4. RESEARCH RESULTS

There were 99 valid responses and their data was coded and analysed using statistical software called SPSS version 7.5. The research variables were subject to validity and reliability test to make sure that they measured what they supposed to measure. The characteristics of the sample was tabulated and displayed. The relationships between groups or variables were then analysed. The hypothesis testing involved the use of bivarate analysis - t-test and Pearson correlation, discriminant analysis for the likelihood of Internet adoption and multiple regressions for the extent of using Internet.

4.1 Instrument Validation

Attitude measures such as the research variables in this study, must be both accurate and useful (David, 1995, pp. 277). The factor analysis was first used to test the construct validity - whether the measures confirmed the hypothesis generated from the theory based on the concepts. Reliability test was then used to test the internal consistency of the measures.

4.1.1 Factor Analysis

Factor analysis was used to test whether the items were tapping into the same construct as described follows:-

4.1.1.1 Perception Towards Internet

Table 4-1 shows the factor analysis for the variable: perception towards Internet. All the items (16) were extracted using Principal components and no further rotation was required. There were five factors which showed Eignevalue of more than 1.0. the total percentage of variance explained by these five factors was 66.4%.

Table 4-1 Factor Analysis - Perception Towards Internet

	Perception Toward Internet (N=99)	(1)	(2)	(3)	(4)	(5)
1	Enhance the corporate image	.467				
2	Increase sales	.527				
3	Develop new business opportunities - local and export	.661				
4	Obtain first hand knowledge about customer needs	.585				
5	Establish stronger relationships with customers and suppliers	.644				
6	Reduce cost for marketing and products promotion	.712				
7	Reduce cost for customer support and communication	.699				
8	Reduce cost for market research	.683				
9	Improve communication among employees and branches	.598				
10	Increase the number of choices for suppliers/service providers	.658				
11	There is support from the top management for the use of Internet		.581			
12	The staff will welcome the adoption of Internet by the organisation	.561				
13	Internet use for business is part of the business plan	.553				
14	It is possible to try out one Internet application first before committing more resources for other Internet applications	.469		.444		
15	There are companies which have successfully adopted Internet				.628	
16	The Internet is not difficult to learn and use					.577

Extraction Method: Principal Component Analysis. 5 components extracted.

All factor loading were more than 0.5 except item 14 which was marginally less than 0.5. According to James (1995), factor loading of 0.4 was important and could be included for further analysis although 0.5 was proposed by Nunnally (1978). It was decided to include as it was the only item that measured the attribute "trialability". As a result, the five factors which represents the five attributes of perception - relative advantage (1-10), compatibility (11-13), trialability (14), observability (15) and ease of use (16), were well measured by these items.

4.1.1.2 Information Need, Competition and Staff Internet Knowledge

These three research variables were each measured by three items and were extracted using Principal components. The factor analysis showed that only one factor with eigenvalue of more than 1.0 for each of the research variable. Table 4-2 shows the factor loading of the items for each research variables. The total percentage of variance explained by the items for information need (86.37%), competition (81.33%) and staff Internet knowledge (53.99%) respectively. All other factors showed factor loading of at least 0.5 and were used in further analysis. Thus the measuring items were well constructed.

Table 4-2 Factor Analysis - Information Need, Competition and Staff Internet Knowledge

	Information Need (N=99)	(1)
1	My organisation requires up-to-date information constantly	.894
2	Having access to relevant and reliable information is important to my organisation	.943
3	It is important for my organisation to access the desired information fast whenever is required	.950
	Competition (N=99)	(1)
4	The competition among companies in our industry is intense	.918
5	There are many companies offering similar products/services	.928
6	Customers can easily switch to other companies product/services	.858
	Level of Staff Internet Knowledge (N=80)	(1)
7	Most of the staff know how to use Internet	.730
8	There is at least one staff who is an expert in Internet	.651
9	The staff is better in Internet compared to others in same industry	.814

Extraction Method: Principal Component Analysis. 5 components extracted.

For subsequent statistical analysis, the score for each variable was the total of score of the items assigned to measure the variable. For example, the score of the variable "perception" is the sum of the items - 1 to 16 (Table 4-1).

4.1.2 Reliability Test

To determine whether a measure is reliable, each of the composite research variable - perception, information needs, competition, staff Internet knowledge, was subject to reliability test for internal consistency as shown in Table 4-3 below.

Table 4-3 Reliability Test - Cronbach Alpha

No	Variable	Internet Users (N=80)		Non-Users Internet (N=19)		Reliability Cronbach Alpha
		Mean	Std Dev	Mean	Std Dev	
1	Perception towards Internet (16 items)	65.03	7.87	60.95	5.88	0.8575
2	Information need (3 items)	12.55	2.79	13.00	2.05	0.9192
3	Competition (3 items)	11.89	3.11	11.05	3.08	0.8815
4	Staff Internet Knowledge (3 items)	10.51	2.31			0.5577

All the reliability coefficients were at least 0.70, except for the variable "staff Internet knowledge". This indicates that the research variable: perception towards Internet, Information need, and competition were reliable and would be used for subsequent analysis. (Nunnally 1978 and James 1995). The variable - level of staff Internet knowledge was not reliable and thus was excluded from subsequent analysis.

