CHAPTER V

RESEARCH RESULTS AND FINDINGS I

This chapter discusses the data analysis techniques and presents the results obtained. First, the survey response rate, analysis of missing data and test for non-response bias are discussed. Second, the sample characteristics, adoption intention of non EDI users and EDI usage statistics are presented. The perception of importance of EDI benefits, organizational, environmental and technological variables and organizational-environmental-technological constructs are presented next. Following this, reliability, convergent and discriminant validity are discussed. The chapter concludes with a discussion of factor analysis and its validation.

5.1 Survey Response

The survey response rate, analysis of missing data and test for non-response bias are discussed in the following sections.

5.1.1 Response Rate

The sampling frame for the study is drawn from the companies listed in the 2003, 2004 and 2005 Federation of Malaysian Manufacturers (FMM) Directory of Malaysian Industries. A decision was made to drop companies that are a subsidiary, an associate company or a company in the same business group or activity. The companies dropped shared the same business address, have the same chief executive officer or were closely related in terms of business activity and in the same group. The parent company is retained in our sampling frame. Based on these criteria, 2165 (95%) companies listed in the FMM directory (2003, 2004, and 2005) were included in the sampling frame.

The final sample size was 2165 companies. 325 companies returned the survey questionnaire, yielding a response rate of 15.01%. 41 incomplete survey questionnaires were dropped from subsequent analysis. The remaining 284 survey questionnaires were retained for further analysis giving a 13.12 % usable response rate.

5.1.2 Analysis of Missing Data

Missing data refers to “information not available for a subject (or case) about which other information is available” (Hair et al. 1998, p. 38). Missing data may be due to the respondent’s refusal or inability to answer one or more questions. The pattern of missing data is more important than the number of missing data. Nonrandomly missing data pose a serious problem because they affect the generalizability of the results. Because we should never assume that the data are missing randomly, therefore tests for missing values should be performed. SPSS Missing Values Analysis (MVA) did not show the existence of any systematic patterns of missing data. When the data for a variable used in statistical analysis was missing, the choice was to delete the case(s) with the missing data. In cases where random missing data were infrequent, mean replacement was used to address the missing value problem (Hair et al., 1998).

5.1.3 Analysis of Non-Response Bias

Non-response bias refers to the difference between the answers of non-respondents and respondents (Lambert and Harrington, 1990). In survey research, the presence of non-response bias in the survey sample could give rise to an important source of bias. Non-response bias in the sample can lead to conclusions that are systematically different from the actual situation. Stated differently, the findings resulting from the sample might be different from the population. Therefore test for non-response bias should be performed to determine if it exists in the sample. If non-response bias is present, then methods to correct it should be performed (Masters et al., 1992). Late respondents behave more like non-respondents (Lambert and Harrington, 1990). Therefore in order to measure non-response bias, the late respondents are used as proxy for the non-respondents. The cutoff point used for distinguishing between early and late respondents was the midpoint of the data collection period. 139 (48.94 %) questionnaires were from the early respondent group while the remaining 145 (51.05 %) questionnaires were from the late respondent group.

5.1.3.1 Analysis of Early and Late Respondent Group

The Levene's test for equality of variances was first checked for its significance. If the Levene's test is significant ($p < 0.05$), then t-tests results that do not assume equal variances for both groups will be used.

Table 5.1 present the results of t-test for equality of means for the organizational, environmental, technological and benefits variables respectively.

Independent sample t-tests for equality of means between early and late respondent groups were conducted. The two groups were compared based on 18 benefits variables, 18 organizational variables, 20 environmental variables, 32 technological variables and 11 constructs. The p-values were not significant for all the benefits variables, organizational variables and environmental variables. t-test analysis was significant for 5 technological variables.

Table 5.1: t-tests for Equality of Means

CONTEXT	CONSTRUCTS	VARIABLES	Sig. (2-tailed)
ORGANIZATIONAL	Top Management Support	management communicated to trade partners support for EDI	0.93
		management communicated to employees support for EDI	0.74
		management interested in company's EDI participation for comp advantage	0.34
		management considers EDI with trade partners important	0.53
		management willing to take risks in EDI adoption	0.49
		management committed to provide adequate resources for EDI	0.61
	IT Capability	our company has strong IT support	0.69
		our employees are computer literate	0.96
		our technical staff has EDI experience	0.69
		our technical staff has EDI expertise	0.85
		our company has good telecommunications infrastructure	0.19
	Compatibility	EDI software compatible with company needs	0.35
		EDI software compatible with existing standard operating procedures	0.26
		EDI software compatible with company's	0.19
	Internal Championship	someone influential actively support EDI	0.37
		someone influential actively promotes	0.32
		someone influential shown keen	0.64
		someone influential create favorable	0.33
ENVIRONMENTAL	External Pressure	trade partners mandated EDI use	0.91
		trade partners recommended EDI use	0.66
		trade partners requested EDI use	0.32
		pressure from industry on EDI use as standard purchasing practice	0.46
		pressure from loss of competitive advantage due to lack of EDI links	0.52
	Interorganizational Trust	trade partners adhere to agreements	0.96
		trade partners consistency in business dealings	0.80
		trade partners willingness to share information	0.41
		reliability of trade partners computer system	0.59
		competency of trade partners to accurately perform required tasks	0.35
		trade partners honesty in business dealings	0.76
		trade partners ability to deliver on promise	0.52
		accuracy of deadlines met by trade partners	0.40
	Critical Mass	adoption of EDI by trade partners is essential and inevitable	0.38
		trade partners will be using EDI soon	0.40
		if our company uses EDI, trade partners will follow in EDI use	0.91
	Legal Framework	e-commerce law exists to protect digital signature	0.92
		e-commerce law exists to protect buyers and sellers	0.95
		e-commerce law exists to protect against computer crimes	0.98
		existence of formal trade agreement that protects both trade partners	0.69
TECHNOLOGICAL	Costs	**consulting costs**	**0.03****
		setup costs	0.10
		training costs	0.13
		support staff costs	**0.08***
		integration costs	**0.01*****
		maintenance costs	**0.04****
		telecommunications costs	**0.04****

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Table 5.1, continued: t-tests for Equality of Means

CONTEXT	CONSTRUCTS	VARIABLES	Sig. (2-tailed)
TECHNOLOGICAL	Risks	EDI reduces full control over information	0.58
		lack of signature for EDI transactions	0.26
		lack of audit trails	0.56
		lack of universally accepted standards for data transmission	0.30
		risk of inadequate record retention	0.69
		risk of lost EDI messages during transmission	0.06
		risk of delayed EDI messages during transmission	0.06
		risk of incomplete EDI messages during transmission	**0.05****
		risk of errors introduced into EDI messages	0.24
		risk of disclosure of EDI messages to unauthorized persons	0.29
		risk of modification of EDI message content	0.27
		risk of unauthorized EDI transactions	0.26
		risk of repudiation of EDI message origin	0.31
		risk of repudiation of EDI message receipt	0.17
		risk of programmer or operator errors	0.16
	Security	EDI security standards for authenticity of EDI message	0.51
		EDI security standards for integrity of EDI message	0.54
		EDI security standards for confidentiality of EDI message	0.58
		digital signature security for EDI transactions	0.08
		password security for EDI transactions	0.19
		data encryption security for EDI transactions	0.23
	Complexity	EDI is difficult to understand and use	0.19
		EDI is a technically complex document transfer process	0.54
		EDI uses technical standards that are unclear and difficult to implement	0.23
		EDI uses many different standards for information exchange of protocols, procedures and data forms	0.37
	Benefits	cost savings	0.98
		closer trading partner relationships	0.82
		improved customer services	0.51
		competitive advantage	0.58
		new ways of doing business	0.79
		improved corporate image	0.85
		compressed production cycle and delivery time	0.77
		improved profits	0.22
		increase market share	0.22
		improved efficiency and productivity	0.86
		reduced paperwork	0.61
		better data security	0.14
		better data accuracy	0.20
		empowered employees	0.59
		improved integration with existing informationsystems	0.65
		improved communications with business partner	0.53
		reduced inventory	0.40
		improved logistics	0.47

*: significance level 0.10
**: significance level 0.05
***: significance level 0.01

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Table 5.2 shows the analysis of non-response bias for the constructs. Costs was the only significant construct ($p < 0.01$).

Table 5.2: Analysis of Non-Response Bias for Constructs

Construct	Early Respondents (N=67)	Late Respondents (N=72)	t	Significance
Top management support	3.48	3.50	0.17	p=0.87
IT capability	3.59	3.58	0.06	p=0.96
Internal championship	3.17	3.32	0.91	p=0.37
External pressure	3.23	3.13	0.59	p=0.35
Interorganizational trust	3.39	3.45	0.37	p=0.71
Legal framework	3.50	3.60	0.51	p=0.61
Costs	4.23	3.91	2.64	p=0.01*
Risks	4.16	3.95	1.62	p=0.11
Security	4.07	3.88	1.34	p=0.18
Complexity	3.40	3.24	1.12	p=0.24
Benefits	3.97	3.98	0.20	p=0.85

The t-test results show conclusively that non-response bias is not present in the sample.

5.2 Sample Characteristics and Adoption Intention

Company characteristics, adoption intention of non EDI users, respondent characteristics and EDI usage statistics are presented in the following sections.

5.2.1 Characteristics of Companies

There are 284 companies in the sample, of which 198 (69.7%) companies are EDI non-adopters and 86 (30.3%) are EDI adopters. Company characteristics by industry, legal status, ownership structure, company size, annual sales turnover, annual procurement expenditure and annual IT investments are discussed next.

5.2.1.1 Adoption Intention of Non EDI Users

Table 5.3a shows the EDI adoption decisions of companies. 122 (62%) companies have not considered adopting EDI while 75 (38%) have considered adopting EDI. Table 5.3b shows the likelihood of a company adopting EDI during 2006. 148 companies (75%) adoption likelihood ranged from “somewhat not likely to adopt” to “not at all likely to adopt EDI”. 21

(10.7%) companies were neutral about EDI adoption. 13 companies (6.6%) were somewhat likely to adopt EDI. 14 (7%) indicated that they were “likely” and “very likely” to adopt EDI.

Table 5.3b shows that the adoption likelihood is very low for companies that have not yet adopted EDI.

