a regression weight of 0.28 (t = 20.024, p = 0.043). The change in χ^2 fit ($\Delta\chi^2$ = 16.7) is greater than 3.84 (tables of critical values), being a significant change in the fit, thus, demonstrating a partial mediation effect.

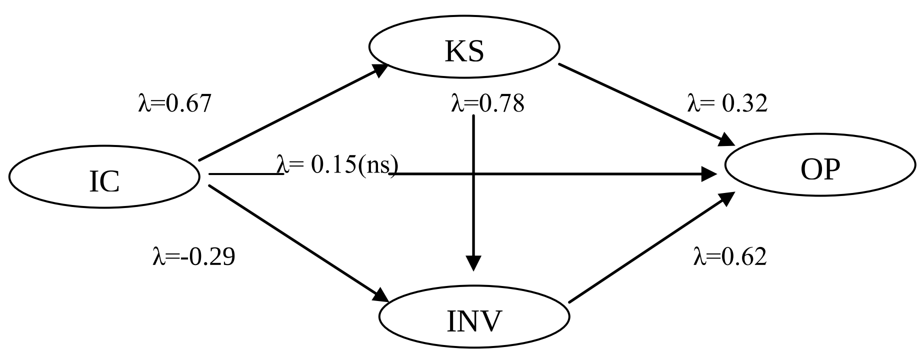


Figure 5.6 (g)
Simplified Models for Testing the Mediation Effect of Knowledge Sharing and Innovation Model

The result of the test on Model 6 shows that the path IC→ OP is not significant with a regression weight of 0.15 ($t = 0.644$, $p = 0.520$). The change in χ^2 fit ($\Delta\chi^2 = 17.8$) is greater than 3.84 (tables of critical value), being a significant change in the fit, thus, demonstrating a partial mediation effect.

These results when combined with the results of the regression weights indicate the existence of some support on the mediation role of KS and INV. However, KS mediates partially and INV mediates fully in Model 2 and Model 3. This makes Model 6 the best model of combination of partial and full mediation effects. Table 5.5 show the mediating effects.

Table 5.15 Fits for Models Used in Testing the Mediating Effects of Knowledge Sharing and Innovation

Model	χ^2	df	CFI	TLI	RMSEA	$\Delta\chi^2$	Remarks	Mediator
1	1643.221	733	0.909	0.903	0.061	-	Full mediation Model	-
2	1653.319	733	0.908	0.902	0.061	10.1*	Partial Mediation Supported	KS
3	1644.450	733	0.909	0.903	0.061	1.229	Full mediation Supported	Innovation
4	1643.218	732	0.909	0.903	0.061	0.003	Full mediation Supported	KS and Innovation
5	1626.489	733	0.910	0.905	0.060	16.7*	Partial Mediation Supported	KS and Innovation
6	1625.465	731	0.910	0.904	0.060	17.8*	Partial Mediation Supported	KS and Innovation

After demonstrating the roles of KS and INV in the model as mediating variables, the following steps analyze the structural model and test the hypotheses. This was performed as presented in the following section.

5.4.3 Analysis of Structural Model and Testing Hypotheses

The first step in model estimation was to examine the goodness-of-fit of the hypothesized model of Figure 5.7. The observed normed χ^2 was 2.22 (χ^2/df = 1625.465/731). The CFI is 0.910, TLI = 0.904 and RMSEA = 0.060. The results of the goodness-of-fit indices exhibited a strong acceptance level of overall model fit and, therefore, provided support to the overall validity of the structural model.

