

CHAPTER 4: RESEARCH RESULTS

4.1 INTRODUCTION

This chapter presents the findings of this study, which answered the research objectives and questions described in Chapter 1. This chapter explains the summary statistics, the descriptive analysis and the reliability and validity analysis. The results are discussed at the end of this chapter.

4.2 DATA OVERVIEW

The invitation email with the survey URL were sent to 500 email addresses, but 31 of the email addresses turned out to be invalid. The remaining 469 recipients yielded 185 responses. The response rate (39.4%) is relatively high due to ease of completing the survey; the recipients only have to click the URL provided and fill up the online survey before submitting.

Since the online survey cannot be submitted if there are still unanswered questions, all of the 185 responses received were complete. However after further examination, 2 responses were from companies which are no longer defined as SME, since they have exceeded the number of employees and the yearly revenues.

On the other hand, although the survey was posted to 200 addresses via mail, only 31 responses were received from the invited respondents. The low response rate (15.5%) is perhaps due to invalid addresses. There is also the possibility of undelivered or unopened mails. The low response rates could also be explained by the growing trend that people are reluctant to respond to random questionnaire survey (Bryman, 1989). Moreover, if they chose not to do the online version, it might be troublesome for the recipients to return the answered survey via post.

As described in the data collection procedure, another 93 responses were then collected in person by interviewing SMEs in the Klang Valley. Each of the response received was also screened for incomplete responses or other errors.

Therefore, a total of 183 useful responses were collected online, 31 were collected through mail, and 93 were collected in person. The total number of useable responses is 307, as shown in the summary below (Table 4.1):

Table 4.1: Survey Collection Method

Data Collection Method	Respondents Targeted	Response	Response Rate	Useable Response
Email	500 (469 valid)	185	39.4%	183
Mail	200	31	15.5%	31
In Person		93	100%	93
Total Usable Responses:				307

In order to assess the differences between the three samples, t-tests were conducted using key variables such as the number of employees, and yearly revenue, and e-commerce adoption levels. It was found that no significant difference between the three samples and so they were all combined to make a single sample, which comprises 307 respondents.

4.3 SUMMARY STATISTICS

4.3.1 Respondents Profile

Table 4.2: Demographic Profile of the Respondents

Characteristics	Frequency	Percentage (%)
Gender		
Female	111	36.2
Male	196	63.8
Age		
21 - 30 years old	74	24.1
31 - 40 years old	130	42.3
41 - 50 years old	73	23.8
above 50 years old	30	9.8
Education Level		
Secondary or lower	13	4.2
Diploma / Certificate	51	16.6
Bachelor's Degree / Professional	183	59.6
Post Graduate Degree	60	19.5
Current Position In Company		
Executive	83	27.0
Manager	88	28.7
Senior Manager	42	13.7
Top Manager / Director	94	30.6

Table 4.2 shows a summary the respondents' demographic profile. Out of 307 respondents, 63.8% are male, while the rest (36.2%) are female. This is expected since in Malaysia, a larger percentage of males hold higher positions within most companies, especially in SMEs.

Most of the respondents are between of 31 to 40 years old (42.3%). Only 30 respondents (9.8%) are above 50 years old. The rest of the respondents are distributed almost equally in the 21 to 30 years old group (24.1%) and the 41 to 50 years old group (23.8%)

In terms of education level, most of the respondents have bachelor's degree or equivalent certifications (59.6%). This is followed by post-graduate level (19.5%) and diploma level (16.6%). Only 4.2% have education up to secondary school or lower. Most of the respondents are very well educated, since 79.1% are at the bachelor's degree level or higher. This is expected since this study involves respondents who hold executive positions or higher.

The respondents are from a wide range of positions within their companies. Most of them (30.6%) hold the top positions, either top manager or director, in their respective companies. This group also includes respondents who are actually the owners of the business. The rest of the respondents hold positions at the executive level (27.0%), manager level (28.7%) and senior manager level (13.7%) in their companies. Since responses that came from non-executive

respondents have been filtered out beforehand, it is expected that all of the remaining data is from respondents who are at least at the executive level. The corresponding positions reflect that the respondents are involved in making relatively key decisions within their organization to a certain extent.