4.2 Characteristics of Organisations

There were 99 respondents and majority of them used Internet (81%). This result was expected as there were more responses from the web-based survey than the traditional method. Nevertheless, the data shows some interesting information and their characteristics are shown in Table 4-4.

64% of the organisations were from the non-manufacturing background and from the Klang valley (66.7%). Most of them were owned by Malaysian (70.7%) and had been established for more than 10 years (53.5%). In terms of number of employees, majority of them (53.5%) employed 100 or less employees and thus were classified as small and medium enterprise as defined in chapter two. The distribution of the annual turnover is more even with 49% achieved more than RM35 million sales annually.

Majority of them (53.5%) targeted their products or services primarily to organisations. The respondents were quite export orientated as 48.5% of them sold their products or services to regional or international countries. In terms of distribution methods, 70% of the organisations sold direct to their customers and this indicates that direct marketing was widely accepted by the business community.

Many of them (52.5%) had internal IS department but since there was no further investigation on its structure and number of support staff, the size and the effectiveness of the IS department could not be analysed.

In terms of the position held in the organisations, most of respondents were from the middle (55.6%) and top management (21.2), giving further confidence about the representativeness of the respondents in regards to their organisations.

Table 4-4 Characteristics of Organisations

		Non-Internet Users (N=19)		Internet Users (N=80)		Total (N=99)	
		Count	%	Count	%	Count	%
Industry	Manufacturing	8	42.1	27	33.8	35	35.4
	Non-manufacturing	11	57.9	53	66.3	64	64.6
Years	10 or less	11	57.9	35	43.8	46	46.5
	More than 10	8	42.1	45	56.3	53	53.5
Number of Employee	Below 10	3	15.8	8	10.0	11	11.1
	10 to 50	9	47.4	19	23.8	28	28.3
	51 to 100	2	10.5	12	15.0	14	14.4
	More than 100	5	26.3	41	51.3	46	46.5
Firm Size	Small	12	63.2	27	33.8	39	39.4
	Medium	2	10.5	12	15.0	14	14.1
	Large	5	26.3	41	51.3	46	46.5
Sales (RM million)	Below 5	5	26.3	12	15.0	17	17.2
	5 to 10	3	15.8	9	11.3	12	12.1
	11 to 35	5	26.3	13	16.3	18	18.2
	36 to 50	2	10.5	10	12.5	12	12.1
	51 to 100			12	15.0	12	12.1
	More than 100	3	15.8	22	27.5	25	25.3
	Not sure	1	5.3	2	2.5	3	3.0
Customers	Individual	10	52.6	13	16.3	23	23.2
	Organization	4	21.1	49	61.3	53	53.5
	Both and others	5	26.3	18	22.5	23	23.2
Sales Area	Local	14	73.7	37	46.3	51	51.5
	Regional	3	15.8	17	21.3	20	20.2
	Global	2	10.5	26	32.5	28	28.3
Distribution Channel	Distributor	7	36.8	30	37.5	37	37.4
	Wholesaler	5	26.3	15	18.8	20	20.2
	Retailer	5	26.3	16	20.0	21	21.2
	Direct	12	63.2	57	71.3	69	69.7
	Others			6	7.5	6	6.1
Internal IS	No	128	63.2	35	43.8	47	47.5
	Yes	7	36.8	45	56.3	52	52.5
Ownership	Malaysian	14	73.7	56	70.0	70	70.7
	Foreigner	5	26.3	23	28.8	28	28.3
	both			1	1.3	1	1.0
Location	Klang Valley	11	57.9	55	68.8	66	66.7
	Northern	5	26.3	16	20.0	21	21.2
	Southern	1	5.3	1	1.3	2	2.0
	More than one state	2	10.5	8	10.0	10	10.1
Position	Top	3	15.8	18	22.5	21	21.2
	Middle	12	63.2	43	53.8	55	55.6
	Executive	4	21.1	8	10.0	12	12.1
	Professional			11	13.8	11	11.1

4.2.1 Perception Towards Internet

Table 4-5 below shows the perception of the organisation towards Internet. The count and the correspondent percentage value indicates the number of organisations who agreed or strongly agreed with the statements associated with the variable.

