Chapter 4: Results

In Chapter 4, data analysis was described in detail and an evaluation of the findings is provided. The following section examines reliability and validity of the instruments used in the study through Cronbach's alpha and exploratory factor analysis. In the study, the purpose of employing Cronbach's alpha was to measure internal consistency reliability, whereas the purpose of using exploratory factor analysis was to evaluate construct validity.

Identifying the relationship between organizational culture and innovation was the essence of the study. Therefore, the correlation between culture variables (empowerment, team orientation, capability development, creating change, customer focus, and organizational learning) and a dependent variable, which is innovation, is examined. Multiple regression analysis was used to identify whether cultural constructs are the explanatory variables of innovation in the final section.

Socio-Demographic Characteristics

Of the 249 respondents, 90.6% were in the age range of 20-39. With respect to educational level, 91.2% had earned at least a degree. Most of them are involved in service industry (28.9%), manufacturing industry (16.9%) and other (22.9%). After referring to the questionnaires, for other industry which most respondents came from was education industry, which was 21.5%.

Furthermore, 66.3% were from local organization (sole proprietor, 2.0%; partnership, 3.2%; local private limited, 28.9%; local public limited, 21.3%;

government / government agency, 8.8%), whereby the percentage for multinational company was merely 33.7%.

As for job position, 62.7% were senior managers, managers and executives. Most of the respondents were having a supporting and functional role in the organization, which were 72.7% (general management, IT / technical / production, human resources, accounting / finance, legal / compliance, other) and 27.3% for sales / marketing / customer service.

Finally, of the 249 respondents, 44.2% working in between 2 to 5 years, 31.3% working less than 2 years and 20.1% working in between 6 to 10 years. The profiles of 249 respondents are exhibited in Table 4-1.

Table 4-1

Demographic Characteristics of Respondents (N=249)

Characteristic	N	%
Age Bracket		
20-29	116	46.4
30-39	110	44.2
40-49	19	7.6
Over 50	4	1.6
Highest Education Level		
Secondary	1	0.4
Certificate / Diploma	21	8.4
Degree / Professional	168	67.5
Post-graduate	59	23.7
Type of Industry		
Services	72	28.9
Pharmaceutical / Medical Device	22	8.8
Manufacturing	42	16.9
NGO (non-governmental organization)	8	3.2
Banking	18	7.2
Government / government agency	15	6.0
Construction	15	6.0
Other	57	22.9
Type of Organization		
Sole proprietor	5	2.0
Partnership	8	3.2
Private limited	72	28.9
Public limited	53	21.3
Multinational company (MNC)	84	33.7
Government / government agency	22	8.8
Other	5	2.0
Current job position		
Top management (CEO, MD, GM, Director)	11	4.4
Other management (senior manager, manager, executive)	156	62.7
Skilled professional (doctor, lawyer, etc)	23	9.2
Technical employee (technician, electrician, etc)	16	6.4
Administration	34	13.7
Own business	1	0.4
Other	8	3.2
Current job function		
General management	46	18.5
IT / technical / production	56	22.5
Sales / marketing / customer service	68	27.3
Human resources	18	7.2
Accounting / finance	31	12.4
Legal / compliance	4	1.6
Other	26	10.4
Years in the current organization		
Less than 2	78	31.3
2 – 5	110	44.2
6-10	50	20.1
Over 10	11	4.4

Descriptive Statistics

As shown in Table 4-2, all variables in this study were briefly described in the full sample. Of the variables, organizational culture was calculated by 30 items used to measure 2 constructs – Involvement and Adaptability which were made up by empowerment, team orientation and capability development for involvement; creating change, customer focus, and organizational learning for adaptability. Innovation was calculated by 12 items which made up by innovation new to the company and innovation new to the industry.

The mean scores for the culture variables ranged from 3.74 to 3.18 suggesting that the respondents, as a group, believe each culture variable to be at least moderately descriptive of their organization. Among the culture variables, the mean score for team orientation (mean = 3.74) was the largest. Customer focus was rated below the team orientation with a mean score of 3.50. The mean score for creating change was the lowest among the six variables. The findings were consistent with Denison et al. (2006), the mean scores for the culture variables ranged from 3.41 to 3.10.