Table 5.3a: Considered EDI Adoption

Considered Adopting EDI	Number	Percentage
No	122	61.9
Yes	75	38.1
Total	**197**	**100**

*Data is based on actual response

Table 5.3b: EDI Adoption Likelihood in 2006

Likelihood of EDI Adoption	Number	Percentage
Not at all likely	123	62.8
Not Likely	14	7.1
Somewhat not likely	11	5.6
Neutral	21	10.7
Somewhat likely	13	6.6
Likely	8	4.1
Very Likely	6	3.1
Total	**196**	**100**

5.2.1.2 Industry Classification

This study classifies the 284 companies by their major sectors. The different sectors are based on the Malaysian Standard Industrial Classification (MSIC) code. 24 sectors in manufacturing and 5 sectors in services were identified for this survey. If a company operates in several major business activities, it was classified into a major sector based on its core business activity. The companies were also classified based on the industry classification benchmark (ICB) developed by Dow Jones and FTSE. The benchmark is based on 10 industries, partitioned into 19 supersectors and 41 sectors. The purpose of using two classification schemes is to identify the major sectors which are or are not using EDI under each classification.

Table 5.4a shows the frequency data of the companies by MSIC sectors.

Table 5.4a: Industry Sectors

Sector	Frequency	Percentage
Food products, beverages, tobacco	30	10.6
Textiles	5	1.8
Wearing apparel	2	0.7
Leather and footwear	1	0.4
Wood products except furniture	5	1.8
Paper products	7	2.5
Printing and publishing	6	2.1
Petroleum products	6	2.1
Chemicals	34	12.0
Rubber products	13	4.6
Plastic products	22	7.7
Non-metallic products	10	3.5
Basic metal industries	21	7.4
Metal products	31	10.9
Machinery	19	6.7
Office and computing machinery	6	2.1
Electrical machinery and apparatus nec	25	8.8
Radio, television and communications equipment	11	3.9
Medical, precision and optical instruments, watches & clocks	4	1.4
Motor vehicles, trailers and semi-trailers	12	4.2
Other transport equipment	2	0.7
Furniture	4	1.4
Manufacturing not elsewhere classified	3	1.1
Business and professional services	1	0.4
Trading	2	0.7
Others	2	0.7
Total	**284**	**100**

*: Companies classified by Malaysian Standard Industrial Classification

Table 5.4a shows that the top five sectors which participated in the survey were the chemicals sector (12.00%), metal products sector (10.90%), food products, beverages and tobacco products sector (10.60%), electrical machinery and apparatus nec sector (8.80%) and the plastic products sector (7.80%).

26 industry sectors out of the 29 industry sectors surveyed participated in this study. The three industry sectors that did not respond were from the manufacturing sector under (1) recycling and from the services sector under (1) shipping products and services and (2) financial institutions/insurance.

Table 5.4b shows the frequency data of adopter class by MSIC sectors.

Table 5.4b: Adoption Class by Industry Sector

	Adopters		Non-Adopter		Total	
Sector	**Freq**	**Pct**	**Freq**	**Pct**	**Freq**	**Pct**
Food products, beverages, tobacco	10	33.3	20	66.7	30	100
Textiles	0	0.0	5	100.0	5	100
Wearing apparel	0	0.0	2	100.0	2	100
Leather and footwear	1	100.0	0	0.0	1	100
Wood products except furniture	1	20.0	4	80.0	5	100
Paper products	1	14.3	6	85.7	7	100
Printing and publishing	1	16.7	5	83.3	6	100
Petroleum products	4	66.7	2	33.3	6	100
Chemicals	7	20.6	27	79.4	34	100
Rubber products	4	30.8	9	69.2	13	100
Plastic products	9	40.9	13	59.1	22	100
Non-metallic products	2	20.0	8	80.0	10	100
Basic metal industries	6	28.6	15	71.4	21	100
Metal products	10	32.3	21	67.7	31	100
Machinery	3	15.8	16	84.2	19	100
Office and computing machinery	2	33.3	4	66.7	6	100
Electrical machinery and apparatus nec	12	48.0	13	52.0	25	100
Radio, television and communications equipment	4	36.4	7	63.6	11	100
Medical, precision and optical instruments, watches & clocks	2	50.0	2	50.0	4	100
Motor vehicles, trailers and semi-trailers	3	25.0	9	75.0	12	100
Other transport equipment	0	0.0	2	100.0	2	100
Furniture	0	0.0	4	100.0	4	100
Manufacturing not elsewhere classified	2	66.7	1	33.3	3	100
Business and professional services	0	0.0	1	100.0	1	100
Trading	1	50.0	1	50.0	2	100
Others	1	50.0	1	50.0	2	100
Total	**86**	**30.3**	**198**	**69.7**	**284**	**100**

*: Companies classified by Malaysian Standard Industrial Classification

Table 5.4b shows that 47.70% of all adopters were from 4 sectors, which are electrical machinery and apparatus nec, food products, beverages and tobacco, metal products and plastic products. 12 of 25 companies (48.00%) of electrical machinery and apparatus nec sector respondents are adopters, 10 of 30 companies (33.00%) of food products, beverages, and tobacco sector respondents are adopters, 10 of 21 companies (32.00%) of metal products sector respondents are adopters and 9 of 22 companies (41.00%) of plastic sector respondents are adopters.

The electrical machinery and apparatus nec, food products, beverages and tobacco, metal products and plastic products are major users of EDI. There were no EDI adopters from textiles, furniture, wearing apparel, other transport equipment, business and professional services sectors.

The majority of respondents were from basic materials followed by industrials, consumer goods, technology, consumer services, oil and gas, healthcare and others.

Table 5.5a shows EDI adopters and non-adopters classified by industrial classification benchmark. The majority of EDI adopters were from basic materials, followed by industrials, consumer goods, technology, oil and gas, healthcare, consumer services and others.

Table 5.5a: EDI Adopters and Non-Adopters Classified by Industrial Classification Benchmark

ICB SECTOR	Adopters		Non-Adopters		Total	
	Freq	Pct	Freq	Pct	Freq	Pct
Oil and Gas	4	66.7	2	33.3	6	100
Basic Materials	39	28.3	99	71.7	138	100
Industrials	20	32.8	41	67.2	61	100
Consumer Goods	12	25.5	35	74.5	47	100
Healthcare	2	50.0	2	50.0	4	100
Consumer Services	2	22.2	7	77.8	9	100
Technology	6	35.3	11	64.7	17	100
Others	1	50.0	1	50.0	2	100
Total	**86**	**30.3**	**198**	**69.7**	**284**	**100**

* Companies classified by Industry Classification Benchmark

Within the individual industries of the ICB, 66.7% of the oil and gas industry are adopters, followed by healthcare (50.0%), others (50.0%), technology (35.3%), industrials (32.8%), basic materials (28.30%), consumer goods (25.5%) and consumer services (22.2%).

5.2.1.3 Legal Status

Table 5.6a shows the legal status of the companies. Table 5.6b shows the legal status of adopter companies. The majority of the respondents (92.3%) are private limited companies while 7.7% of respondents are public limited companies. 30.50% of private limited

companies are EDI adopters while 27.27% of public limited companies are EDI adopters. Private limited and public limited companies in our sample are equally likely to adopt EDI.

Table 5.6a: Company Characteristics

	Full Sample	
Legal Status	**No of companies**	**Percentage**
private limited company (Sdn Bhd)	262	92.3
public limited company (Bhd)	22	7.7
Total	**284**	**100**
Ownership Structure		
100% local ownership	159	56
majority local ownership	39	13.7
50% local and 50% foreign ownership	8	2.8
majority foreign ownership	42	14.8
100% foreign ownership	36	12.7
Total	**284**	**100**
Size (based on no of Employees)		
<= 20	22	7.8
>20 and <=100	98	34.5
>100	164	57.8
Total	**284**	**100**
Size (based on Paid Up Capital)		
< RM100,000	12	4.2
RM100,000 to RM499,999	28	9.8
RM500,000 to RM2.5 million	100	35.2
> RM2.5 million	144	50.7
Total	**284**	**100**

5.2.1.4 Ownership Structure

Table 5.6a shows the ownership structure of the companies. Table 5.6b shows the ownership structure of adopter companies 159 (56.00%) companies are fully locally owned companies. 39 (13.70%) companies are majority owned by locals. 8 (2.80%) companies have equal local and foreign ownership. 42 (14.80%) companies are majority owned by foreigners. 36 (12.70%) respondent companies are fully owned by foreigners.

Table 5.6b: Adopter Company Characteristics

	Adopters			
Legal Status	**No of Adopters**	**Percentage**	**No of companies**	**Percentage Adopter**
private limited company (Sdn Bhd)	80	93	262	30.50
public limited company (Bhd)	6	7	22	27.27
Total	**86**	**100**	**284**	**32.57**
Ownership Structure				
100% local ownership	39	45.4	159	24.53
majority local ownership	11	12.8	39	28.20
50% local and 50% foreign ownership	3	3.5	8	37.50
majority foreign ownership	16	18.6	42	38.09
100% foreign ownership	17	19.8	36	47.22
Total	**86**	**100**	**284**	**30.28**
Size (based on no of Employees)				
<= 20	2	2.35	22	9.10
>20 and <=100	22	25.9	98	22.44
>100	61	71.8	164	37.20
Total	**85**	**100**	**284**	**29.92**
Size (based on Paid Up Capital)				
< RM100,000	1	1.2	12	8.33
RM100,000 to RM499,999	3	3.5	28	10.71
RM500,000 to RM2.5 million	30	34.9	100	30.00
> RM2.5 million	52	60.5	144	36.11
Total	**86**	**100**	**284**	**30.28**

* The data in the tables are based on actual responses

43.42% of companies with majority and 100% foreign ownership have adopted EDI compared with 25.25% of companies with majority and 100% local ownership which have adopted EDI. This shows that foreign ownership companies are more likely to adopt EDI than local ownership companies.

5.2.1.5 Company Size

Table 5.6a shows company size based on the number of employees. Table 5.6b shows adopter company size based on the number of employees. 22 (7.80%) companies with 20 or fewer employees were categorized as small size. 98 (34.50%) companies with greater than 20 up to 100 employees were categorized as medium size. The remaining 164 (57.80%) companies with more than 100 employees were categorized as large size.

37.20 % of the large size companies, 22.44% of the medium size companies and 9.10% of the small size companies have adopted EDI. This shows that the larger the company size the more likely it will be an EDI adopter.

Table 5.6a shows company size by paid up capital. Table 5.6b shows adopter company size by paid up capital. 40 (14.1%) companies with paid-up capital of less than MYR500,000 are in the small size category. 100 (35.21%) companies with paid-up capital of between MYR500,000 up to MYR2.5 million are in medium size category. The remaining 144 (50.70%) companies with paid-up capital of more than MYR2.5 million are in the large size category.

36.11 % of the large size companies, 30.00% of the medium size companies and 10.00% of the small size companies are EDI adopters. This shows that the larger the company size the more likely it will be an EDI adopter.