Table 4-5 Perception Towards Internet

			(N=99)	
No	**Items**	**Mean**	**Count**	**%**
1	Enhance the corporate image	4.30	87	87.9
2	Increase sales	3.88	72	72.7
3	Develop new business opportunities - local and export	4.18	80	80.8
4	Obtain first hand knowledge about customer needs	4.02	73	73.7
5	Establish stronger relationships with customers and suppliers	3.88	68	68.7
6	Reduce cost for marketing and products promotion	3.74	61	61.7
7	Reduce cost for customer support and communication	3.74	60	60.6
8	Reduce cost for market research	3.69	61	61.6
9	Improve communication among employees and branches	4.07	77	77.7
10	Increase the number of choices for suppliers/service providers	3.85	64	64.7
11	There is support from the top management for the use of Internet	4.14	80	80.8
12	The staff will welcome the adoption of Internet by the organisation	4.17	85	85.8
13	Internet use for business is part of the business plan	4.02	76	76.7
14	It is possible to try out one Internet application first before committing more resources for other Internet applications	3.93	75	75.7
15	There are companies which have successfully adopted Internet	4.22	84	84.9
16	The Internet is not difficult to learn and use	4.41	92	92.9

Overall, the organisations had highly positive perception about the use of Internet for business. All the items associated with the perception shows above 60% agreement. In particular, 93% of the organisation found the Internet easy to learn and use. The results may imply that many organisations perceived little difficulties in Internet and complexity should not impose any barriers to the adoption or usage of Internet. However, this may be also due to the high percentage of them were Internet users.

On the other hand, organisations also rated highly about the capability of Internet usage in improving their corporate image (87.9%) and in developing new business in both local and export (80.8%). In addition, the use of Internet was seen to be compatible to their business strategy (76.7%) and well supported by both the management and staff (80.8 and 85.8%).

The success story of other organisations in the use of Internet has also been well observed and received by the respondent organisations (85%). This may be due to the media publicity and Government initiative to promote the use of Internet in the local business community.

However, the organisations were less likely to perceive the relative cost saving over existing practices in terms of promotion and advertisement, customers service and market research. This implies that the cost savings associated with the use of Internet may not be easily understood by the business and may require more education and promotion by the vendor and the consultants as well as efforts from Government. It could also be that the perceived cost savings is overshadowed by the initial outlays required to make these cost savings possible.

Overall, the above results is consistent with the sentiments of the organisation as measured by question 14 in which the organisations were asked the possibility of adopting or using more of Internet. Table 4-6 below shows that about 82% of the organisations were more likely to adopt or use more of the Internet despite the problems and concerns which would be discussed in later section.

Table 4-6 Possibility of Adopting and Using More of Internet in the Near Future

No		Count	%
1	Most Probably	46	46.5
2	Probably	35	35.4
3	Not Sure	10	10.1
4	Probably Not	3	3.0
5	Most Probably Not	5	5.1
	Total	99	100.0

4.2.2 Internet Usage Pattern of Organizations

Table 4-7 below shows the Internet usage pattern of the organisations. As expected, all of them had access to the Internet with the majority of them (45%) had the access for more than two years. Similarly, the e-mail facilities which was part of the Internet services were used by almost all the Internet users and not surprisingly majority of them (48%) also used the e-mail for more than two years. In contrast, not all the organisations (Internet users) had home page or web site. Only 68.8% of them reported to have web sites and majority of them (67.3%) had it for 2 years or less. This shows that Malaysian business were in fact quite slow in the use of Internet web site/home page as compared to other developed countries.

In terms of web site development, most of them (38.2%) outsourced it to vendors while 36.3% of them did it in-house. The organisations also reported that 18.2% of them actually had their internal staff working closely with the vendors to develop the web site. For the management and maintenance of the Internet applications, majority of them (75%) have assigned at least one staff for the purpose. This is in line with the results of the statement which says "Need additional staff to manage the Internet applications" of section D - 60.1% of respondent Internet users agree or strongly agree with the statement. The high percentage shows that the organisations indeed were highly committed in their Internet usage.

Unfortunately, the same commitment was not reflected in the training provided by the organisations as most of them (51.3%) did not provide any training to the employees even though most of them (56.3%) have an IS department (see Table 4-4). Similarly, not all of the employees of the organisations were allowed access to the Internet in the office. It was reported that only 17.3% of the organisations provided Internet access to all their employees. This shows that most of the organisations imposed tight control on Internet access by the employees and this may be due to some reports claiming staff were spending too much time surfing while working which may lead to low productivity.

Table 4-7 Internet Usage Pattern

		Count	%
Internet Access	Use	80	100
Length of use (N=80)	Less than 1 year	16	20
	1 to 2 year	28	35
	more than 2 years	36	45
Electronic Mail	Use	79	98.8
	Not use	1	1.2
Length of use (N=79)	Less than 1 year	14	17.8
	1 to 2 year	27	34.2
	more than 2 years	38	48.0
Web Site	Use	55	68.8
	Not use	18	22.5
	Intend to use	7	8.7
Length of use (N=55)	Less than 1 year	15	27.3
	1 to 2 year	22	40.0
	more than 2 years	18	22.5
Web Site Development (N=55)	In-house	20	36.3
	Outside Vendor	21	38.2
	Both	10	18.2
	Uncertain	4	7.3
Support Staff (N=80)	Only one	19	23.8
	More than one	41	51.2
	None or uncertain	20	25.0
Internet Training for employee (N=80)	No	41	51.3
	Yes	39	48.7
Employee Access to Internet (N=80)	All	17	21.3
	More than 50%	16	20.0
	50% or less	39	48.7
	None or uncertain	8	10.0