The mean score for the variable of innovation new to the company, 3.51 is slightly higher than the variable of innovation new to the industry, which is 3.3

Table 4-2

Descriptive Analysis of All Variables

	Mean	Range	Std. Deviation
Empowerment	3.46	1.0 - 5.0	0.52
Team Orientation	3.74	1.0 - 5.0	0.50
Capability Development	3.46	1.0 - 5.0	0.46
Creating Change	3.18	1.0 - 5.0	0.38
Customer Focus	3.50	1.0 - 5.0	0.46
Organizational Learning	3.49	1.0 - 5.0	0.48
Innovation Company	3.51	1.0 - 5.0	0.67
Innovation Industry	3.33	1.0 - 5.0	0.83

Exploratory Factor Analysis

In general, not only was exploratory factor analysis (EFA) employed to examine construct validity of constructs based on correlations between them, but it was also used to fulfill data reduction in order to extract common factors from items measuring the constructs (Leech, Barrett, & Morgan, 2005). In this study, the instruments that were adopted from the previous studies and had been examined by the instrument developers comprised six constructs – empowerment, team orientation, capability development, creating change, customer focus, organizational learning, were measured by five items respectively. Factor analysis will condense a large set of variables down to a smaller, more manageable number of dimensions or factors. This tool will be summarizing the underlying patterns of correlation and looking for groups of closely related items.

Before fulfilling EFA, Kaiser-Meyer-Olkin (KMO) test and Bartlett's test needed to be examined first. The purpose of KMO test was to examine whether items were sufficiently predicted for each factor. The KMO index ranges from 0 to 1, with .6 suggested as the minimum value for a good factor analysis (Tabachnick & Fidell, 2001). The purpose of Bartlett's test was to indicate whether items were highly correlated in order to provide a logical reason for performing EFA. The Bartlett's test of sphericity should be significant ($p<.05$) for the factor analysis to be considered appropriate (Tabachnick & Fidell, 2001).

On examining KMO values and Bartlett's test, the results indicated not only that all constructs in this study were sufficient for social science research but also that EFA could be conducted to examine the construct validity of the instruments. KMO values and Bartlett's test of all constructs are exhibited in Tablet 4-3.

Table 4-3

KMO and Bartlett's Test

Construct	KMO	Bartlett's Test Sig. (*p*)	Eigenvalues
Empowerment	0.672	0.000	1.881
Team Orientation	0.713	0.000	2.333
Capability Development	0.742	0.000	2.092
Creating Change	0.829	0.000	2.822
Customer Focus	0.803	0.000	3.004
Organizational Learning	0.840	0.000	3.026
Innovation New for Company	0.688	0.000	2.603
Innovation New for Industry	0.819	0.000	3.463

In the following step, EFA was adopted to examine validity of all constructs. SPSS uses the Kaiser criterion (retain all components with eigenvalues above 1) as the default. The eigenvalue of a factor represents the amount of the total variance explained by that factor. As shown in Table 4-4, all factor loadings were more than .4, indicating considerable shared variance within those items intended to measure the same underlying concepts. The results were also consistent with the study by Denison et al.,2007.

Table 4-4

Factor Loadings for Empowerment, Team Orientation, Capability Development, Creating Change, Customer Focus and Organizational Learning

Item	**Factor**					
	Empowerment	Team Orientation	Capability Development	Creating Change	Customer Focus	Organizational learning
1	.564					
2	.574					
3	.662					
4	.588					
5	.670					
6		.594				
7		.588				
8		.797				
9		.761				
10		.541				
11			.523			
12			.693			
13			.730			
14			.693			
15			.570			
16				.747		
17				.752		
18				.687		
19				.747		
20				.818		
21					.817	
22					.793	
23					.723	
24					.729	
25					.807	
26						.774
27						.771
28						.707
29						.866
30						.764

In the following step, the six items innovation new to the company and another six items of innovation new to the industry were also examined through factor analysis. This result confirmed the results by Johannessen et al. (2001). The factor analysis of the twelve innovation variables, confirmed the unidimensionality of the scale. All variables loaded strongly on the same factors.