5.2.1.6 Annual Sales Turnover

Table 5.7: Annual Sales Turnover

	Annual Sales Turnover									
	low		medium		high		very high		Row total	
Adopters	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
NO	62	(32.0)	43	(22.2)	43	(22.2)	46	(23.7)	194	(69.2)
YES	15	(17.4)	20	(23.3)	20	(23.3)	31	(36.0)	86	(30.7)
% column total	77	(27.5)	63	(22.5)	63	(22.5)	77	(27.5)	280	(100.0)

* Data is based on actual response

Non-adopters and adopters have a mean annual sales turnover of 42 million and 56 million respectively. t-test analysis shows that the mean annual sales turnover of EDI adopters was significantly greater ($p < 0.01$) than the mean annual sales turnover of non-adopters.

Table 5.7 shows that there are more non-adopters in the low to medium annual sales turnover category than in the high to very high annual sales turnover category. There are more adopters in the high to very high annual sales turnover category than in the low to medium

annual sales turnover category. Table 5.7 shows that EDI adopters are more likely to have higher annual sales turnover.

Large size companies have the highest mean annual sales turnover (MYR69 million) followed by small size companies (MYR25 million) and medium size companies (MYR21 million).

5.2.1.7 Annual Procurement Expenditure

Table 5.8: Annual Procurement Expenditure

	Annual Procurement Expenditure									
	low		medium		high		very high		Row total	
Adopters	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
NO	53	(28.2)	47	(25.0)	25	(13.3)	63	(33.5)	188	(70.2)
YES	14	(17.5)	18	(22.5)	12	(15.0)	36	(45.0)	80	(29.8)
% column total	67	(25.0)	65	(24.3)	37	(13.8)	99	(36.9)	268	(100.0)

* Data is based on actual response

Non-adopters and adopters have a mean annual procurement expenditure of 5.3 million and 6.4 million respectively. t-test analysis shows that the mean annual procurement expenditure of EDI adopters was significantly greater ($p < 0.05$) than the mean annual procurement expenditure of non-adopters.

Table 5.8 shows that there are more non-adopters in the low to medium annual procurement category than in the high to very high procurement category. There are more adopters in the high to very high annual procurement category than in the low to medium procurement category. Table 5.8 shows that EDI adopters are more likely to have higher annual procurement expenditure.

Large size companies have the highest mean annual procurement expenditure (MYR7.4 million) followed by mid size companies (MYR4.0 million) and small size companies (MYR 1.2 million).

5.2.1.8 Annual Information Technology Investments

Table 5.9: Annual Information Technology Investments

	Annual Information Technology Investment									
	low		medium		high		very high		Row total	
Adopters	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
NO	0	(0.0)	147	(76.6)	0	(0.0)	45	(23.4)	192	(70.6)
YES	0	(0.0)	45	(56.3)	0	(0.0)	35	(43.8)	80	(29.4)
% column total	0	(0.0)	192	(70.6)	0	(0.0)	80	(29.4)	272	(100.0)

* Data is based on actual response

Non-adopters and adopters have mean annual IT investment of MYR285,000 and MYR403,000 respectively. t-test analysis shows that the mean annual IT investment of EDI adopters was significantly greater ($p < 0.10$) than the mean annual IT investment of non-adopters. Table 5.9 showed EDI adopters have higher levels of annual IT investment than non EDI adopters.

5.2.2 Descriptive Statistics by Job Function

Table 5.10a shows the respondents classified by job function.

Table 5.10a: Job Functions

Job Function	Respondents	Percentage
Top management	98	36.16
IS/IT	45	16.61
Finance	35	12.92
Administration	33	12.18
Accounting	16	5.9
Engineering and production	10	3.69
Human resource	10	3.69
Purchasing and logistics	8	2.95
Business	6	2.21
Marketing and sales	4	1.48
Commerce	3	1.11
Quality Assurance/International Standards Organization	3	1.11
Total	**271**	**100**

The respondents classified by job functions are described next. 98 (36.16%) respondents are in the top management category. 33 (12.18%) respondents are in administration function, 16 (5.90%) respondents are in accounting function, 35 (12.92%) respondents are in finance management and 10 (3.69%) respondents are in human resource

function. 10 (3.69%) respondents are in engineering and production function, 8 (2.95%) respondents are in purchasing and logistics function and 4 (1.48%) respondents are in marketing and sales function. 45 (16.61%) respondents are in IS/IT management and. 6 (2.21%) respondents are in business-related function. 3 (1.11%) respondents are from commerce-related function. 3 (1.11%) respondents are from quality assurance/ISO function.

Table 5.10b shows the respondents classified by management level.

Table 5.10b: Management Levels

Management Levels	Respondents	Percentage
Strategic	98	36.16
Tactical	94	34.69
Operational	22	8.12
Business Support	57	21.03
Total	**271**	**100**

The respondents classified by management levels are discussed next. 98 respondents are at the strategic management level. 94 respondents (finance, accounting, administration, human resource) are at the tactical management level. 22 respondents (engineering, purchasing & logistics, marketing & sales) are at the operational management level. 57 respondents (IS/IT, business-related, commerce-related, quality assurance) are from business support level. The respondents comprising mainly executives from strategic and tactical management are those who understand the strategic and tactical direction of the company and therefore are the best respondents for the adoption survey.

5.3 EDI Usage

This section describes the function, diversity and breadth of EDI usage in Malaysian companies. The influence of size on EDI adoption is examined. The difference in procurement practice and perception of importance of adoption variables between EDI adopters and non-adopters is also examined.

5.3.1 Year EDI is First Used

Table 5.11 shows the year that EDI is first used. The earliest adoption year reported by a company in our survey is in 1985. The percentage of EDI adopters before the year 2000 was 26.90%. The percentage of EDI adopters from the year 2000 to 2003 was 82.00%. There was a large increase in EDI adoption after the year 2000. Factors such as cheaper hardware and software for EDI implementation (Philip and Pedersen, 1997) and EDI having reached a critical mass may have accounted for the rapid EDI adoption (Chwelos et al., 2001).

5.3.2 Number of Years EDI in Use

Table 5.11 shows the number of years that a company had used EDI. 4 (5.10%) companies have been using EDI for more than 15 years. 5 (6.40%) companies have been using EDI between 10 and 15 years. 24 (30.80%) companies have been using EDI between 5 and 10 years. 57 (73.00%) companies have adopted EDI for only five years, i.e. between 2000 and 2005. This shows that there has been a rapid adoption of EDI in the years 2000 to 2005.

Table 5.11: EDI Usage

		Frequency	%
Year EDI First Used	BEFORE 2000	21	26.9
	2000	12	15.4
	2001	8	10.3
	2002	13	16.7
	2003	10	12.8
	2004	11	14.1
	2005	3	3.9
Total		**78**	**100**
		Frequency	**%**
Number of Years EDI Used	<= 5	45	57.7
	>5 and <=10	24	30.8
	>10 and <=15	5	6.4
	>15	4	5.1
Total		**78**	**100**
		Frequency	**%**
EDI Main Use (a)	Sales	55	64.7
	Purchase	40	47.1
	Financial EDI	48	56.5
	Trade Declaration	18	21.2
	Others	13	15.3
		Frequency	**%**
EDI Document Types (b)	PO	51	60
	Invoice	41	48.2
	PO ack	36	42.4
	Pay instruction	31	36.5
	Pay advice	31	36.5
	RFQ	27	31.8
	PO change	27	31.8
	Cr/Dr adjustment	27	31.8
	Inventory advice	26	30.6
	Order status inquiry	23	27.1
	PO change ack	20	23.5
	Shipping notice/manifest	19	22.4
	Receive advice	18	21.2
	ASN	17	20
	Dr authorization	16	18.8
	RFP	13	15.3
	Others	12	14.1
		Frequency	**%**
EDI communication channels (c)	Proprietary networks	14	16.9
	Private networks	26	31.3
	Internet	64	77.1

(a), (b) Frequency is based on sample size 85
(c) Frequency is based on sample size 83
*The data in tables are based on actual responses

5.3.3 EDI Main Application Areas

Table 5.11 showed the main EDI functions. 55 (64.70%) adopter companies used EDI mainly for sales while 48 (56.50%) adopter companies used financial EDI for purposes such as electronic exchange of payments and payment information. 40 (47.05%) adopter companies used EDI mainly for purchases and 18 (21.17%) companies used EDI mainly for trade declaration and customs clearance. 13 (15.29%) adopter companies used EDI for other purposes.

The findings that EDI uses are mainly in sales and purchase order transactions are supported by studies from the statistical office of the Republic of Slovenia (2007, 2008) and Vijayasarathy and Tyler (1997).

5.3.4 EDI Main Document Types

Table 5.11 showed the EDI diversity with different document types used in purchasing, sales, financial EDI and other EDI functions. Numbers in parenthesis indicate the number of companies using the document types out of 85 companies. Documents related to purchasing are PO (51), PO ack (36), PO change (27), PO change ack (20), order status inquiry (23) and receive advice (18) document types. Documents related to sales are invoice (41), inventory advice (26), shipping notice/manifest (19) and Advanced Shipping Notice (17) document types. Document related to financial EDI are pay instruction (31), pay advice (31), cr/dr adjustment (27), dr authorization (16) document types. Prepurchase document types include RFQ (27), RFP (13) document types.

32.70% of companies used 5 purchase document types (po, po ack, po change, order status inquiry, po change ack, receive notice) while 30.90% companies used 4 financial EDI document types (pay instruction, pay advice, cr/dr adjustment, dr authorization). 30.30% companies used 4 sales document types (invoice, inventory advice, shipping notice/manifest, ASN) while 23.50% companies used 2 pre-purchase document types (RFQ, RFP). The mean of the EDI diversity (different types of transactions/documents performed) is 5. McGowan

and Madey (1998) study of EDI in US firms found that the mean of the EDI diversity is 7. The findings show that EDI use is less diversified in Malaysian manufacturers.

Table 5.11 shows that the main EDI uses for Malaysian companies are in sales, purchase, financial EDI and trade declaration. The findings concur with studies by the statistical office of the Republic of Slovenia (2007, 2008) and Vijayasarathy and Tyler (1997) that main EDI uses are in sales and purchase order transactions.

5.3.5 EDI Communication Channels Usage

Table 5.11 shows the extent of EDI communication channels usage. The most popular EDI communication channel in Malaysia is the Internet, followed by private networks (VANs) and proprietary networks. 72.10% of adopters use only one type of communication channel. 24.40% of adopters use two types of communication channels. No company used all three types of communication channels. No company used proprietary and private networks at the same time.