4.2.3 Internet Applications in Business Process

Table 4-8 below shows the applications of Internet in the business processes of the organisations. As can be seen from the table, the business process which shows the highest usage of Internet (78.8%) is the communication and file transfer. This is consistent with most researches that Internet is often used for communication and sharing of information (Cockburn, 1996; Christina et al, 1997; Paula et al, 1998)

Table 4-8 Business Use of Internet

		Count	% (N=80)
Marketing and Advertising	Publishing company information and the product/services offered	49	61.3
	Providing new services - e.g. search engines, Internet yellow pages, web hosting	18	22.5
Market Research	Researching on consumers preferences and competition	36	45.0
	Researching and evaluating new suppliers	30	37.0
Customer service and support	On-line help - FAQ, User manual	20	25.0
	Handling customers feedback/queries - email, on-line form	45	56.3
E-Commerce	Processing sales order from customers on-line	13	16.3
	Co-ordinating procurement with suppliers on-line	12	15.0
	Processing electronic payment or credit transaction on-line	7	8.8
Communication and other function	Communication and transferring files via e-mail, telnet	63	78.8
	Recruitment - advertising job vacancies	29	36.3
	Tracking incoming and outgoing goods delivery (shipment, courier service)	13	16.3

Ranked second (61.3%) is the use of Internet for providing company information and product/services offered. Followed closely is customer service and support that handle customer feedback and queries by means of e-mail and on-line fill in forms (56.3%). Market research is also another area which has seen high usage of Internet - 45% of respondent Internet users used Internet for market research on consumers and competition while 37.5% of the organisations use Internet for researching on suppliers. Other areas which have seen high applications of Internet were: Job advertisement, one-line help and providing new services.

As expected, there were very few applications of Internet for e-commerce applications. At present, most of the organisations were using Internet to process sales order (16.3%) and to co-ordinate procurement (15.0%). The use of Internet for on-line credit transactions was very low (8.8%). The same findings was also evident in the Jaring commerce directory mall in which there were only a few sites (about 10 sites) offering online shopping facilities, such as Malaysia Mall, Founder mall and some of them were only set-up less than a month at the time of writing. These sites provided facilities for ordering as well as payment, but mostly involved in collecting credit card information - either via the Internet or by fax/phone.

However, there appeared to be a growing interest in the local business community regarding e-commerce. And this is exactly what this survey has found - more than 30% of the organisations planning to use Internet for e-commerce in the next 12 month as shown in Table 4-9.

Table 4-9 E-Commerce - Planning to use within next 12 months

No		Count	%
1	Processing sales orders	28	35.0
2	Co-ordinating procurement	26	32.5
3	E-payment or on-line credit payment	31	38.8

This growing interest may be attributed to government's efforts in setting up MSC and the co-operations with international bodies such as United Nations (Computerworld, 1998) and APEC to facilitate and develop the e-commerce infrastructure in Malaysia. Furthermore, the decreasing prices of software and hardware, in addition to the increasing number of innovations developed to resolve the security issues, would motivate the organizations in Malaysia to use more Internet in their businesses.

4.3 Hypothesis Testing

With reference to chapter three, there were nine hypothesis to be tested. However, the hypothesis 5a was dropped because the variable - " staff Internet knowledge" failed the reliability test. Nevertheless, the rest of the hypothesis were tested in this section as they passed the validity and reliability test as shown in earlier section.

4.3.1 Likelihood of Internet Adoption

The dependent variable - the likelihood of Internet adoption, was hypothesised to have relationship with the independent variables: perception towards Internet, firm size, information need and competition. The hypothesis were 1a, 2a, 3a and 4a.

Pearson product-moment correlation coefficient was used to analyse the relationships between variables. In addition, the correlation matrix was used for examining the multicollinearity among the research variables (which is critical for multivariate regression analysis later).

Table 4-10 Pearson Correlation Matrix - Likelihood of Using Internet

Correlations[a]

		1	2	3	4	5	6	7	8	9	10
Pearson Correlation	Industry	1.000									
	Years	-.053	1.000								
	Firm Size	.031	-.462**	1.000							
	Sales Area	-.339**	.255*	-.271**	1.000						
	Internal IS	.101	.209*	-.602**	.113	1.000					
	Ownership	-.105	.124	-.087	.313**	.220*	1.000				
	Perception	.101	.091	-.122	.210*	.160	.140	1.000			
	Information need	-.070	.117	-.250*	.148	.144	.039	.328**	1.000		
	Competition	-.058	.226*	-.154	.171	.126	.001	.406**	.536**	1.000	
	LIKELIHOOD	.069	.112	-.197	.216*	.153	.040	.210*	-.067	.106	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Listwise N=99

The Pearson Correlation matrix for the Likelihood of using Internet and other research variables was shown above in Table 4-10. It was found that none of the squared coefficient was close to 0.8 to suggest a multicollinearity problem among the

research variables (Hair et al 1992 and James 1995). The correlation also showed that there is significant relationship ($p<0.05$) between the likelihood of using Internet and (1) Perception towards the use of Internet and (2) the sales area (local or export). In addition, there is also a marginal significant relationship ($p=0.0501$) between the likelihood of using Internet and Firm size.