Table 4-5

Factor Loading for Innovation New for the Company

Item	**Factor**					
	New for the Company					
	New products	New Services	New methods of production	Opening new markets	New sources of supply	New ways of organizing
1 **2** **3** **4** **5** **6**	.588	.695	.640	.682	.735	.599

Table 4-6

Factor Loading for Innovation New for the Industry

Item	**Factor**					
	New for the Industry					
	New products	New Services	New methods of production	Opening new markets	New sources of supply	New ways of organizing
1 **2** **3** **4** **5** **6**	.622	.760	.801	.771	.803	.785

Reliability Analysis

Reliability of the instrument used in a study indicated the extent of the internal consistency and stability of the instrument (Leech et al., 2005). In a study, the higher the reliability of the instrument was, the higher the internal consistency and stability of the instrument was (Leech et.al., 2005; Nunnally, 1978).

Cronbach's alpha was employed to measure six organizational culture constructs and two innovation constructs. According to the study by Leech et al. (2005), Cronbach's alpha was appropriately used to evaluate the reliability of a variable measured by Likert scale items because Cronbach's coefficient alpha was able to calculate the internal consistency and reliability based on the average correlation of each item in the scale with every other term.

Based on the studies by Leech et al. (2005) and Nunally (1978), a Cronbach's coefficient alpha for each of these scales needed to reach.70, the minimum threshold for the internal consistency reliability in the social science research. Through Cronbach's alpha, the coefficients of the six cultural constructs ranged from .585 to .836. Kline (1999) notes that although the generally accepted value of .8 is appropriate for cognitive tests such as intelligence, for ability tests a cut-off point of .7 is more suitable. He goes on to say that when dealing with psychological constructs values below even .7 can, realistically, be expected because of the diversity of the constructs being measured. Therefore the low coefficients of empowerment and capability development are still acceptable.

The coefficients of innovation new to the company and innovation new to the industry are .734 and .849 respectively. These are shown in Table 4-7. The results indicated that the instruments in this study have high internal consistency reliability.

Table 4-7

Reliability Statistics

Variables	Items	Cronbach's Alpha ((α)
Empowerment	5	0.585
Team Orientation	5	0.709
Capability Development	5	0.642
Creating Change	5	0.806
Customer Focus	5	0.833
Organizational Learning	5	0.836
Innovation New to Company	5	0.734
Innovation New to Industry	5	0.849

Correlation

The relationship between Organizational Culture (as measured by Involvement – Empowerment, Team Orientation, Capability Development and Adaptability – Creating Change, Customer Focus and Organizational Learning) and Innovation (as measured by Innovation New to the Company and Innovation New to the Industry) was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity.

Through (2-tailed) Pearson correlation, for the full sample correlations between culture variables and innovation are exhibited in Table 4-8. The value of Pearson correlation (r) can range from –1.00 to 1.00. This value will indicate the strength of the relationship between two variables. A correlation of 0

indicates no relationship at all, a correlation of 1.0 indicates a perfect positive correlation, and a value of –1.0 indicates a perfect negative correlation. Cohen (1988) suggests the following guidelines:

r=.10 to .29 or r=–.10 to –.29 => small

r=.30 to .49 or r=–.30 to –.4.9 => medium

r=.50 to 1.0 or r=–.50 to –1.0 => large

Empowerment, creating change, customer focus and organizational learning were showing a positive significant correlation with innovation, with the *p* value less than 0.01. Creating change (*r*=.26) and organizational learning (*r*=.24) are showing stronger correlation with innovation, followed by customer focus (*r*=.21).