The findings by Meta group (2004) showed that VAN-based EDI traffic is roughly flat but Internet EDI transactions are growing at an annual rate of 50.00% to 60.00% (Bednarz, 2004). The trend is that companies prefer to use Internet for EDI. Findings by Angeles (2001) and Segev et al. (1997) also provide further proof that the Internet is the most common EDI transmission channel. An explanation for the Internet's popularity is it is relatively cheap (McBride, 1997).

5.3.6 Extent of EDI-Links to Local Customers/Suppliers/Banks and Foreign Customers/Suppliers/Banks

Table 5.12 presents the EDI breadth, i.e. EDI-linkages to local customers, suppliers and banks and foreign customers, suppliers and banks based on the 25 percentile, 50 percentile and 75 percentile of EDI adopters.

Table 5.12: EDI Linkages with Business Partners and Banks

			Linkages							
		NO	Low		Medium		High		Very High	
			No	Pct	No	Pct	No	Pct	No	Pct
Customer	Local_Linked	**53**	9	17.0	15	28.3	15	28.3	14	26.4
	Foreign_Linked	**39**	6	15.4	12	30.8	11	28.2	10	25.6
Supplier	Local_Linked	**33**	8	24.2	6	18.2	8	24.2	11	33.3
	Foreign_Linked	30	6	20.0	7	23.3	6	20.0	11	36.7
Bank	Local_Linked	45	10	22.2	10	22.2	11	24.4	14	31.1
	Foreign_Linked	21	4	19.0	5	23.8	4	19.0	8	38.1

Notes:
1. local_linked customers: low up to 2 links, medium up to 4 links, high up to 18 links, very high up to 180 links
2. foreign-linked customers: low up to 2 links, medium up to 4 links, high up to 10 links, very high up to 50 links
3. local_linked suppliers: low up to 4 links, medium up to 10 links, high up to 32 links, very high up to 165 links
4. foreign-linked suppliers: low up to 2 links, medium up to 5 links, high up to 11 links, very high up to 50 links
5. local_linked banks: low 1 link, medium up to 2 links, high up to 3 links, very high up to 10 links
6. foreign_linked banks: low 1 link, medium up to 2 links, high up to 2 links, very high up to 12 links
7. Data based on quartiles

25.00% of adopters have up to 2 local-linked customers while 50.00% of adopters have up to 4 local-linked customers. 75.00% of adopters have up to 18 local-linked customers. 25.00% of adopters have up to 2 foreign-linked customers while 50.00% of adopters have up to 5 foreign-linked customers. 75.00% of adopters have up to 10 foreign-linked customers.

25.00% of adopters have up to 4 local-linked suppliers while 50.00% of adopters have up to 10 local-linked suppliers. 75.00% of adopters have up to 32 local-linked suppliers. 25.00% of adopters have up to 2 foreign-linked suppliers while 50.00% of adopters have up to 5 foreign-linked suppliers. 75.00% of adopters have up to 11 foreign-linked suppliers.

25.00% of adopters have up to 1 local-linked bank while 50.00% of adopters have up to 2 local-linked banks. 75.00% of adopters have up to 3 local-linked banks. 25.00% of adopters have up to 1 foreign-linked bank while 50.00% of adopters have up to 2 foreign-linked banks. 75.00% of adopters have up to 2 foreign-linked banks.

Table 5.12 showed that adopters connect to more local-linked customers than foreign-linked customers. Adopters also connect to more local-linked suppliers than foreign-linked suppliers and connect to almost equal number of local-linked banks and foreign linked banks.

Companies usually do not have many EDI links to customers or suppliers because EDI links to customers or suppliers are only cost-effective if there are sufficient EDI transaction volumes between them (Swatman et al., 1994). Because of this companies would only establish EDI links with their major customers or suppliers. Most companies only link to one or two major bank for their financial EDI transactions.

5.3.7 Average Monthly Sales Order Transactions Per Customer and Average Monthly Purchase Order Transactions Per Supplier

Table 5.13a shows the average monthly sales order transactions, average monthly purchase order transaction data based on the 25 percentile, 50 percentile and 75 percentile of EDI adopters.

Table 5.13a: Average Monthly Sales Order Transaction per Customer and Average Monthly Purchase Order Transaction per Supplier

	No Cases	Low		Medium		High		Very High	
		No	Pct	No	Pct	No	Pct	No	Pct
Average monthly sales order transactions	44	12	27.27	11	25.00	11	25.00	10	22.73
Average monthly purchase order transactions	31	8	25.81	8	25.81	8	25.81	7	22.58

Average monthly sales order transactions: low up to 12 SO transactions, medium up to 30 SO transactions, high up to 100 SO transactions, very high up to 18000 SO transactions
Average monthly purchase order transactions: low up to 6 PO transactions, medium up to 18 PO transactions, high up to 90 PO transactions, very high up to 300 PO transactions
* Data is based on actual response

25.00% adopters have up to 12 monthly sales order transactions per customer while 50.00% have up to 30 monthly sales order transactions per customer. 75.00% adopters have up to 100 monthly sales order transactions per customer.

25.00% adopters have up to 6 monthly purchase order transactions per supplier, while 50.00% adopter have up to 18 monthly purchase order transactions per supplier. 75.00% adopters (buyers) have up to 90 monthly purchase order transactions per supplier. Adopters (buyers and sellers) transact more sales order transactions per customer than purchase order transactions per supplier. Adopters use EDI more for taking sales orders from customers than for procurement from their suppliers.

5.3.8 Average Daily Volume of EDI Transactions

Table 5.13b shows the average daily EDI volume data based on the 25 percentile, 50 percentile and 75 percentile of EDI transaction data. The 25 percentile is classified as low volume, the 50 percentile is classified as medium volume, the 75 percentile is classified as high volume and greater than 75 percentile is classified as very high volume.

Table 5.13b: Average Daily EDI Transaction Volumes

		Volumes			
EDI average daily transaction volumes	**No Cases**	**Low**	**Medium**	**High**	**Very High**
		Number of companies	Number of companies	Number of companies	Number of companies
sales order transaction	49	11	9	15	14
purchase order transaction	44	11	8	12	13
all other EDI transactions	50	10	10	17	13

Average daily sales order transaction: low up to 4 transactions, medium up to 8 transactions, high up to 20 transactions, very high up to 1500 transactions
Average daily purchase order transaction: low up to 4 transactions, medium up to 8 transactions, high up to 25 transactions, very high up to 150 transactions
Average daily number of all other edi transactions: low up to 2 transactions, medium up to 9 transactions, high up to 25 transactions, very high up to 2500 transactions
* Data is based on actual response

25.00% adopters have up to 4 daily sales order transactions; 50.00% adopters have up to 8 sales order transactions and 75.00% adopters have up to 20 sales order transactions.

25.00% adopters have up to 4 daily purchase order transactions; 50.00% adopters have up to 8 purchase order transactions and 75.00% adopters have up to 25 daily purchase order transactions.

25.00% adopters have up to 2 daily other EDI transactions; 50.00% adopters have up to 9 other EDI transactions and 75.00% adopters have up to 25 daily other EDI transactions.

Analysis of actual volume data shows that there is very little difference between the number of average daily sales order transactions, average daily purchase order transactions and average daily all other EDI transactions for the low, medium and high volume groups. For the very high volume group, all other EDI transactions and sales order transactions far exceed purchase order transactions.

McGowan and Madey (1998) found that the mean EDI volume for US firms is 39. Our findings show that the mean EDI volume is 117 per day which is much higher than the findings of McGowan and Madey (1998). Closer analysis revealed that EDI volume is affected by a few firms with very high daily EDI volumes.

5.4 Current Procurement Practice Usage

The companies were asked to indicate their usage of the following procurement practices: mail-based, fax-based, telephone-based, e-mail based, e-procurement (internet-based), EDI procurement and sales person visits (order taking). The usage ranges from 0 (0.00%) to 5 (100.00%).

Table 5.14a shows the mean and t-tests of the procurement practices for the sample, non-adopters and adopters. The mean of the procurement practices for the sample, non-adopters and adopters ranges from 1.07 to 3.70, from 1.01 to 3.72 and from 1.03 to 3.65 respectively. The least important procurement practice for the sample and non-adopters is ‘EDI-based procurement’ while the least important procurement practice for adopters is ‘salesperson visits.’ The most important procurement practice for the sample, non-adopters and adopters is fax-based procurement.

Fax-based procurement is very frequently used by companies. Frequent salesperson visits are less important to EDI adopters which rely more on negotiated contracts and online transactions.

t-test analysis showed significant differences for e-mail-based procurement ($p < 0.10$), for mail-based procurement ($p < 0.05$), for e-procurement and EDI-based procurement ($p < 0.01$) usage between EDI adopter and non-adopter. The companies differ in their usage of the preceding procurement practices. EDI adopters use e-mail-based and mail-based procurement more frequently than the EDI non-adopters. EDI adopters use e-procurement and EDI-based procurement more frequently than the non-adopters because EDI adopters procure mainly through online transactions.

Table 5.14a: Perception of Importance of Procurement Practices

Construct	*Mean Sample (N = 271)*	*Mean Non-Adopter (N=193)*	*Mean Adopter (78)*	*T*	*Sig*	*Sig*
Mail-based procurement	2.14	2.02	2.44	-2.31	0.02	**
Fax-based procurement	3.70	3.72	3.65	0.42	0.68	
Telephone-based procurement	2.82	2.88	2.67	1.14	0.26	
Email based procurement	2.40	2.32	2.60	-1.81	0.07	***
eprocurement	1.76	1.64	2.04	-2.66	0.01	*
EDI-based procurement	1.42	1.12	2.14	-6.83	0.00	*
Salesvisit	2.15	2.22	1.97	1.49	0.14	
Others	1.07	1.01	1.03	-0.78	0.44	

*Significance level 0.10; **Significance level 0.05; ***Significance level 0.01

5.5 Perception of Importance of EDI Benefits

The companies were asked to rate their perception of the importance of the EDI benefits. Table 5.14b (see appendix) shows the mean and t-tests of the EDI benefits variables for the sample, non-adopters and adopters. The mean of the benefits variables for the sample, non-adopter and adopter ranges from 3.65 to 4.26, from 3.62 to 4.24 and from 3.65 to 4.30 respectively. Both adopters and non-adopters perceive ‘improved efficiency and productivity’ to be the most important benefit. Non-adopters perceive ‘empowered employees’ to be the least important benefit while adopters perceive ‘reduced inventory’ to be the least important benefit**.** A reason why improved efficiency and productivity is rated the most important

variable is this factor is very important for competing effectively against others. (Vlosky et al., 1994)

Our findings are compared with other benefits findings. The least important benefit variable to EDI adopter and non-adopter in US small manufacturing companies is reduced inventory level and the most important benefit variable to EDI adopter and non-adopter is better customer service (Jun and Cai, 2003). The most important benefit variable to EDI adopter and non-adopter in US retail companies is data accuracy and the least important variable is 'complying with vendor's request/demand' (Vijayasarathy and Tyler, 1997). The most important benefit variable for EDI adopter is improved customer service and the least important variable is cost savings (Arunachalam, 1995). Our findings' most important variable (efficiency and productivity) differs from above research while the least important variable (reduced inventory) for the adopters is the same as the findings of Jun and Cai (2003). This is because in today's highly competitive world, efficiency and productivity gains from EDI is crucial for a company's survival.

t-test analysis for user grouping variable showed a significant difference ($p < 0.05$) for 'reduced inventory' and is not significant for the other 17 benefit variables. EDI adopters and non-adopters do not differ significantly in their perception of the importance of benefits.