For the hypothesis testing, t-test was used to analyze the relationships between the research variables and the dependent variable as the dependent variable was in nominal scale whereas the research variables were in interval scale.

Table 4-11 t-test

	Internet Users (N=80)		Non-Internet Users (N=19)		t-test	
	Mean	Std Dev	Mean	Std Dev	t-value	2-tailed sig.
Perception Towards Internet	65.03	7.87	60.95	5.88	-2.119	0.037*
Information Need	12.55	2.79	13.00	2.05	0.660	0.511
Competition	11.89	3.11	11.05	3.08	-1.054	0.295

The t-test results shows that there was a significant relationship between the likelihood of using Internet with the organization's perception towards Internet. As a result, the null hypothesis (1a) was rejected and the hypothesis 1a - the more positive the perception towards the Internet, the greater the likelihood of using Internet, was supported.

The other two variables - information need and competition which did not have a significant relationship with the likelihood of using Internet and thus hypothesis 3a and 4a were rejected. However, as shown in Pearson Correlation Matrix (Table 4-10), these two variables were significantly correlated with the perception towards Internet. Therefore, they may have indirect influence on the use of Internet through the perception towards Internet.

For the analysis of the relationship between the likelihood of using Internet and firm size, Chi-square analysis was used as both variables were nominal.

Table 4-12 Chi-square test - Likelihood and Firm Size

			Non-Internet Users	Internet Users	Total
Firm Size	Large	Count	5	41	46
		%[a]	26.3%	51.3%	46.5%
	Small and medium	Count	14	39	53
		%[a]	73.7%	48.8%	53.5%
Total		Count	19	80	99
		%[a]	100.0%	100.0%	100.0%

a. Pearson chi-square = 3.837, *sig (2 sided) =0.050

The Chi-square analysis (Table 4-12) shows that there was a marginally significant relationship between the likelihood of using Internet and firm size. As such, it appeared that the larger organizations were more likely to use Internet than the small and medium sized organizations hence the hypothesis 2a was supported.

The results were in fact consistent with the surveys by Yankee Group and Cahners in-Stat group in which they found that most SMEs in US were not taking advantage of the Internet and its commerce, despite the fact that SME was in a better position to capitalize the benefits of the Internet than the large business.

From the Pearson Correlation test (Table 4-10), there appeared to be a significant relationship between firm size and Internal IS. Therefore, chi-square analysis (Table 4-13) was used to analyze the relationship and found that large business were more likely to have internal IS than the SME. This shows that internal experts could be an important factor why SME was slow in adopting Internet for their business.

Table 4-13 Chi-square Test - Firm Size and Internal IS

			Internal IS		
			No	Yes	Total
Firm Size	Large	Count	7	39	46
		%	14.9%[a]	75.0%	46.5%
	Small and medium	Count	40	13	53
		%	85.1%	25.0%	53.5%
Total		Count	47	52	99
		%	100.0%	100.0%	100.0%

a. Pearson chi-square = 35.855, sig (2-sided) = 0.000

4.3.1.1 Discriminant Analysis

Discriminant analysis was used to test the effects to the likelihood of using Internet when the research variables were combined. It is the appropriate analysis since the dependent variable was nominal, i.e. Internet users or non-Internet users, and the independent variables were in interval scale.

The results shows a discriminant function with eigenvalues of 0.135 with canonical correlation of 0.345. This indicates that the functions accounted for only 13.5% of the between group variance explained by the within group variance which implies that there could be other important influencing factors not included in the function. However, the Wilks' Lambda was 0.881 and Chi-square value of 12.031 with significance of 0.017 which indicates that the model was significant.

Table 4-14 Discriminant Analysis - Likelihood of Using Internet

	Univariate F-Test	Significance	Standardized Canonical Coefficient	Structure Matrix : Pooled within group correlation
Perception towards Internet	4.492	0.037*	-0.662	-0.586
Information Need	0.436	0.151	0.797	0.547
Competition	1.110	0.295	-0.397	-0.291
Firm Size	3.911	0.051	0.654	0.182

*Sig at p<0.05

The results above (Table 4-14) shows similarity with the results of t-test and Chi-square test. However, in view of the low representation of the above model, the discriminant analysis was repeated to include more variables (
Table 4-15).

As a result, the eigenvalues obtained was 0.541 with canonical correlation of 0.592 and the Wilks' Lambda is 0.649 with Chi-square of 38.036 at significance of 0.004. Therefore, the model was statistical significance and the independent variables accounted for 54.1% of the discriminant score of the model.
Table 4-15 shows only the significance variables and their respective coefficient. The full result of the discriminant analysis is shown in the Appendix.