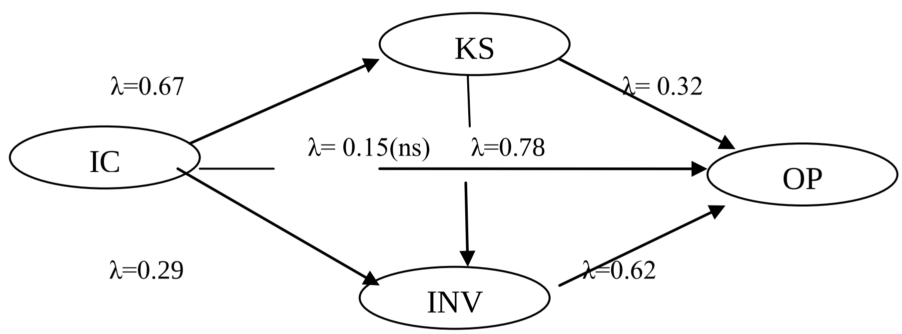


Figure 5.7
Result of structural model

The structural model is analyzed based on the modified measurement models using the maximum likelihood estimation (MLE) method. Some authors do this by comparing the model to alternative models as outlined in Anderson and Gerbing (1988) and applied by others e.g. Li et al. 1998. The procedure involves comparing the proposed model to alternative models by conducting sequential Chi-square differences by calculating the differences between the Chi-square statistic values for the proposed model and each alternate model. The degree of freedom for the Chi-square difference equals the difference in the degrees of freedom of the pair of models being compared. This study proposes the models presented in Figure 5.8, where Model 6 is the initially proposed model and Models 1,2, 3, 4 and 5 are the alternative models to be analyzed. The regression weights for each path are seen in each corresponding figure.

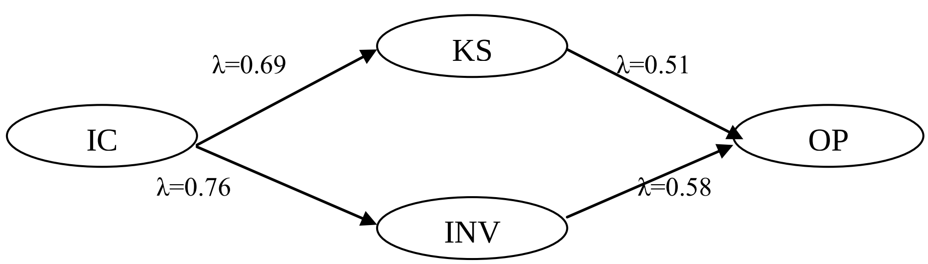
Table 5.16 presents the results of the fit and the calculated Chi-square difference. Even though the result showed that Model 2 is the best model in term of change of chi-square, significant increase in the Chi-square value compared to the proposed model. Similarly, Models 1, 3 and 4 also show significant increases in the Chi-square values compared to the initially proposed model (Model 6). However, the study is proposing Model 5 as alternative model to basic model – Model 6. The comparison of Model 5 and Model 6 produces an insignificant change in the Chi-square value leading to the conclusion that Model 5 is the most suitable among the proposed alternative models. Model 5 in Figure 5.8 is presented again in Figure 5.9 with the corresponding details. The open arrows stand for the error variance terms (unstandardized) corresponding to the measured items represented by number boxes (1, 2 or 3) for each of the twenty first order latent variables linked to either of the three second order latent variables. The regression weights for each relationship (significant at $p > 0.05$) with the corresponding critical ratio (t-value) in brackets are shown in the figure. The correlation coefficient for intellectual capital and organizational performance is 0.28 ($t = 1.934$, $p = 0.53$).

Table 5.16 Sequential Chi-square difference Tests

Model	χ^2	df	CFI	TLI	RMSEA	$\Delta\chi^2$
1	1644.450	733	0.909	0.903	0.061	18.985
2	1653.319	733	0.908	0.902	0.061	27.854
3	1643.221	733	0.909	0.903	0.061	17.756
4	1643.218	732	0.909	0.903	0.061	17.753
5	1626.489	733	0.910	0.905	0.060	1.024
6	1625.465	731	0.910	0.904	0.060	-

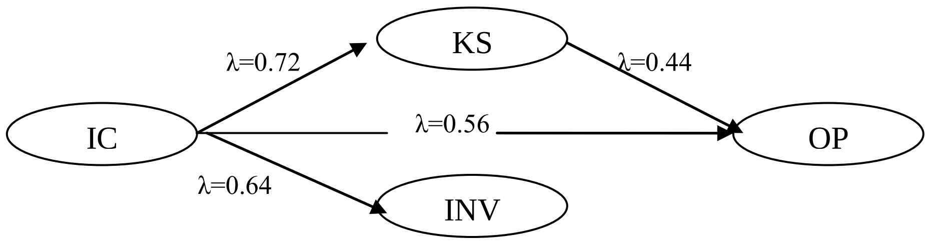
Other results are presented in Appendix 9 depicting the regression weight of each link in the model being significant (as seen from the significant t-values which are all greater than 3, $p \leq 0.05$) for all the links.)