4.3.1 Company Profile

Table 4.3: Profile of the Company

Characteristics	Frequency	Percentage (%)
Type of Industry		
Manufacturing	105	34.2
Services	202	65.8
Total Number of Employees		
Manufacturing:		
1 – 4	28	9.1
5 – 50	36	11.7
51 – 150	41	13.4
Services:		
1 – 4	48	15.6
5 – 19	48	15.6
20 – 50	102	33.2
Yearly Revenue		
Manufacturing:		
Less than RM250,000	35	11.4
RM250,000 – less than RM10 million	41	13.4
RM10 million – less than RM25 million	29	9.4
Services:		
Less than RM200,000	63	20.5
RM200,000 – less than RM1 million	52	16.9
RM1 million – less than RM5 million	86	28.0

As described in the data collection section of this paper, not all of the responses came from businesses which fit the definition of SME. After the non-SMEs were filtered out, final data comprises of 307 SMEs, as shown in Table 4.3.

Out of 307 SMEs that were involved in the survey, 202 businesses came from the services sector. The rest (105 businesses) came from the manufacturing sector. It should be noted that although more SMEs from the service sector were involved in this study (65.8%), the percentage of the services sector still did not reflect the actual scenario in Malaysia, where the services sector apparently makes up 86.5% of total Malaysian SMEs.

Out of all the SMEs that were involved in the survey, 13.4% are in the manufacturing sector with 51 to 150 employees, 11.7% are in manufacturing sector with 5 to 50 employees, and only 9.1% are in manufacturing sector with 1 to 4 employees. Of all the SMEs, 33.2% of them are in the services sector with 20 to 50 employees. The rest are equally divided (15.6% each) into the 1 to 4 employees group and the 5 to 19 employees group, in the services sector.

In term of yearly revenues, most of the manufacturing SMEs are collecting yearly revenues in the range of RM250,000 to less than RM10 million (13.4%). On the other hand, most of the SMEs in the services sector have yearly

revenues between RM1 million to less than RM 5million (28.0%). Only 9.4% of the companies in the data have revenues more than RM10 million per year.

4.4 DESCRIPTIVE ANALYSIS

Table 4.4 presents the mean and standard deviation for the responses on the eight independent variables and the depending variable. The cut-off point for agreement level is 3.5000.

Table 4.4: Descriptive statistics of research variables

Research Variables	Mean	Standard Deviation
Technological Context		
Perceived Relative Advantage	5.481	1.532
Perceived Compatibility	5.055	1.648
Perceived Complexity	2.946	1.605
Organisational Context		
E-commerce Knowledge and Expertise	4.764	1.679
Management Attitude towards E-commerce	4.809	1.765
Environmental Context		
External Change Agents	3.809	1.622
Pressure from Trading Partners	3.439	1.660
Pressure from Competitors	4.539	1.755
E-commerce Adoption	4.463	1.739

The mean score for perceived relative advantage is at 5.481 out of 7, which is the highest mean score among all variables. This result indicates that on

average the respondents tend to agree that e-commerce provide relative advantages, if adopted within their organization.

The second highest mean score is perceived compatibility, with a mean of 5.055. This shows that on average, the respondents have the perception that e-commerce is compatible with their nature of work, culture, values and preferred work practice.

On the other hand, perceived complexity mean is low (2.946). This indicates that the respondents do not agree that e-commerce is complex. On average, the respondents perceive e-commerce is easy to be deployed, easy to be used, not difficult to learn, and does not take a long time to be implemented successfully.

On average, the respondents concurred that they have high organisational readiness in terms of expertise, knowledge and attitude. This is reflected by the high means in both e-commerce knowledge and expertise (4.764) and management attitude towards e-commerce (4.809).

In terms of environmental context, the external change agents recorded a mean score of 3.809. The pressure from trading partners has a mean of only 3.439, while pressure from competitors has mean score of 4.539. This shows that among all environmental factors, competitive pressure is the most felt by the

respondents. This is perhaps due to the nature of competition between SMEs in most industries.

The dependent variable, e-commerce adoption, has a mean score of 4.463 across its 6 items. In order to understand the state of e-commerce adoption among Malaysian SMEs, further descriptive analysis was done on each of the e-commerce adoption items, as shown in Table 4.6.

Table 4.5: Descriptive statistics of e-commerce adoption items

Items in E-commerce Adoption Variable	Mean	Standard Deviation
1. Website	4.29	2.203
2. Email	5.52	1.909
3. Online Marketing	4.52	2.133
4. Online Sales	4.46	2.201
5. Online Payments	4.28	2.274
6. Online Purchases	3.70	2.145
E-commerce Adoption	4.463	1.739

As illustrated in Table 4.5, email usage scored the highest mean (5.52), indicating that SMEs tend to agree that they use email extensively to communicate with customers and vendors. On the other hand, online purchases scored the lowest mean. SMEs tend to disagree that online purchased (3.70) are conducted extensively.