Table 4-15 Results of Discriminant Analysis - Significant Variables Only

	Univariate F-Test	Significance	Standardized Canonical Coefficient	Structure Matrix : Pooled within group correlation
Perception towards Internet	4.492	0.037*	-0.319	-0.293
Sales Area	4.755	0.032*	0.440	0.301
Customer - individual	12.617	0.001*	0.423	0.490
Customer - organization	10.867	0.001*	-0.401	-0.455
Firm Size	3.911	0.051	0.654	0.182

*Sig at p<0.05

The results shows that perception, firm size, sales area, customer orientation were significant variables in influencing the extent usage of Internet. The customer orientation - individual consumers or organisation were dummy variables and thus one would act in the opposite way of the other.

The actual signs of the coefficient are arbitrary. The negative coefficients for some variables could just be positive if the signs of the other coefficients were reversed (SPSS, 1994). As the results have shown, the coefficients of the variables - perception and customer (organisation) were negative while the firm size (1=SME), sales area (1=domestic) and customer (individual) were positive. In addition, as the t-

test have shown that the more positive the perception, the greater the likelihood of using Internet. So we can reverse the sign in this case.

As a result, besides positive perception, those organisations which were large and export orientated; had high perception toward Internet and target the organisations as their primary customers, were more likely to adopt Internet. The findings are consistent with the anecdotal evidence and John et al (1996)'s study that Internet can enhance the organisations' export business at relatively lower cost and wider reach. Furthermore, the results also provide evidence that Internet could be an ideal medium for business to business trade as well.

4.3.2 Extent of Using Internet for Business

The dependent variable, the Extent of Using Internet, was hypothesised to have relationship with the independent variables: perception towards Internet, firm size, information need and competition. The hypothesis developed were 1b, 2b, 3b and 4b.

Pearson product-moment correlation coefficient was used to analyse the relationships between variables. In addition, the correlation matrix was used for examining the multicollinearity among the research variables (which is critical for multivariate regression analysis later).

Table 4-16 Pearson Correlation Matrix - Extent of Using Internet

Correlations[a]

		1	2	3	4	5	6	7	8	9	10
Pearson Correlation	Industry	1.000									
	Years	-.043	1.000								
	Firm Size	.061	-.501**	1.000							
	Sales Area	-.344**	.243*	-.199	1.000						
	Internal IS	.117	.238*	-.551**	.041	1.000					
	Ownership	-.084	.048	-.061	.285*	.203	1.000				
	Perception	.094	.109	-.080	.134	.180	.164	1.000			
	Information	-.106	.129	-.229*	.175	.102	.085	.408**	1.000		
	Competition	-.060	.237*	-.102	.193	.131	-.035	.470**	.625**	1.000	
	EXTENT	-.180	-.003	-.132	.111	.255*	.320**	.321**	.189	.222*	1.000

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

a. Listwise N=80

The Pearson Correlation matrix for the Extent of using Internet and other research variables is shown in Table 4-16 above. Please note that the correlation coefficients in Table 4-16 were different from those in Table 4-10 Pearson Correlation Matrix - Likelihood of Using Internet) because for the former, only the organisations which use Internet were included in the analysis.

It was found that none of the squared coefficient was close to 0.8 to suggest a multicollinearity problem among the research variables (Hair et al 1992 and James 1995).

The correlation matrix also showed that there was significant relationship between the extent of using Internet and (1) perception towards Internet (2) competition (3) Internal IS and (4) Majority ownership. This provides support to hypothesis 1b and 4b which said that the more positive the perception and the greater the level of competition, the greater the extent of using Internet. The other two hypothesis - 2b (Firm Size) and 3b (Information need) were rejected.

4.3.2.1 Multivariate Regression Analysis

Multivariate regression analysis was then performed to determine the combination effect of independent research variables in influencing the dependent variable. It is appropriate when the dependent variable is interval scale.

The results shows a regression model with R^2 value = 0.120 with F value = 2.554 at significance of 0.046. This indicates that the model is significant and the variance of the predictor variables account for 12% of the variance of the dependent variable.

Table 4-17 Regression Analysis - Extent of Using Internet

	Beta	t-value	Significance
Perception towards Internet	0.274	2.198	0.031*
Information Need	0.004	0.027	0.979
Competition	0.081	0.553	0.582
Firm Size	-0.101	-0.909	0.367

The results above (
Table 4-17) shows that only variable perception towards Internet was significant factor in explaining the variance of the dependent variable. This will provide support to hypothesis 1b. The other two hypothesis - 2b (Firm Size), 3b (Information Need) and 4b (competition) were rejected. From the Pearson Correlation matrix, both the information need and competition again shows high correlation with the perception, so we could speculate that these two variables had an indirect effect on the extent of using Internet through the organisations' perception.

When the regression analysis was repeated to include more variables, the R^2 value increased to 0.516 with F value = 4.954 at significance 0.000. This indicates that the model was significant and the variance of the predictor variables accounted for 54.1% of the variance of the dependent variable.