Table 4-8

Correlations

Item		Innovation
Empowerment	Pearson Correlation	0.192**
	Sig. (2-tailed)	0.002
Team Orientation	Pearson Correlation	0.127*
	Sig. (2-tailed)	0.045
Capability Development	Pearson Correlation	0.137*
	Sig. (2-tailed)	0.031
Creating Change	Pearson Correlation	0.263**
	Sig. (2-tailed)	0.000
Customer Focus	Pearson Correlation	0.206**
	Sig. (2-tailed)	0.001
Organizational Learning	Pearson Correlation	0.237**
	Sig. (2-tailed)	0.000
** Correlation is significant at the 0.01 level (2 tailed)		
* Correlation is significant at the 0.05 level (2 tailed)		

Standard Multiple Regression

Based on the study by Leech et al. (2005), multiple regression analysis was one of complicated statistical approaches predicating explanatory relationships between several independents variables and one dependent variable. Aiken and West (1991) moreover, proposed multiple regression analysis as a general strategy for analyzing data.

In standard multiple regression all the independent (or predictor) variables are entered into the equation simultaneously. Each independent variable is evaluated in terms of its predictive power, over and above that offered by all the other independent variables.

An Adjusted R Square (R^2) value is calculated which takes into account the number of variables in the model and the number of participants the model is based on. This adjusted R^2 value gives the useful measure of the success of the model. From Table 4-9, it is known adjusted R^2 is 0.083, which means the model explains 8.3% of the variance in innovation.

If the Sig. value is less than or equal to 0.05, then there is a significant difference somewhere among the mean scores on the dependent variable for the groups. In this test the overall Sig. value is 0.0001, which is less than 0.05, indicating a statistically significant result somewhere among the groups.

In this case we are interested in comparing the contribution of each independent variable; therefore we will use the beta values. From Table 4-10, the largest beta coefficient is 0.168, which is for Creating Change. This means that this variable makes the strongest unique contribution to explaining the innovation, when the variance explained by all other variables in the model is controlled for. The Beta value for Organizational Learning was slightly lower (0.139), indicating that it made less of a contribution.

If the coefficient value is positive, then there is a positive relationship between the independent variable and dependent variable. If this value is negative, then there is a negative relationship between the independent variable and the dependent variable. The coefficient values for team orientation as well as capability development and innovation are negative, which show the relationships are negative.

The t and Sig. (p) values give a rough indication of the impact of each independent variable – a big absolute t value and small p value suggests that an independent variable is having a large impact on the dependent variable. The t value for Creating Change is 2.447 and Sig. value is 0.015, which is less than 0.05, which shows this variable is making a significant unique contribution to the prediction of innovation. The rest of the variables are greater than 0.05, it is concluded those variables are not making a significant unique contribution to the prediction of innovation.

If VIF (Variance inflation factor) values are above 10, it would be a concern, indicating multicollinearity. The VIF values here were ranging from 1.270 to 1.521, indicating no threat of multicollinearity.

Table 4-9

Standard Multiple Regression

Model	R	R^2	Adjusted R^2	F	Sig
1	0.324[a]	0.105	0.083	4.719	0.0001[a]

a Predictors: (Constant), Organizational Learning, Empowerment, Creating Change, Capability Development, Customer Focus, Team Orientation

b Dependent Variable: Innovation

N = 249

Table 4-10

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	21.093	4.188		5.036	0		
	Empowerment	0.207	0.173	0.088	1.194	0.234	0.687	1.455
	Team Orientation	-0.122	0.183	-0.050	-0.664	0.507	0.657	1.521
	Capability Development	-0.0002	0.185	-0.0001	-0.001	0.999	0.747	1.338
	Creating Change	0.537	0.220	0.168	2.447	0.015	0.788	1.270
	Customer Focus	0.223	0.190	0.084	1.174	0.242	0.724	1.382
	Organizational Learning	0.354	0.189	0.139	1.877	0.062	0.679	1.473

a Dependent Variable: Innovation

Testing of Hypotheses

This section reports the results of the hypotheses testing, which was conducted through a series of analyses.

Hypothesis 1: There is a significant correlation between empowerment and organizational innovation

This hypothesis examined whether or not there is a significant correlation between empowerment and organizational innovation. The hypotheses was tested by analyzing data taken from the completed questionnaire, where respondents were asked to identify the degree to which five (5) items described the empowerment values in their organization.

From Table 4-8 *correlations,* the *r*=.192 with the *p* value as .002, which confirms there is a significant correlation between empowerment and organizational innovation.