It is interesting to note that, in average, the mean score of having a website (4.29) is lower than online marketing (4.52) and online sales (4.46) activities. This indicates that activities like marketing and sales were done, even by SMEs that do not have websites. Possible avenues for such activities are external websites like online directories and marketplace, and also third party platforms like Facebook.

4.3 RELIABILITY AND VALIDITY

The constructs reliability was assessed using Cronbach's alpha. Cronbach's coefficient alpha is an indication of the average correlation among all of the items that make up the scale. Values range from 0 to 1, with higher values indicating greater reliability. In this study, 31 items that make up the 8 constructs were tested for their reliability.

Table 4.6: Reliability Analysis of Research Variables

Research Variables	Number of Measures	Cronbach's Alpha
Technological Context		
Perceived Relative Advantage	5	0.959
Perceived Compatibility	4	0.961
Perceived Complexity	4	0.933
Organisational Context		
E-commerce Knowledge and Expertise	4	0.927
Management Attitude towards E-commerce	4	0.955
Environmental Context		
External Change Agents	4	0.858
Pressure from Trading Partners	3	0.845
Pressure from Competitors	3	0.912

Table 4.6 shows the component and total reliabilities of the 8 constructs. The reliability scores are consistently high in all dimensions. For the constructs within the technological context, the Cronbach's alpha for perceived relative advantage is 0.959, for perceived compatibility is 0.961, and for perceived complexity is 0.933.

As for the organisational context, the Cronbach's alpha coefficient for e-commerce knowledge and expertise is 0.927, while for management attitude towards e-commerce is 0.955. Finally, for environmental context items, the Cronbach's alpha coefficient for external change agents is 0.858, for pressure from trading partners is 0.845, and for pressure from competitors is 0.912.

Nunnally (1978) suggested that the minimum acceptable alpha for scale reliability is 0.70. Therefore, all of the Cronbach's alpha scores for the constructs in the survey are well above the acceptable point. This shows that all of the 31 items that were used to represent the 8 constructs in this study are reliable.

4.5 TESTING OF HYPOTHESES

In order to test the hypotheses, two sets of analyses were conducted: correlation-based analysis (refer to Table 4.7) and regression-based analysis (refer to Table 4.8 and 4.9), and both are presented and discussed below.

4.5.1 Pearson Product-Moment Correlation

The relationship between variables was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity.

Table 4.7: Summary of Pearson Product-Moment Correlation Coefficients

	RA	Cp	Cx	KE	MA	ECA	PTP	PC	EA
RA		0.888	-0.474	0.627	0.728	0.525	0.367	0.591	0.719
Cp			-0.464	0.707	0.792	0.579	0.424	0.576	0.757
Cx				-0.522	-0.447	-0.254	-0.065	-0.282	-0.461
KE					0.792	0.581	0.383	0.571	0.700
MA						0.636	0.447	0.570	0.748
ECA							0.638	0.575	0.618
PTP								0.402	0.395
PC									0.502
EA									

RA=Perceived Relative Advantage, Cp=Perceived Compatibility, Cx=Perceived Complexity, KE=E-commerce Knowledge and Expertise, MA=Management Attitude towards E-commerce, ECA=External Change Agents, PTP=Pressure from Trading Partners, PC=Pressure from Competitors, and EA=Ecommerce Adoption.

This analysis has provided support for all the hypotheses as the result shows that all the eight variables (RA, Cp, Cx, KS, MA, ECA, PTD, and PC) have meaningful linear relationships with the e-commerce adoption variable. As expected, apart from perceived complexity, all of other seven the variables have positive relationships with e-commerce adoption.

The strongest correlation is between the perceived relative advantage (RA) and perceived compatibility (Cp) (0.735), which means high levels of perceived compatibility are associated with higher levels of perceived relative advantage.

4.5.2 Multiple Regression

Multiple regression analysis was used to examine how well each of the determinants individually predicts e-commerce adoption. The adjusted R-square value offers noteworthy insight based on the overall ability of the dimensions to explain the variation in the score of e-commerce adoption. Table 4.8 shows the multiple regression analysis between the eight factors and e-commerce adoption.