The results shows that there were four significant variables - perception, ownership, industry and in-house development team. The regression equation is as shown below:

$$Y = a + 0.215X_1 - 0.284X_2 + 0.216X_3 + 0.280X_4$$

Y = Extent of Using Internet

X_1 = Perception towards Internet

X_2 = Ownership (1=Majority Malaysian)

X_3 = Industry (1=manufacturing)

X_4 = In-house development team (1=Yes)

The regression model again shows that organisations perception plays an important role in influencing the decisions on Internet adoption as well as the extent of Internet usage. Besides that, the foreign owned companies were found to use more of the Internet than the Malaysian owned organizations. This could be attributed to their earlier exposure to the Internet with the influence from their parent office. Furthermore, they are also in greater need to communicate and share information with their peers or counterparts in overseas. Therefore, the Internet serves their needs for cost effective communication tools.

In addition, those who developed the web site in-house shows more business functions being conducted through Internet. The ability to develop the web site in-house means that the organisations had the internal expertise who would be able to plan and strategize the use of Internet more effectively. This provides evidence that the in-house development team, who were the sources of technical expert and knowledge, could influence the extent usage of Internet.

Those organizations from the manufacturing background were also found to be using more of Internet. One explanation could be that these organizations which traditionally depended on retailers and wholesalers to promote their products, were

beginning to take advantage of the Internet to conduct direct marketing; enhance corporate image and develop new business - both local and exports. This is also consistent with the finding that direct marketing was widely used in Malaysia.

4.4 Barriers to The Use of Internet for Business

Factor analysis was used to reduce the items to measure the barriers - (1) Reasons for not using or using more of Internet applications and (2) problems currently experienced by the Internet users. The results is as follow:

4.4.1 Reasons for not using or using more of Internet applications

An examination of the correlation matrix indicates that a considerable number of correlation exceed 0.3 and thus the matrix is suitable for factoring. The extraction method used is principal component analysis. The component matrix showed there were complex variables which had high loading on more than factors. Thus a Varimax rotation was used to reduce the number of complex variables and to enhance interpretation. The results is as follows:-

Table 4-18 Factor Analysis - Barriers

Reasons for not using or using more Internet (N=99)	Factor loading	Mean	Count*	%*
Factor 1 - Potential for Business Use				
Market potential of Internet users is too small	.770	2.38	16	16.2
Internet is not as effective as traditional marketing channel	.767	2.66	19	19.2
It will upset existing distribution channels	.685	2.66	18	18.2
Information from the Internet is not useful	.557	2.18	9	9.1
Most suppliers do not have access to Internet	.514	3.21	44	44.5
Factor 2 - Security				
Insufficient security for on-line credit payment transaction	.847	3.63	59	59.6
Insufficient security to prevent hacking and viruses	.788	3.62	60	60.6
Factor 3 - Infrastructure and Support				
Telecommunication infrastructure is not adequate	.702	3.29	43	43.4
Insufficient qualified vendors for developing applications	.690	3.05	32	32.3
Factor 4 - Application Difficulty				
Our sales/marketing requires high degree of human interaction	.757	3.52	51	51.5
Lack of knowledge about the potential applications of Internet	.679	3.32	53	53.6
Lack of standards/regulations from government on Internet issues	.669	3.35	46	46.5
Factor 5 - Cost				
Cost of setting up Internet presence is high	.799	3.25	46	46.5
Need additional staff to manage the Internet applications	.711	3.53	62	62.6
Difficult to justify the cost with desired benefits	.668	3.19	46	46.5

* The count and its percentage is based on response of "agree" and "strongly agree"

The factor analysis shows five main factors representing the reasons that may serve as barriers to Internet adoption and usage.

Factor 1 - Potential for Business Use

This factor indicates that there were concerns regarding the potential of Internet as commercial medium. Although with the lowest factor loading, most organisations reported that most of their suppliers did not have access to Internet. This could have implications as Internet has been a useful tool in connecting the organisations with their suppliers. If the suppliers were not in the Internet, there was little justification for the organisations to use Internet. In addition, there were concerns regarding the effectiveness of Internet as a marketing channel and new business channel. This can be contributed to the current populations of Internet users in Malaysia is rather low and these organisations were concerned that they may upset the existing distribution network and create channel conflicts if Internet were used.

Factor 2 - Security

The security remains one of the main reasons why organisations were reluctant to use Internet for business. About 60% of the organisations were aware that there was insufficient security to conduct electronic transactions on the Internet and to protect their web sites from hackers and virus attacks. The findings again provides support to other surveys that these security issues were the main barriers to commercialisation of Internet. Until the issues were resolved, the business would be discouraged from conducting transactions on the Internet, thus was unable to fully capitalise the potential of Internet.