Model 1



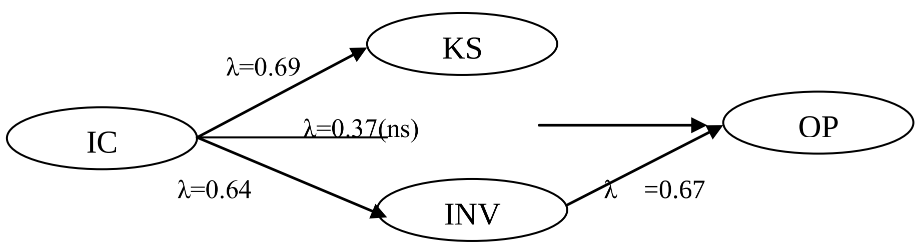
χ^2 = 1644.450, df = 733, CFI = 0.909, TLI = 0.903, RMSEA = 0.061

Model 2



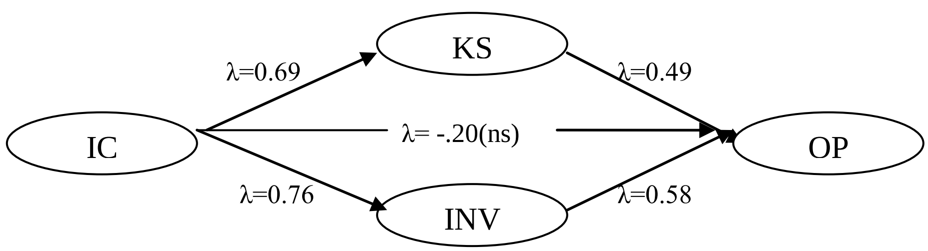
χ^2 = 1653.319, df = 733, CFI = 0.908, TLI = 0.902, RMSEA = 0.061

Model 3



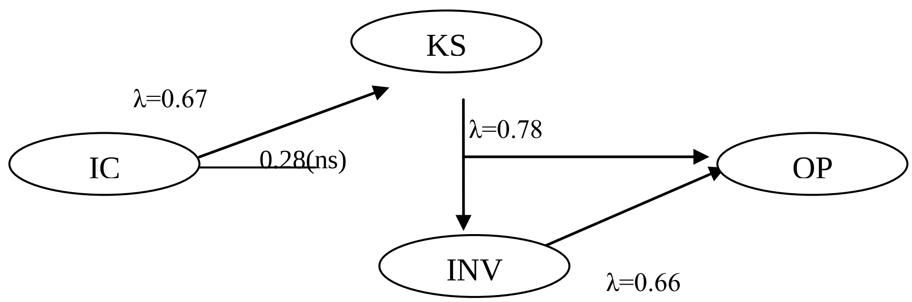
χ^2 = 1643.221, df = 733, CFI = 0.909, TLI = 0.903, RMSEA = 0.061

Model 4



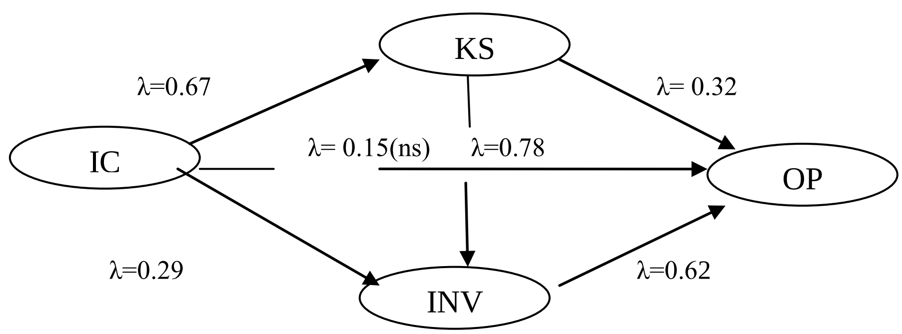
χ^2 = 1643.218, df = 732, CFI = 0.909, TLI = 0.903, RMSEA = 0.061

Model 5



χ^2 = 1626.489, df = 733, CFI = 0.910, TLI = 0.905, RMSEA = 0.060

Model 6



χ^2 = 1625.465, df = 731, CFI = 0.910, TLI = 0.904, RMSEA = 0.060

Figure 5.8
Simplified Models for sequential Chi-square difference Tests

The effects of each indicator (item), as represented by the regression weights in Appendix 9, have a direct relationship with the second order variables in the sense that they are caused by these second order variables. Increased activities related to any of the indicators are a reflection of an increase in the level of the first order variable and, consequently, the second order variable.