5.6 Perception of Importance of Organizational Variables

The perception of importance of the organizational variables of top management support, information technology capability, organizational compatibility and internal championship are discussed in the following sections. Table 5.15 shows the means and standard deviation for all organizational variables**.**

5.6.1 Perception of Importance of Top Management Support

The companies were asked to rate the importance of the "top management support" variables. Table 5.14b (see appendix) shows the mean and t-tests of the top management support variables for the sample, non-adopters and adopters. The mean of the 'top

management support' variables for the sample, non-adopter and adopter ranges from 3.35 to 3.59, from 3.28 to 3.51 and from 3.58 to 3.83 respectively.

Non-adopters perceive "communication to trade partners and employees support for EDI" to be the least important variable while adopters perceive "management willingness to take risks" as the least important variable. EDI adopters perceive top management giving consideration to EDI with trade partners as most important for adoption because top management support is essential to mobilize support and carry it through the organization (Premkumar, 1995). Non-adopters consider EDI giving them a competitive edge against others as most important.

t-test analysis for user grouping variable (Table 5.14b, see appendix) showed significant differences ($p < 0.01$) for two variables, significant difference ($p < 0.05$) for a variable and significant differences ($p < 0.10$) for three variables. Adopters and non-adopters differ significantly in their perception of the importance of top management support (Premkumar, 1995).

5.6.2 Perception of Importance of Information Technology Capability

The companies were asked to rate the importance of the "IT capability" variables. Table 5.14b (see appendix) shows the mean and t-tests of the IT capability variables for the sample, non-adopters and adopters. The mean of the 'IT capability' variables for the sample, non-adopter and adopter ranges from 3.43 to 3.83, from 3.33 to 3.78 and from 3.64 to 3.95 respectively.

Both adopters and non-adopters perceive 'staff has EDI experience' as the least important variable and 'our company has good telecommunications infrastructure' as the most important variable. Staff with EDI experience is the least important variable because a company can outsource its EDI support and trained EDI users can use the EDI system easily without help from internal IT staff (Rohde, 2004). A good telecommunications infrastructure

is considered the most important variable because an adequate infrastructure is essential to support effective electronic transactions (Zwass, 1996).

t-test analysis for user grouping variable showed significant differences ($p < 0.01$) for a variable, ($p < 0.05$) for a variable and ($p < 0.10$) for two variables. Adopter and non-adopter differ significantly in their perception of the importance of information technology capability.

5.6.3 Perception of Importance of Organizational Compatibility

The companies were asked to rate the importance of the compatibility variables. Table 5.14b (see appendix) shows the mean and t-tests of the compatibility variables for the sample, non-adopters and adopters. The mean of the 'compatibility' variables for the sample, non-adopter and adopter ranges from 3.56 to 3.72, from 3.53 to 3.67 and from 3.64 to 3.86 respectively.

Both adopters and non-adopters perceive 'EDI software compatible with company's beliefs, values and experience' as the least important variable and 'EDI software compatible with company needs' as the most important variable. The finding that 'EDI software compatible with company needs' is the most important variable is consistent with IS literature (Boockholdt, 1999; Lyytinen and Robey, 1999) that 'software that meets company/user requirements' is one of the most important factor for adoption and implementation success.

t-test analysis showed a significant difference ($p < 0.10$) for 'software compatible with company needs.' Adopter and non-adopter do not differ significantly in their perception of the importance of organizational compatibility.

5.6.4 Perception of Importance of Internal Championship

The companies were asked to rate the importance of the internal championship variables. Table 5.14b (see appendix) shows the mean and t-tests of the internal championship variables for the sample, non-adopters and adopters. The mean of the 'internal championship' variables for the sample, non-adopter and adopter ranges from 3.23 to 3.34, from 3.14 to 3.24 and from 3.42 to 3.56 respectively.

Both adopters and non-adopters perceive 'someone influential create favorable opinion towards EDI among employees' as the least important variable and 'someone influential actively support EDI use' as the most important variable. An influential person being able to provide resources to support EDI adoption is considered most important for EDI adoption because without resources EDI adoption and use will be hindered (Premkumar, 1995). Having a person who helps lower resistance to EDI use by creating a positive opinion of EDI is considered least important because once EDI is adopted its use is mandatory regardless of user's opinion.

t-test analysis for user grouping variable showed significant difference ($p < 0.05$) for all internal championship variables. Adopter and non-adopter differ significantly in their perception of the importance of internal championship.

5.7 Perception of Importance of Environmental Variables

The perception of importance of the environmental variables of external pressure, inter-organizational trust, critical mass and legal framework are discussed in the following sections. Table 5.15 shows the means and standard deviation for all environmental variables**.**

5.7.1 Perception of Importance of External Pressure

The companies were asked to rate the importance of the external pressure variables on EDI adoption. Table 5.14b (see appendix) shows the mean and t-tests of the external pressure variables for the sample, non-adopters and adopters. The mean of the 'external pressure' variables for the sample, non-adopter and adopter ranges from 3.16 to 3.39, from 3.01 to 3.30 and from 3.45 to 3.69 respectively.

Both adopters and non-adopters differ in their perception of the least important and most important variables. EDI non-adopters perceive that trade partner's recommendation to adopt EDI as least important because many non adopters only adopt when forced to. The EDI adopters do not perceive they are pressured by their industry to adopt EDI and this explains the lowest importance for this variable. Adopters perceive mandated EDI use as most

important because to them EDI adoption is a forced decision rather than a voluntary decision (Son et al. 2000). Non-adopters perceive pressure from loss of competitive advantage due to lack of EDI links as most important because they are not able to do business effectively with their suppliers or customers without EDI links.

t-test analysis for user grouping variable showed significant difference for five variables. Adopter and non-adopter differ significantly in their perception of the importance of external pressure.

5.7.2 Perception of Importance of Interorganizational Trust

The companies were asked to rate the importance of the inter-organizational trust variables on EDI adoption. Table 5.14b (see appendix) shows the mean and t-tests of the interorganizational trust variables for the sample, non-adopters and adopters.The mean of the 'inter-organizational trust' variables for the sample, non-adopter and adopter ranges from 3.30 to 3.72, from 3.17 to 3.65 and from 3.59 to 3.97 respectively.

Both adopters and non-adopters perceive 'trade partner adhere to agreements' to be the least important interorganizational trust variable. The non-adopters perceive being able to deliver what has been promised as most important because non-delivery will seriously affect their business operations. The adopters perceive being able to accurately and efficiently complete the tasks within a specified time as most important because this will enhance their business operations efficiency.

t-test analysis for user grouping variable showed significant difference for six variables. Adopter and non-adopter differ significantly in their perception of the importance of inter-organizational trust.

5.7.3 Perception of Importance of Critical Mass

The companies were asked to rate the importance of the critical mass variables on EDI adoption. Table 5.14b (see appendix) shows the mean and t-tests of the critical mass variables for the sample, non-adopters and adopters. The mean of the critical mass variables for the

sample, non-adopter and adopter ranges from 3.03 to 3.42, from 3.01 to 3.35 and from 3.10 to 3.60 respectively.

Both adopters and non-adopters perceive the inevitable adoption of EDI by trade partners as most important in influencing their EDI adoption. Both adopters and non-adopters perceive trade partners following their example in adopting EDI as least important in influencing EDI adoption. The findings show that inevitability (no choice) is most influential to EDI adoption while persuasion or choice is least influential to EDI adoption.

t-test analysis for user grouping variable showed significant difference for two variables. Adopter and non-adopter differ significantly in their perception of the importance of critical mass (Premkumar and Ramamurthy, 1995; Lee, 1998).

5.7.4 Perception of Importance of Legal Framework

The companies were asked to rate the importance of legal framework variables on EDI adoption. Table 5.14b (see appendix) shows the mean and t-tests of the legal framework variables for the sample, non-adopters and adopters. The mean of the 'legal framework' variables for the sample, non-adopter and adopter ranges from 3.64 to 3.75, from 3.61 to 3.73 and from 3.72 to 3.80 respectively.

Both adopters and non-adopters perceive the existence of e-commerce law protecting against computer crimes as most important because being able to prosecute criminals will be a deterrent to hackers. Both adopters and non-adopters perceive the protection of digital signature by e-commerce law as least significant as the use of digital signature for e-commerce is still low.

t-test analysis for user grouping variable did not show any significant difference for all legal framework variables.

5.8 Perception of Importance of Technological Variables

The perception of importance of the technological variables of costs, risks, security and complexity are discussed in the following sections. Table 5.15 shows the means and standard deviation for all technological variables.

5.8.1 Perception of Importance of Costs

The companies were asked to rate the importance of the costs variables on EDI adoption. Table 5.14b (see appendix) shows the mean and t-tests of the costs variables for the sample, non-adopters and adopters. The mean of the costs variable for the sample, non-adopter and adopter ranges from 3.88 to 4.29, from 3.88 to 4.34 and from 3.90 to 4.23 respectively.

Both adopters and non-adopters perceive telecommunications costs as the least important variable. Non-adopters perceive setup costs as the most important variable while adopters perceive integration costs as the most important variable. Telecommunications cost is least important because this cost component is relatively small compared to setup costs and integration costs. The finding is consistent with the system development life cycle where only relevant costs are important. Non-adopters have to incur setup costs initially if they are to adopt while adopters will have to incur integration costs eventually if they are to optimize their system use.

t-test analysis for user grouping variable did not show any significant difference for all costs variables. Adopter and non-adopter do not differ significantly in their perception of costs.

5.8.2 Perception of Importance of Risks

The companies were asked to rate the importance of the risks variables. Table 5.14b (see appendix) shows the mean and t-tests of the risks variables for the sample, non-adopters and adopters. The mean of the risks variable for the sample, non-adopter and adopter ranges from 3.71 to 4.15, from 3.70 to 4.16 and from 3.72 to 4.16 respectively.