Table 4.8: Regression Output on Independent Variables

No	Hypothesis	Standardized Coefficient (β)	t-value	Sig.
	Technological Context			
H1	Perceived Relative Advantage	0.193	2.579	0.010 (p<0.05)
H2	Perceived Compatibility	0.210	2.542	0.012 (p<0.05)
H3	Perceived Complexity	-0.063	-1.559	0.120 (p>0.05)
	Organisational Context			
H4	E-commerce Knowledge and Expertise	0.171	2.865	0.004 (p<0.05)
H5	Management Attitude towards E-commerce	0.194	2.931	0.004 (p<0.05)
	Environmental Context			
H6	External Change Agents	0.216	4.153	0.000 (p<0.05)
H7	Pressure from Trading Partners	-0.031	-0.703	0.482 (p>0.05)
H8	Pressure from Competitors	-0.071	-1.565	0.119 (p>0.05)

Std. Error of Estimate = 1.00050
 R^2 = 0.678 Adjusted R^2 = 0.669

Table 4.9: Regression Analysis of Variance

Model	Sum of Squares	Df	Mean Square	F value	Sig.
Regression	627.133	8	78.392	78.313	0.000 (p < 0.001)
Residual	298.297	298	1.001		

The first hypothesis (H1) tests the relationship between perceived relative advantage and e-commerce adoption. From the multiple regression analysis, the standardized coefficient (β) between perceived relative advantage and e-commerce adoption is 0.193 and the p-value is 0.010, which is significant at α equals to 0.05. This means that perceived relative advantage makes a contribution in predicting e-commerce adoption, when the variance explained by all other variables in the model is controlled for. This is also supported with its p-value, which is less than 0.05. Thus, the result provides support for H1.

The second hypothesis (H2) tests the relationship between perceived compatibility and e-commerce. The standardized coefficient (β) between perceived compatibility and e-commerce adoption is 0.210 and the p-value is 0.012, which is less than α at 0.05. This means that perceived compatibility makes a unique contribution in predicting e-commerce adoption, when the variance explained by all other variables in the model is controlled for. Therefore, H2 is also supported by the results.

Hypothesis 3 (H3) tests the relationship between perceived complexity and e-commerce adoption. As shown in the table, the standardized coefficient (β) - 0.63 and the p-value is 0.120, which is more than α at 0.05. This means that tangibility does not make a significant unique contribution to the prediction of satisfaction. Hence, the result does not provide support for H3.

The fourth hypothesis (H4: e-commerce knowledge and expertise is correlated to e-commerce adoption) was supported. The standardized coefficient (β) between the two variables is 0.171 and the p-value is 0.004, which is less than α at 0.05. This means that e-commerce knowledge and expertise make a strong unique contribution in predicting e-commerce adoption as well, and therefore H4 is supported.

The fifth hypothesis (H5) states the correlation between management's attitude towards e-commerce and its adoption. The standardized coefficient (β) between the two variables is 0.194 and the p-value is 0.004, which is less than α at 0.05. This shows that e-commerce knowledge and expertise make a strong unique contribution in predicting e-commerce adoption as well. Hence, H5 is also supported by the results.

The sixth hypothesis (H6), which postulates that the existence of external change agents is correlated to e-commerce adoption, is also supported. As shown in the table, the standardized coefficient (β) is 0.216 and the p-value is

0.000, which is less than α at 0.05. This means that external change agent makes the strongest unique contribution in predicting e-commerce adoption, as compared to other factors. Therefore, H6 is supported.

The final two hypotheses test the how the e-commerce adoption variable is dependent on pressure from trading partners (H7) and pressure from competitors (H8). The standardized coefficients (β) are -0.031 and -0.71 respectively. The p-values are 0.482 and 0.119, both of which are more than 0.05. This means that both pressure from trading partners and pressure from competitors do not make significant unique contributions to the prediction of e-commerce adoption. Hence, neither H7 nor H8 were supported by the results.

In short, external change agents and perceived compatibility are the two most important factors that affect the e-commerce adoption variable. This is followed by management attitude towards e-commerce, perceived relative advantage, and finally e-commerce knowledge and expertise. On the other hand, the other three factors (perceived complexity, pressure from trading partners, and pressure from competitors) do not make significant contribution to the model.

In total, five of the hypotheses were supported by the results, while the other three were rejected. The summary of the hypotheses results in this study is shown in Table 4.10.