The results of the fits provided by the paths IC→KS→INV→OP are quite reasonable, if one considers the complexity of the model, limitation and number of observed items (Min and Mentzer, 2004). The Normed χ^2 was 2.219, CFI was 0.910, TLI was 0.905 while RMSEA was 0.060. The Normed χ^2 meets the threshold requirement of less than 3 while the CFI and TLI values are above the 0.9 threshold. The RMSEA fulfils the requirement of the respective thresholds (less than 0.08 and 0.07, respectively). All threshold points are according to Hair et al. (2006). Considering the large number of observed items, the values of GFI (0.805) and AGFI (0.782) are within what Min and Mentzer (2004) term as reasonable fits in terms of overall model fit indices.

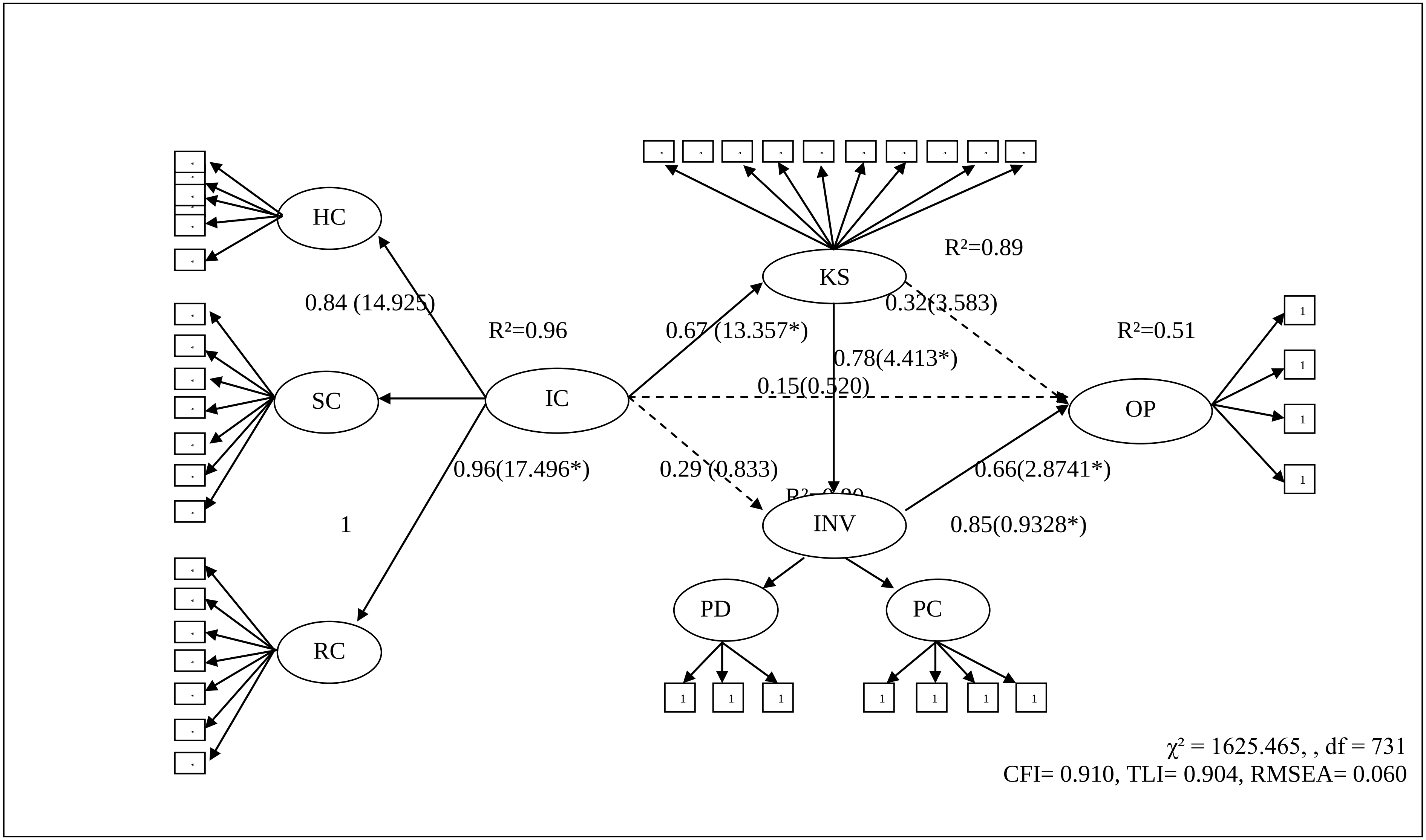


Figure 5.9

The Final Structural Model

Weights and path coefficients ß are shown above with their corresponding t critical value in bracket.

The lines indicate significant paths, the dotted lines indicate insignificant paths and the gray lines indicate new paths

5.6 Summary of Hypotheses Findings

The causal relationship between four constructs – Intellectual capital (IC), Knowledge Sharing (KS), Innovation (INV) and Organizational Performance (OP) were examined. Eight hypotheses were formed based on previous studies and frameworks, and they were tested with the collected data using Structural Equation Modelling of AMOS. The summary of the eight hypotheses is shown in Table 5.17. Testing of the hypotheses is to show the evidence of support that a theoretically specified model fits the sample data.

Table 5.17 Summary of Hypotheses

Hypotheses	Details	Result
H1:Intellectual capital has a positive relationship on organizational performance	There is a positive relationship between Intellectual capital and organizational performance.	Supported
H2:Intellectual capital has a positive relationship on knowledge sharing	There is a positive relationship between intellectual capital and knowledge sharing.	Supported
H3:Knowledge sharing has a positive impact on organizational performance	There is a positive relationship between knowledge sharing and organizational performance	Supported
H4: Intellectual capital has a positive relationship on innovation	There is a positive relationship between intellectual capital and innovation.	Supported
H5: Innovation has a positive relationship on organizational performance	There is a positive relationship between innovation and organizational performance	Supported
H6: Knowledge sharing positively mediates the relationship between intellectual capital and organizational performance	A positive relationship between intellectual capital and organizational performance is mediated by knowledge sharing	Not Supported
H7: Innovation positively mediates the relationship between the intellectual capital and organizational performance	A positive relationship between intellectual capital and organizational performance is mediated by innovation	Supported