Adopters perceive internal risk of unauthorized access to EDI transactions as most important because unauthorized access will compromise their systems. Non-adopter's perceive external risk of exposure of EDI transactions to unauthorized persons as most important because unauthorized access will also compromise their systems. Adopters perceive the lack of accepted standards for data transmission as least important because conversion between different formats is handled behind the scenes and have no great effect on EDI transactions. Non-adopters regard the loss of full control over information through EDI use as least important because they perceive that loss of some control over information through EDI use will not compromise their security to a great extent.

t-test analysis for user grouping variable did not show any significant difference for all risks variables. Adopter and non-adopter do not differ significantly in their perception of risks.

5.8.3 Perception of Importance of Security

The companies were asked to rate the importance of security variables. Table 5.14b (see appendix) shows the mean and t-tests of the security variables for the sample, non-adopters and adopters. The mean of the security variables for the sample, non-adopter and adopter ranges from 3.99 to 4.19, from 3.99 to 4.16 and from 3.94 to 4.26.

Adopters and non-adopters perceive password security as most important for EDI transaction because most security system uses the userid/password pair to gain access to a system. Adopters perceive digital signature security as the least important variable because they seldom use digital signature for their EDI transactions. Non-adopters perceive EDI security standard for authenticity of EDI message to be least important because the security is built into EDI messages and is proven quite secure.

t-test for user grouping variable did not show any significant difference for all security variables. Adopter and non-adopter do not differ significantly in their perception of the importance of security variables.

5.8.4 Perception of Importance of Technological Complexity

The companies were asked to rate the importance of complexity variables. Table 5.14b (see appendix) shows the mean and t-tests of the complexity variables for the sample, non-adopters and adopters. The mean of the complexity variables for the sample, non-adopter and adopter ranges from 3.30 to 3.52, from 3.31 to 3.49 and from 3.26 to 3.58 respectively.

EDI as a technically complex document transfer process is perceived as the least important by adopters and non-adopters because its complexity is hidden from end users and does not affect EDI transactions. The many different standards for information exchange is perceived as most important by adopters and non-adopters because they are concerned that differing EDI standards would make it difficult to exchange data.

t-test analysis for user grouping variable did not show any significant difference for all complexity variables. Adopter and non-adopter do not differ significantly in their perception of the importance of technological complexity.

5.9 Perception of Importance of Adoption Constructs

The organizational-environmental-technological constructs were obtained by averaging the items of the constructs. Table 5.14b shows the means and t-tests of the constructs for the sample, non-adopters and adopters. The means of organizational constructs, environmental constructs and technological constructs for the sample range from 3.30 to 3.60, range from 3.20 to 3.60 and range from 3.40 to 4.10 respectively. The companies perceive the importance of organizational-environmental-technological constructs to be between neutral and fairly important. The technological constructs are perceived to be more important than the organizational and environmental constructs.

Table 5.14c: Perception of Importance of Adoption Constructs

Context	*Construct*	*Mean Sample (N = 284)*	*Mean Non-Adopter (N=198)*	*Mean Adopter (86)*	*t*	*Sig*
Organizational	Top Management Support	3.50	3.38	3.72	-3.36	0.00*
	IT Capability	3.60	3.57	3.78	-2.27	0.02**
	Compatibility	3.60	3.62	3.75	-1.18	0.24
	Internal Championship	3.30	3.20	3.49	-2.31	0.02**
Environmental	External Pressure	3.30	3.17	3.55	-3.51	0.00*
	Interorganizational Trust	3.60	3.46	3.78	-3.39	0.00*
	Critical Mass	3.20	3.13	3.37	-2.28	0.02**
	Legal Framework	3.70	3.68	3.76	-0.64	0.55
Technological	Cost	4.10	4.15	4.08	0.79	0.45
	Risks	3.90	3.93	3.97	-0.48	0.63
	Security	4.00	4.05	4.03	0.22	0.82
	Complexity	3.40	3.38	3.38	0.00	1.00
	Benefit	4.00	3.96	3.98	-0.31	0.76

*Significance level 0.10; **Significance level 0.05; ***Significance level 0,01

t-test analysis for user grouping variable showed significant difference for top management support, IT capability, internal championship and critical mass and external pressure and interorganizational trust constructs. The adopters perceive these six constructs to be more important than the non-adopters.

5.10 Reliability and Validity Analysis

Statistical tests to establish the reliability and validity of the survey instrument will be discussed next.

5.10.1 Construct Reliability

The adoption constructs are analyzed for reliability and validity. The three measures of construct reliability i.e. Cronbach's alpha, Guttman split-half reliability and composite reliability will be discussed in the following sections.

5.10.1.1 Cronbach's Alpha, Split-Half Reliability and Composite Reliability

Table 5.15 shows the composite reliability, Cronbach alpha and split half reliability. Cronbach's alpha assesses the reliability or internal consistency of each construct. Cronbach's alpha for organizational, environmental and technological variables ranges from 0.88 to 0.96, from 0.87 to 0.97 and from 0.93 to 0.97 respectively. Cronbach's alpha for benefits variables is 0.94.

The lower limit for Cronbach's alpha should have a reliability value of at least 0.70 is (Nunnally, 1978). Since Cronbach's alpha values range from 0.87 to 0.97, it indicate that the items of each construct (organizational, environmental, technological) form highly reliable measures.

Split-half reliability involves administering two equivalent batteries of items measuring the same thing in the same instrument to the same people. The Guttman split-half reliability measures a different dimension of reliability. Guttman split-half reliability for the organizational, environmental and technological variables ranges from 0.81 to 0.95, from 0.75 to 0.96 and from 0.87 to 0.92 respectively. Guttman split-half reliability for benefits variables is 0.86. Guttman split-half reliability for each construct ranges from 0.75 to 0.96 and indicates that the items of each construct (organizational, environmental, technological) form highly reliable measures.

Composite reliability for organizational, environmental and technological variables ranges from 0.71 to 0.93, 0.61 to 0.93 and 0.86 to 0.94 respectively. Composite reliability for benefits variables is 0.95. Composite reliability for each construct ranges from 0.61 to 0.95 and indicates that the items of each construct (with the exception of "critical mass") are highly reliable measures.

Table 5.15 shows that Cronbach's alpha, Guttman split-half reliability and composite reliability have high reliability.

Table 5.15: Summary of Measurement Scales

Context	Construct	M	SD	Factor Loading	Item Reliability	Composite Reliability	Cronbach Alpha	Split Half Reliability	Average Variance Extracted
1. Organizational	1. Top Management Support								
	management communicated to trade partners support for EDI	3.41	1.03	0.80	0.64				
	management communicated to employees support for EDI	3.39	1.02	0.80	0.64				
	management interested in company's EDI participation for comp advantage	3.59	1.02	0.84	0.71	0.91	0.93	0.91	0.68
	management considers EDI with trade partners important	3.59	0.98	0.82	0.67				
	management willing to take risks in EDI adoption	3.35	1.01	0.77	0.59				
	management committed to provide adequate resources for EDI	3.57	0.99	0.70	0.49				
	2. IT Capability								
	company has strong IT support	3.64	1.02	0.79	0.62				
	our employees are computer literate	3.77	0.85	0.82	0.67				
	our technical staff has EDI experience	3.43	0.96	0.70	0.49	0.87	0.88	0.83	0.64
	our technical staff has EDI expertise to support EDI	3.51	0.95	0.70	0.49				
	our company has good telecommunications infrastructure	3.83	0.85	0.77	0.59				
	3. Compatibility								
	EDI software compatible with company needs	3.72	0.98	0.71	0.50				
	EDI software compatible with existing standard operating procedures	3.69	0.99	0.68	0.46	0.71	0.94	0.81	0.55
	EDI software compatible with company's beliefs, values and experience	3.56	0.98	0.62	0.38				
	4. Internal Championship								
	someone influential actively support EDI use	3.34	1.05	0.85	0.72				
	someone influential actively promotes EDI's benefits	3.30	1.03	0.88	0.77	0.93	0.96	0.95	0.79
	someone influential shown keen interest to use EDI	3.30	1.03	0.90	0.81				
	someone influential create favorable opinion towards EDI among employees	3.23	1.02	0.87	0.76				
2. Environmental	5. External Pressure								
	trade partners mandated EDI use	3.36	1.13	0.83	0.69				
	trade partners recommended EDI use	3.16	1.06	0.87	0.76				
	trade partners requested EDI use	3.21	1.09	0.87	0.76	0.91	0.92	0.80	0.70
	pressure from industry on EDI use as standard purchasing practice	3.29	1.06	0.77	0.59				
	pressure from loss of competitive advantage due to lack of EDI links	3.39	1.08	0.71	0.50				

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Table 5.15, continued: Summary of Measurement Scales

Context	Construct	M	SD	Factor Loading	Item Reliability	Composite Reliability	Cronbach Alpha	Split-Half Reliability	Average Variance Extracted
	6. Interorganizational Trust								
	trade partners adhere to agreements	3.30	0.96	0.66	0.44				
	trade partners consistency in business dealings	3.37	0.98	0.69	0.48				
	trade partners willingness to share information	3.41	0.96	0.71	0.50				
	reliability of trade partners computer system	3.63	1.00	0.74	0.55	**0.91**	**0.95**	**0.91**	**0.62**
	competency of trade partners to accurately perform required tasks	3.68	1.00	0.81	0.66				
	trade partners honesty in business dealings	3.67	0.94	0.80	0.64				
	trade partners ability to deliver on promise	3.72	0.97	0.76	0.58				
	accuracy of deadlines met by trade partners	3.68	0.96	0.74	0.55				
	7. Critical Mass								
	adoption of EDI by trade partners is essential and inevitable	3.42	0.97	0.70	0.49				
	trade partners will be using EDI soon	3.15	0.99	0.59	0.35	**0.61**	**0.87**	**0.75**	**0.47**
	if our company uses EDI, trade partners will follow in EDI use	3.03	0.98	0.45	0.20				
	8. Legal Framework								
	e-commerce law exists to protect digital signature	3.64	1.08	0.89	0.79				
	e-commerce law exists to protect buyers and sellers	3.70	1.07	0.90	0.81	**0.93**	**0.97**	**0.96**	**0.79**
	e-commerce law exists to protect against computer crimes	3.75	1.09	0.89	0.79				
	existence of formal trade agreement that protects both trade partners	3.71	1.07	0.81	0.66				
3. Technological	9. Risks								
	EDI reduces full control over information	3.71	0.89	0.46	0.21				
	lack of signature for EDI transactions	3.72	0.97	0.63	0.40				
	lack of audit trails	3.79	0.98	0.68	0.46				
	lack of universally accepted standards for data transmission	3.75	0.94	0.63	0.40				
	risk of inadequate record retention	3.83	0.89	0.70	0.49				
	risk of lost EDI messages during transmission	4.04	0.90	0.80	0.64				
	risk of delayed EDI messages during transmission	3.99	0.88	0.78	0.61	**0.94**	**0.97**	**0.92**	**0.61**
	risk of incomplete EDI messages during transmission	4.01	0.92	0.79	0.62				
	risk of errors introduced into EDI messages	4.00	0.91	0.80	0.64				
	risk of disclosure of EDI messages to unauthorized persons	4.15	0.89	0.78	0.61				
	risk of modification of EDI message content	4.07	0.89	0.79	0.62				
	risk of unauthorized EDI transactions	4.15	0.89	0.76	0.58				
	risk of repudiation of EDI message origin	4.04	0.88	0.81	0.66				
	risk of repudiation of EDI message receipt	4.01	0.92	0.81	0.66				
	risk of programmer or operator errors	3.87	0.90	0.61	0.37				