Table 4.10: Summary of Hypotheses Results

No	Hypothesis	Conclusion
	Technological Context	
H1	Perceived relative advantage is positively related to adoption of e-commerce.	Supported
H2	Perceived compatibility is positively related to adoption of e-commerce.	Supported
H3	The perceived complexity is negatively related to adoption of e-commerce.	Rejected
	Organisational Context	
H4	E-commerce knowledge and expertise is positively related to adoption of e-commerce.	Supported
H5	Management attitude towards e-commerce is positively related to adoption of e-commerce.	Supported
	Environmental Context	
H6	External change agent is positively related to adoption of e-commerce	Supported
H7	Pressure from trading partners is positively related to adoption of e-commerce.	Rejected
H8	Pressure from competitors is positively related to adoption of e-commerce.	Rejected

4.6 DISCUSSION OF RESULTS

The results in this study demonstrated that although most of the SMEs in Malaysia have adopted some form of e-commerce application, most of them have only implemented basic e-commerce applications such as website and email. The SMEs do some form of online marketing and online selling, but not extensively. Furthermore, they do not engage in extensive online purchases or any form of online payments.

In general, the results highlighted that the adoption level of e-commerce is still considerably low among Malaysian SMEs. These findings matched the results in other similar studies conducted by Sulaiman (2000), Khatibi et al. (2003), and Liew, V. K. (2004) on Malaysian SMEs.

Based on the regression analysis, five of the independent variables (namely: perceived relative advantage, perceived compatibility, perceived complexity, e-commerce knowledge and expertise, management attitude towards e-commerce, environmental context, external change agents, pressure from trading partners, and pressure from competitors) were found to be statistically significant determinants of adopting e-commerce.

Of all the factors, the two most significant factors are: external change agent ($\beta=0.216$) and perceived compatibility ($\beta=0.210$).

External change agents among SMEs play a big role in determining e-commerce adoption. This finding is consistent with past studies (e.g. Chwelos et al, 2001; Iacovou et al, 1995) that discovered external pressures, including from the government, were significant determinants of e-commerce adoption. External change agents, such as the government, advisors, external consultants and e-commerce solution providers, play a vital role in determining whether the SME adopts e-commerce.

Perceived compatibility of the SMEs towards e-commerce was also found to be a strong factor in adoption. This finding is consistent with past research that showed the organisation's culture, values and preferred work practices were correlated with e-commerce adoption (Grandon et al., 2003). Other past studies have also highlighted the role played by national culture (Gefen et al., 2006) and organization culture (Gibbs et al, 2003) in the implementation of e-commerce technologies. This is expected since if the technology is not compatible with the SMEs, the adoption cannot be implemented successfully, or would not be initiated at all in the first place. As concluded by Saffu et al. (2008), this suggests that the SMEs that wish to adopt e-commerce in their organisations must ensure that there is alignment between the culture in the organisations, the infrastructure and e-commerce.

Apart from the two significant factors above, perceived relative advantage ($\beta=0.194$) and management attitude towards e-commerce ($\beta=0.193$) are also found to be significant in determining e-commerce adoption among SMEs.

The significance of perceived relative advantage is supported by past studies. Davis et al. (1989) found perceived relative advantage underpinned the SME intention to adopt e-commerce. Similarly, Grandon and Pearson found perceived usefulness to be a significant factor towards e-commerce adoption among SMEs. Manager will only adopt e-commerce if they can see the potential relative advantage that they can gain from it. It is safe to assume that only adopters can find e-commerce advantageous, while non-adopters may find it non-advantageous for their organization.

Since the focus of this study was more towards Business-to-Consumer (B2C), it is expected that pressure from trading partners is not one of the significant factors adopting e-commerce. Unlike larger companies, SMEs are not typically involved in Business-to-Business (B2B) activities, and therefore do not have many trading partners such as distributors or other intermediaries. Even if they do, they are not as dependent on the partners, as much as larger companies are. This might explain why the pressure from such partners is not significant for Malaysian SMEs in incorporating e-commerce.

From the three contexts (namely technological, organizational, and environmental) involved in this study, only the organizational context had all of its factors to be significant in contributing towards e-commerce adoption in this study. In the past, the results of organizational context such as organizational readiness were varied. For instance, readiness was not significant in the USA (Grandon and Pearson, 2004), but was significant in Ghana (Saffu et al., 2008). As explained by Saffu et al., this inconsistency may be explained by the difference in the availability of resources at the firm level.

4.8 CONCLUSION

This chapter presented the statistical results of this study. The next chapter will summarize the conclusions that can be drawn from this research.