H8: Knowledge sharing and innovation positively mediates the relationship between intellectual capital and organizational performance	A positive relationship between intellectual capital and organizational performance is mediated by knowledge sharing and innovation	Supported

H1: Intellectual capital has a positive impact on organizational performance

The statistical significance of IC and OP representing H1 confirms that intellectual capital has a positive relationship with organizational performance, with a path coefficient of 0.78, t-value 12.170 and significant at $p < 0.05$. A total of 66.7% of organizational performance is explained by intellectual capital. This finding is supported by previous studies on the positive relationship between intellectual capital and organizational performance (Wang and Chang, 2005, Yang, 2008, Yaosheng et al., 2005) where intellectual capital is identified as a key resource and driver of organizational performance (Itami and Roehl, 1991; Teece, 1998, Mayo, 2000, Li, 2007; Hong et al. 2008))

H2: Intellectual capital has a positive impact on knowledge sharing

The standardized coefficient of the effect of intellectual capital on knowledge sharing provides support for hypothesis H2. This indicates that intellectual capital has a positive impact on knowledge sharing with a path coefficient of 0.766, t-value 15.476 and significant at $p < 0.05$. Intellectual capital has 88% variance explained by knowledge sharing. This finding is similar to the previous studies of Lee and Choi (2003), Yang (2005), Cheng et al., (2008). Li and Zhu (2009) also found that intellectual capital has a strong positive relationship to knowledge sharing.

H3: Knowledge sharing has a positive impact on organizational performance

The significant standardized coefficient of the direct link of knowledge sharing and organizational performance supports hypothesis H3, showing that KS has a direct positive influence on organizational performance with a path coefficient of 0.741, t-value 10.951

and significant at $p < 0.05$. Knowledge sharing has 69.7% variance explained by organizational performance. This finding is similar to previous studies done by Yang (2005), Cheng et al., (2008), Du et al., (2007), and Hoffman et al., (2005). This is similar to the findings of Yang (2007) and Hsu (2008) on the organizational knowledge sharing to organizational performance in Taiwan

H4: Intellectual capital has a positive impact on innovation

The standardized coefficient of the effect of intellectual capital on innovation provides support to hypothesis H4 with a path coefficient of 0.735, t-value 13.086 and significant at $p < 0.05$. Knowledge sharing has 69.7% variance explained byorganizational performance. This finding is similar to previous studies done by Yang (2005), Cheng et al., (2008), Du et al., (2007), and Hoffman et al., (2005). This shows that intellectual capital positively impacts innovation. The result of correlation analysis supports the indication thatintellectual capital and its measures are significantly related to innovation and its measures.