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Table 5.15, continued: Summary of Measurement Scales

Context	Construct	M	SD	Factor Loading	Item Reliability	Composite Reliability	Cronbach Alpha	Split-Half Reliability	Average Variance Extracted
	10. Costs								
	consulting costs	4.18	0.87	0.84	0.71				
	setup costs	4.29	0.87	0.88	0.77				
	training costs	4.09	0.88	0.85	0.72				
	support staff costs	4.10	0.84	0.84	0.71	0.93	0.94	0.87	0.70
	integration costs	4.22	0.82	0.75	0.56				
	maintenance costs	4.12	0.97	0.83	0.69				
	telecommunications costs	3.88	0.97	0.67	0.45				
	11. Security								
	EDI security standards for authenticity of EDI message	3.99	0.88	0.74	0.55				
	EDI security standards for integrity of EDI message	4.01	0.88	0.76	0.58				
	EDI security standards for confidentiality of EDI message	4.01	0.87	0.75	0.56	0.86	0.96	0.91	0.59
	digital signature security for EDI transactions	4.00	0.88	0.65	0.42				
	password security for EDI transactions	4.19	0.86	0.64	0.41				
	data encryption security for EDI transactions	4.13	0.88	0.71	0.50				
	12. Complexity								
	EDI is difficult to understand and use	3.33	0.95	0.85	0.72				
	EDI is a technically complex document transfer process	3.3	0.95	0.87	0.76	0.90	0.93	0.90	0.74
	EDI uses technical standards that are unclear and difficult to implement	3.38	0.96	0.86	0.74				
	EDI uses many different standards for information exchange of protocols, procedures and data forms	3.52	0.92	0.77	0.59				
4. Benefits	13. Benefits								
	cost savings	4.10	0.95	0.66	0.43				
	closer trading partner relationships	3.79	0.99	0.76	0.57				
	improved customer services	4.15	0.90	0.73	0.53				
	competitive advantage	4.09	0.89	0.70	0.49				
	new ways of doing business	3.78	0.95	0.85	0.73				
	improved corporate image	3.81	0.90	0.83	0.69				
	compressed production cycle and delivery time	4.09	0.88	0.65	0.43				
	improved profits	4.01	0.97	0.80	0.63				
	increase market share	3.78	1.03	0.69	0.48	0.95	0.94	0.86	0.58
	improved efficiency and productivity	4.26	0.79	0.57	0.33				
	reduced paperwork	4.03	0.90	0.79	0.63				
	better data security	3.89	0.92	0.72	0.52				
	better data accuracy	4.06	0.90	0.74	0.55				
	empowered employees	3.65	0.88	0.68	0.47				
	improved integration with existing information systems	3.89	0.97	0.68	0.46				
	improved communications with business partner	3.90	0.91	0.55	0.30				
	reduced inventory	3.83	0.91	0.63	0.40				
	improved logistics	3.93	0.85	0.61	0.37				

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5.10.2 Construct Validity

Validity is the extent to which a scale or subset of measures accurately represents the concept of interest. Factor analysis and correlation were used to test convergent and discriminant validity of the constructs.

5.10.2.1 Convergent Validity and Factor Loadings

Convergent validity assesses the degree to which two measures of the same concept are correlated. Convergent validity can be assessed by factor loading and average variance extracted (AVE). A factor loading which is greater than 0.70 is significant and proves convergent validity.

Table 5.15 shows the factor loadings of the variables. The factor loadings for the organizational variables of “top management support” range from 0.70 to 0.84; of “IT capability” range" from 0.70 to 0.82; of “compatibility” range from 0.62 to 0.71 and of “internal championship” range from 0.85 to 0.90. The factor loadings for the environmental variables of “external pressure” range from 0.71 to 0.87; of “inter-organizational trust” range from 0.66 to 0.81; of “critical mass” range from 0.45 to 0.70 and of “legal framework” range from 0.81 to 0.90. The factor loadings for the technological variables of “risk” range from 0.46 to 0.81; of “costs” range from 0.67 to 0.88; of “security range” from 0.64 to 0.76 and of “complexity” range from 0.77 to 0.87. The factor loadings for benefits variables range from 0.55 to 0.85.

76.10% of the standardized factor loadings in the measurement model exceeded 0.70 and are considered significant. 19.40% of the standardized factor loadings are between 0.60 and 0.70 and are considered moderately significant. The exceptions are 4 variables with factors loading less than 0.60. The factor loadings demonstrate adequate convergent validity of the organizational, environmental, technological constructs.

5.10.2.2 Convergent Validity and Average Variance Extracted

The average variance extracted (AVE) measures the percentage of variance (in the indicators) captured by the latent construct relative to the amount of variance due to random measurement error (Netemeyer et al., 1990). Guidelines suggest that the variance extracted value should exceed 0.50 for a valid construct. The construct cannot be valid if the average variance extracted is less than 0.50 because the variance due to measurement error is greater than the variance due to the construct itself.

Table 5.15 shows the average variance extracted for each construct. The average variance extracted for the organizational, environmental and technological variables ranges from 0.55 to 0.79, from 0.47 to 0.79 and from 0.59 to 0.74 respectively. The average variance extracted for benefits variables is 0.58. The average variance extracted for the organizational, environmental and technological construct ranges from 0.47 to 0.79.

The average variance extracted values of the constructs (with the exception of "critical mass") exceeded the 0.50 lower limit recommended by Fornell and Larcker (1981). The average variance extracted demonstrates adequate convergent validity of the organizational, environmental and technological constructs.

5.10.2.3 Convergent Validity and Correlation

Convergent validity is shown by correlation analysis, i.e. items that measure the same factor should correlate highly with one another.

The correlation table for the technological variables is presented in Table 5.16a. The costs variables are more highly correlated with their associated costs variables than with any other technological variables. Correlation for the costs variables ranges from 0.54 to 0.84.

The risks variables, security variables and complexity variables are more highly correlated with their associated variables than with other technological variables. Correlation for the risks variables ranges from 0.43 to 0.94. Correlation for the security variables ranges from 0.73 to 0.96. Correlation for the complexity variables ranges from 0.69 to 0.84. Almost

all variables are moderately to highly correlated with one another with correlations that exceeded 0.60. This confirms the convergent validity of the technological factors. The correlation table for the organizational variables is presented in Table 5.16b. The “top management support” variables are more highly correlated with their associated “top management support” variables than with other organizational variables. The correlation for the “top management support” variables ranges from 0.59 to 0.79.

The “IT capability” variables and “internal championship” variables are more highly correlated with their associated variables respectively than with other organizational variables. Correlation for the “IT capability” variables ranges from 0.53 to 0.77. Correlation for the “internal championship” variables ranges from 0.82 to 0.91. Almost all variables are moderately to highly correlated with one another with correlations that exceeded 0.60. This confirms the convergent validity of the organizational factors.

The correlation table for the environmental variables is presented in Table 5.16c. The “external pressure” variables are more highly correlated with their associated “external pressure” variables than with other environmental variables. The correlation for the “external pressure” variables ranges from 0.64 to 0.89.

The “inter-organizational trust” variables and “legal framework” variables are more highly correlated with their associated variables respectively than with other environmental variables. Correlation for the “interorganizational trust” variables ranges from 0.63 to 0.89. Correlation for the “legal framework” variables ranges from 0.83 to 0.95. Almost all variables are moderately to highly correlated with one another with correlations that exceeded 0.60. This confirms the convergent validity of the environmental factors.

5.10.2.4 Discriminant Validity

Discriminant validity is the degree to which two conceptually similar concepts are distinct. Some researchers use r = 0.85 as a cutoff for assessing discriminant validity. Discriminant validity can also be tested by comparing the average variance extracted (AVE)

values associated with each construct to the correlations among the constructs (Anderson and Gerbing, 1988; Jarvenpaa and Staples, 2000).

5.10.2.5 Discriminant Validity and Correlation

Discriminant validity is achieved if an item correlates more highly with items that measure the same factor than with items that measure a different factor. Discriminant validity is determined by counting the number of times an item has a higher correlation with an item from another factor than with items from its own factor. Campbell and Fiske (1959) suggested that a count of less than one-half is acceptable as valid (Chau and Tam, 1997).

An examination of the correlation matrix of technological items (Table 5.16a) shows that only 88 (8.90%) of the 992 cells in the correlation matrix have correlations that are larger outside the factor than within the factor. This confirms the discriminant validity of the technological factors.

An examination of the correlation matrix of organizational items (Table 5.16b) shows that only 1 (0.95%) of the 105 cells in the correlation matrix has correlation that is larger outside the factor than within the factor. This confirms the discriminant validity of the organizational factors.

An examination of the correlation matrix of environmental items (Table 5.16c) shows only 8 (5.90%) of the 136 cells in the correlation matrix have correlations that are larger outside the factor than within the factor. This confirms the discriminant validity of the environmental factors.

5.10.2.6 Discriminant Validity and Average Variance Extracted

Table 5.16d shows the results of discriminant validity analysis. Each bold diagonal element in the table is obtained by taking the square root of the average variance extracted. Each off diagonal element is the correlation between the constructs. The correlations (shared variances) between constructs are lower than the square root of the average variance extracted on the individual constructs. This confirms discriminant validity of the adoption constructs.

5.11 Factor Analysis

Factor analysis is a multivariate statistical technique to identify the dimensions of the structure and determine the extent to which each variable is explained by each dimension. The factor analysis procedure follows the 7 stages recommended by Hair et al. (1998). Factor analyses of the technological, organizational and environmental constructs are presented in the following sections.

5.11.1 Full Sample Factor Analysis of Technological Variables (Stage 1)

32 technological variables were factor analyzed to identify the dimensions of the technological context.