However from Table 4-10 *coefficients,* the significant value is 0.234, which is more than 0.05, which shows this variable is not making a significant unique contribution to the prediction of innovation.

Hypothesis 2: There is a significant correlation between team orientation and organizational innovation

This hypothesis examined whether or not there is a significant correlation between team orientation and organizational innovation. The hypotheses was tested by analyzing data taken from the completed questionnaire, where respondents were asked to identify the degree to which five (5) items described the team orientation values in their organization.

From Table 4-8 *correlations,* the *r*=.127 with the *p* value as .045, which confirms there is no correlation between team orientation and organizational innovation.

From Table 4-10 *coefficients,* the significant value is 0.507, which is more than 0.05, which shows this variable is not making a significant unique contribution to the prediction of innovation.

Hypothesis 3: There is a significant correlation between capability development and organizational innovation

This hypothesis examined whether or not there is a significant correlation between capability development and organizational innovation. The hypotheses was tested by analyzing data taken from the completed questionnaire, where respondents were asked to identify the degree to which five (5) items described the capability development values in their organization.

From Table 4-8 *correlations,* the *r*=.137 with the *p* value as .031, which confirms there is no correlation between empowerment and organizational innovation.

From Table 4-10 *coefficients,* the significant value is 0.999, which is more than 0.05, which shows this variable is not making a significant unique contribution to the prediction of innovation.

Hypothesis 4: There is a significant correlation between creating change and organizational innovation

This hypothesis examined whether or not there is a significant correlation between creating change and organizational innovation. The

hypotheses was tested by analyzing data taken from the completed questionnaire, where respondents were asked to identify the degree to which five (5) items described the creating change values in their organization.

From Table 4-8 *correlations,* the *r*=.263 with the *p* value as .000, which confirms there is a significant correlation between creating change and organizational innovation.

However from Table 4-10 *coefficients,* the significant value is 0.015, which is less than 0.05, which shows this variable is making a significant unique contribution to the prediction of innovation.

Hypothesis 5: There is a significant correlation between customer focus and organizational innovation

This hypothesis examined whether or not there is a significant correlation between customer focus and organizational innovation. The hypotheses was tested by analyzing data taken from the completed questionnaire, where respondents were asked to identify the degree to which five (5) items described the customer focus values in their organization.

From Table 4-8 *correlations,* the *r*=.206 with the *p* value as .001, which confirms there is a significant correlation between customer focus and organizational innovation.

However from Table 4-10 *coefficients,* the significant value is 0.242, which is more than 0.05, which shows this variable is not making a significant unique contribution to the prediction of innovation.

Hypothesis 6: There is a significant correlation between organizational learning and organizational innovation

This hypothesis examined whether or not there is a significant correlation between organizational learning and organizational innovation. The hypotheses was tested by analyzing data taken from the completed questionnaire, where respondents were asked to identify the degree to which five (5) items described the organizational learning values in their organization.

From Table 4-8 *correlations,* the *r*=.237 with the *p* value as .000, which confirms there is a significant correlation between organizational learning and organizational innovation.

However from Table 4-10 *coefficients,* the significant value is 0.062, which is more than 0.05, which shows this variable is not making a significant unique contribution to the prediction of innovation.

Summary of Research Results

The primary purpose of this chapter was to report the results of the major hypotheses testing. Prior to presenting the results of each hypothesis, socio-demographic analysis was conducted in the study. Regarding type of organization, 66.3% (n=165) were from local organization, whereby there were 33.7% (n=85) from multinational company. In addition, 72.7% (n=181) were responsible for the functional roles in their organization and 27.3% (n=68) were in sales / marketing / customer service. On the other hand, for type of industry, 54.5% (n=136) were involved in services, pharmaceutical / medical device and manufacturing and 45.4% (n=113) were from education, banking, government / government agency and NGO.

A correlation analysis was also conducted between organizational culture and innovation. Hypothesis 4 was accepted whereas Hypothesis 1, Hypothesis 2, Hypothesis 3, Hypothesis 5 and Hypothesis 6 were rejected. This shows creating change makes the strongest unique contribution to explaining the innovation.