H5: Innovation has a positive impact on organizational performance

Similarly, the significant standardized coefficient of the direct link between INV and OP, supporting hypotheses H5, shows that INV has a positive impact on OP. This result is further demonstrated by the findings of the correlation analysis that suggest that INV is significantly and positively related to OP measures. This indicates that INV as an intermediate predictor for a firm to achieve satisfactory performance.

H6: Knowledge sharing positively mediates the relationship between intellectual capital and organizational performance

Knowledge sharing does not mediate the relationship between intellectual capital and organizational performance with path coefficient of 0.36 (t = 0.784) .Even though the impact is positive however the effect is not significant and weak. This finding is contrasted with other findings such as Liao and Chuang (2006) found that knowledge sharing mediates the relationship of intellectual capital and organizational performance (Hoffman et al, 2005; Gloet and Terziovski, 2004; Wah et al. 2005, Steinheider and Al-Hawamdeh, 2004). However, this result is supported by Kim (2008), Garud and Nayyar (1994)

H7: Innovation positively mediates the relationship between intellectual capital and organizational performance

The results include a substantial change in the chi-square after entering the innovation variable ($\Delta\chi^2 = 17.758$, $\Delta df= 1$, $p<0.01$) as the mediating variable between IC and OP, it fully mediates the relationship. This is in line with the study done by Hult et al. (2004). As reflected by the R^2, in this model 80 percent of variance in innovation ($\beta = 0.64$, $t=13.822$) is explained by intellectual capital and the 51.1 percent of variance in organizational performance ($\beta = 0.56$, $t=10.522$) is explained by innovation. This implies that while innovation is an important direct driver of performance, it also appears to be a necessary mediator of the link between IC and OP. This finding is similar to Wang and Chang (2000), Hsu and Fang (2009) and Chen et al. (2001) who observed the mediating effect of innovation on organizational performance and intellectual capital. Lin and Chen (2007) found $R^2 = 0.411$ for innovation of SMEs in Taiwan.

H8: Knowledge sharing and innovation positively mediates the relationship between intellectual capital and organizational performance

Knowledge sharing and innovation partially mediates the relationship between intellectual capital and organizational performance, with51% variance explained in organizational performance by knowledge sharing and innovation. Intellectual capital has a path coefficient of 0.67 to knowledge sharing, which contributes 89% variance explained by knowledge sharing. It also shows a strong path coefficient between knowledge sharing and innovation at 0.78 with 85% variance explained by innovation. Knowledge sharing has a strong link to product innovation with79% of variance explained by knowledge sharing. The process innovation has 42% of variance explained by knowledge sharing with a significant positive link. This result is consistent with the research that shows the relationship of knowledge sharing and innovation (Koenig, 1998; Steinheider and Hawandeh, 2004). This finding indicates that firms will achieve a higher level of innovation when organizational members have more social interaction such as trust, communication and share more frequently and effectively (Huang and Li, 2009). This is supported by Abbot et al. (2006), Cavusgil et al. (2003), Saenz, Aramburu and Rivera (2009).

5.7 Summary

This chapter presented the research findings. The descriptive analysis was carried out to check the response bias, test of normality and test of collinearity and linearity. The data was seen to be normally distributed. A structural equation modelling approach was applied to the data using the AMOS version 16.0 software packages. Through CFA, the constructs were tested for validity and proven to possess validity in all tested aspects. Eight hypotheses were tested with a positive result. The test of mediation of knowledge sharing and innovation are possible using structural equation modelling. The tests showed that knowledge sharing and innovation partially mediate the relationship of intellectual capital and organizational performance.

In the next chapter, the discussions derived from the research's findings are discussed. The chapter provides answers to the research questions presented in the beginning of the study as well as the concluding remarks for this study.