Factor 3 - Infrastructure and Vendor Support

43% of the organisations believed that the telecommunication infrastructure was not adequate, and 32% reported lack of qualified vendors to provide support in applications development. Both of these factors are the core components of the infrastructure which the organisations depended on to build their Internet applications. Therefore, it is important for Government to improve the local

telecommunication infrastructure in terms of bandwidth and digital network such as ISDN. In addition, the Government and the vendors should develop local expertise to support the increased demand in the development of Internet applications.

Factor 4 - Difficulty in Applications of Internet

The constraints imposed by the existing physical value chain such as high degree of human interaction in the sales and marketing functions, would pose a threat to Internet use for business. This was made worst with the organisation's lack of knowledge on how to go about it.

As discussed in chapter two, there had been many success stories on conducting business functions such as customer service on the Internet. Traditionally, this part of value chain requires high degree of human interaction and is important to the success of overall sales and marketing strategy With Internet, the customer service would be complemented with the use of FAQ and the e-mail, which the customer could find out the answer to their problems at their own convenience. For the organisations, Internet provides means for them to cut down support staff and time, as most of the common problems would be answered by the FAQ.

However, this would also require high computer literacy and accessibility to Internet among the consumers. This again shows that efforts from government and vendor are greatly needed to educate the business people and the consumers alike on how to use Internet for their benefits.

Factor 5 - Cost

As mentioned earlier in chapter two, cost is one of the most critical barriers that could discourage the use of Internet. The results (Table 4-18) has shown organisations rated highly about the set-up cost and additional manpower as the main contributor to the cost of using Internet. In addition, as with most IT application, it is difficult to measure the effectiveness and performance of using Internet as the benefits are mainly intangible. Thus, with the perceived high cost associated with using Internet,

most organisations (46.5%) found it difficult to justify the cost with the desired benefits.

4.4.2 Problems that faced by the Internet users

As a considerable number of correlation exceed 0.3, the matrix is suitable for factoring. The extraction method used is principal component analysis and Varimax rotation was used to reduce the number of complex variables and enhances interpretation. The results is as follows:-

Table 4-19 Factors Analysis - Problems

Problems Faced by Existing Internet Users (N=80)	Factor loading	Mean	Count	%
Factor 1 - Internet Marketing				
The company has difficulty in promoting the web site	.809	2.89	22	27.3
The cost of maintaining Internet presence is high	.742	3.04	26	32.5
Difficulty to target the right customer segment	.694	3.04	33	41.3
Factor 2 - Service and Support				
Additional staff and time required to analyse and respond to customers' feedback/queries	.812	3.03	32	40.0
Services provided by the ISPs are inadequate	.698	3.10	28	35.1
Has difficulty in locating the desired information	.649	2.78	25	31.3
Customers are reluctant to provide their data on-line	.580	3.21	36	45.1

* The count and its percentage is based on response of "agree" and "strongly agree"

The above results was based on those Internet users (N=80) only. The results shows that these organisations were facing problems on how to promote and market their products/services in the Internet. Also, they were finding problems which were related to the service and support required in the use of Internet for business.

Factor 1 - Internet Marketing

Many organisations (27%) reported difficulties in promoting the web site while 32.3% found that the cost to maintain the Internet presence is high. This may be due to the fact that the creation of a web site is not a one-time effort as suggested by John et al (1996). In order to make the web site well known to the consumers and to have repeat visits by the potential customers, the organisations need to publish their web site in other areas such as search engines and Internet directory mall as well as

other media such as newspaper and magazine. In addition, the organisations need to constantly access the effectiveness of their web site and to make improvement on the content of their web site. This would lead to additional staff and cost.

Apart from that, the organisations also reported difficulty in customer segmentation. This is expected as the consumer market is different on the Internet and there is often lack of understanding on customers' demographics which make segmentation impossible if not unnecessary as reported by Alicia et al (1997). In addition, the users are in control on what they want to see or buy and they are exposed to more choices. Alicia suggested that the only way to successful customer segmentation is to understand the benefits sought by the customers and then develop the strategy from there.

Factor 2 - Service and Support

From the results, many organisation reported facing problems in service and support of Internet applications. In particular, the organisations may have problems assigning additional staff to manage the Internet applications and faced difficulties in locating the desired information. Although there was high commitment shown by the organizations in which many of them assigned staff to manage the Internet applications, the amount of customer inquires and complaints via the Internet could be too large and least expected by the organizations. Thus many of them had difficulties in allocating additional staff and time to cope.

In addition to that, the organisations also reported that the service from ISPs were inadequate and difficulties in locating desired information. As Internet in Malaysia is still considered as infant stage, there are only two ISPs - Jaring and TMnet, thus traffic congestion occurs which usually slow down the loading of web pages. In addition, as there is a lack of structure and control on the type of information available in the Internet and search engines such as CARI which are dedicated for Malaysian, the organisations may find themselves wasting precious time in gathering information.

Besides that, as the customer are generally reluctant to release their private information across the Internet, the organisations may find it inadequate to use Internet to solicit customer demographics for marketing purposes and thus may be discouraged from using more of Internet.