5.11.1.1 Assessing Adequacy of Sample Size (Stage 2)

Factor analysis is appropriate and meaningful only if there are at least five times as many observations as there are variables to be analyzed. Our sample size of 284 observations is adequate for factor analysis since it exceeds the minimum sample size of 160 (32 X 5) observations which is required for factor analysis of the technological variables.

5.11.1.2 Evaluating the Assumptions of Factor Analysis (Stage 3)

Table 5.17 shows the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity (BTOS) for technological variables. The KMO measure is 0.95 and the Bartlett's test of sphericity has significance of 0.00. Both tests show that the sample is adequate to run factor analyses.

5.11.1.3 Deriving Factors, Assessing Overall Fit, Criteria for Number of Factors to Extract (Stage 4)

Principal component analysis (PCA) with latent root criteria was used to extract the factors. Factors with latent roots or eigenvalues > 1 are significant and are retained. Table 5.18 shows the total variance explained for the technological variables. 4 factors have eigenvalues > 1 and cumulative variance of 75.80 % is extracted for the technological context.

Table 5.17: Kaiser-Mayer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity

Context			Full Sample	Full Sample Vars dropped	Subsample 50A	Subsample 50A Vars dropped	Subsample 50B	Subsample 50B Vars dropped
Technological	Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.95		0.91	0.91	0.94	
	Bartlett's Test of Sphericity	Approx. Chi-Square	10806.91		4979.17	4567.76	6103.69	
		df	496.00		496.00	406.00	496.00	
		Sig.	0.00		0.00	0.00	0.00	
Organizational	Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.93	0.92	0.91	0.89	0.92	0.91
	Bartlett's Test of Sphericity	Approx. Chi-Square	5034.21	3934.32	2597.06	2053.95	2528.61	1975.01
		df	153.00	105.00	153.00	105.00	153.00	105.00
		Sig.	0.00	0.00	0.00	0.00	0.00	0.00
Environmental	Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.94	0.93	0.93	0.92	0.93	0.92
	Bartlett's Test of Sphericity	Approx. Chi-Square	6689.87	5408.03	3244.51	2797.74	3562.06	3202.17
		df	190.00	120.00	190.00	136.00	190.00	136.00
		Sig.	0.00	0.00	0.00	0.00	0.00	0.00

Table 5.18: Total Variance Explained for All Factor Models

Context		Full sample		Full sample Vars dropped		Subset 50A		Subset 50A Vars dropped		Subset 50B		Subset 50B Vars dropped	
		% of variance		% of variance		% of variance		% of variance		% of variance		% of variance	
Technological	Factor 1	RISK	30.6			RISK1	28.8	RISK	30.8	RISK	31.4		
	Factor 2	COST	18.4			COST	15.7	COST	17.5	COST	20.1		
	Factor 3	SECU	13.9			SECU	12.5	SECU	13.8	SECU	14.7		
	Factor 4	COMP	12.9			COMP	12.1	COMP	13.5	COMP	12.9		
	Factor 5					RISK2	7.4						
	Total variance		**75.8**				**76.5**		**75.6**		**79.1**		
Organizational	Factor 1	ITC	26.7	TMS	29.7	TMS	26.9	TMS	31.2	ITC	29.5	TMS	27.8
	Factor 2	TMS	25.5	ICH	24.5	ITC	24.7	ICH	24.6	TMS	23.9	ICH	24.9
	Factor 3	ICH	23.0	ITC	23.3	ICH	24.2	ITC	22.5	ICH	22.2	ITC	24.2
	Total variance		**75.2**		**77.5**		**75.8**		**78.3**		**75.6**		**76.9**
Environmental	Factor 1	ITR	30.2	ITR	29.3	ITR	29.2	ITR	31.0	ITR	29.8		42.1
	Factor 2	EPR	26.4	EPR	27.3	EPR	27.1	EPR	25.5	EPR	27.1		35.7
	Factor 3	LFR	21.1	LFR	25.3	LFR	20.8	LFR	23.7	LFR	22.1		
	Total variance		**77.7**		**81.9**		**77.1**		**80.2**		**79.0**		**77.8**

Risk: Risks, Cost: Costs, Secu: Security, Comp: Complexity **ITC:** Information Technology Capability, **TMS:** Top management support, **ICH:** Internal Championship
ITR: Interorganizational Trust, **EPR:** External Pressure, **LFR:** Legal Framework

5.11.1.4 Criteria for Significance of Factor Loadings (Stage 4)

The rotated component matrix was examined for significant factor loadings. Factor loadings > ± 0.30 meet the minimum level. Loadings of > ± 0.40 are more important and loadings > ± 0.50 are considered practically significant. The squared factor loading is the amount of a variable's total variance accounted for by the factor.

Statistical power based on sample size to indicate significant factor loadings is used by SPSS to report factor loadings. The factor loadings have to exceed 0.35 if it is significant for a sample size of 284. The factor loading is significant if it exceeds 0.45 for a sample size of 142 (sample 50A and 50B).

Table 5.19a, Table 5.19b and Table 5.19c present the factor loadings for the technological, environmental and organizational variables for the full sample, subset 50A and subset 50B sample respectively. The factor loadings in Table 5.19a, Table 5.19b and Table 5.19c are all greater than 0.40 and significant ($p < 0.05$) at a power level of 0.80.

5.11.1.5 Factor Rotation and Interpreting the Factor Matrix (Stage 5)

SPSS computes the initial unrotated factor matrix to determine the number of factors to extract. Orthogonal varimax rotation gives a rotated factor matrix with a simplified factor structure. Table 5.19a shows the rotated matrix of factor loadings for the full sample. Each column of numbers represents a separate factor (component). The columns of numbers are the factor loadings for each variable on each factor. The factor pattern matrix has loadings that represent the unique contribution of each variable to the factor. Factor analysis of the technological variables extracted four factors. The variables within each factor load more highly on their corresponding factor than on other factors giving a simple factor structure. The risks construct is the first factor of 15 risks variables. The costs construct is the second factor of 7 costs variables. The security construct is the third factor of 6 security variables. The complexity construct is the fourth factor of 4 technological complexity variables.

Table 5.19a: Factor Analysis Results (Full Sample)

Context		Factor Loadings									
	ITEMS	RISK	COST	SECURITY	COMPLEXITY	IT CAPABILITY	TOP MANAGEMEMT SUPPORT	INTERNAL CHAMPIONSHIP	INTER-ORGANIZATIONAL TRUST	EXTERNAL PRESSURE	LEGAL FRAMEWORK
Technological	REPMSGOR	0.81									
	REPMSGRE	0.81									
	LOSEDMSG	0.80									
	ERREDMSG	0.80									
	MDEDMSG	0.79									
	INCEDMSG	0.79									
	DELEDMSG	0.78									
	DISEDMSG	0.78									
	UNAUTTXN	0.77									
	INADRECR	0.70									
	LAUDTRAI	0.68									
	LSIGAUTH	0.63									
	LSTDATRA	0.63									
	PRGOPRER	0.61									
	RCTLINFO	0.46									
	SETUPCOS		0.88								
	TRAINCOS		0.85								
	SSTAFCOS		0.84								
	CONSCOST		0.84								
	MAINCOST		0.83								
	INTCOST		0.75								
	TELECOST		0.67								
	STDINTEG			0.76							
	STDCONFI			0.75							
	STDAUTHE			0.74							
	DATENCRY			0.71							
	DIGSIGSE			0.65							
	PWDSEC			0.64							
	CXFERPRO				0.87						
	STDIF2IM				0.86						
	DIF2USE				0.85						
	UDIFSTD				0.77						
Organizational	GTELINFR					0.78					
	ECOMPLIT					0.76					
	STRITSUP					0.75					
	TSEDIKNO					0.72					
	TSEXPEDI					0.68					
	IPRTCADV						0.82				
	ETPIMPT						0.81				
	COMEMPSP						0.80				
	COMTPSUP						0.79				
	WTRADOPT						0.78				
	CPRADRES						0.69				
	SIKINTED							0.89			
	SIPROEDI							0.87			
	SIFAVOPI							0.86			
	SISUPEDI							0.83			
Environmental	TPCPTASK								0.80		
	TPHONBDE								0.78		
	TPABDELP								0.75		
	TPCSYREL								0.74		
	ACCDATME								0.73		
	TPWSHINF								0.71		
	TPCOBDEL								0.68		
	TPADHAGR								0.65		
	TPRECUSE									0.88	
	TPREQUSE									0.88	
	TPMANDUS									0.61	
	IPRSPP									0.75	
	PRLOSCAD									0.70	
	PBUYSELL										0.90
	PCOMCRIM										0.89
	PDIGSIG										0.69
	PBOTHTP										0.61

*Factor Analysis is run on full sample
*** Loadings < 0.4 not shown

** Variables which do not rotate into recognizable factors have been dropped from analysis

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Table 5.19b: Factor Analysis Results (Sample 50A)

Context		Factor Loadings									
	ITEMS	RISK	COST	SECURITY	COMPLEXITY	TOP MANAGEMENT SUPPORT	IT CAPABILITY	INTERNAL CHAMPIONSHIP	INTERORGANIZATIONAL TRUST	EXTERNAL PRESSURE	LEGAL FRAMEWORK
Technological	INCEDMSG	0.86									
	ERREDMSG	0.85									
	REPMSGRE	0.85									
	LOSEDMSG	0.85									
	REPMSGOR	0.83									
	MDEDMSG	0.82									
	DELEDMSG	0.81									
	UNAUTTXN	0.75									
	DISEDMSG	0.75									
	PRGOPRER	0.64									
	LSTDATRA	0.55									
	LSIGAUTH	0.51									
	TRAINCOS		0.90								
	SETUPCOS		0.89								
	SSTAFCOS		0.87								
	CONSCOST		0.86								
	MAINCOST		0.80								
	INTCOST		0.66								
	TELECOST		0.56								
	STDCONFI			0.77							
	STDINTEG			0.77							
	STDAUTHE			0.76							
	DATENCRY			0.66							
	DIGSIGSE			0.65							
	PWDSEC			0.62							
	STDIF2IM				0.87						
	DIF2USE				0.87						
	UDIFSTD				0.83						
	CXFERPRO				0.80						
Organizational	IPRTCADV					0.84					
	ETPIMPT					0.83					
	CCMEMPSP					0.82					
	WTRADOPT					0.82					
	COMTPSUP					0.81					
	CPRADRES					0.73					
	ECOMPLIT						0.78				
	STRITSUP						0.78				
	GTELINFR						0.77				
	TSEDIKNO						0.72				
	TSEXPEDI						0.66				
	SIKINTED							0.88			
	SIPROEDI							0.88			
	SIFAVOPI							0.86			
	SISUPEDI							0.84			
Environmental	TPCPTASK								0.82		
	TPHONBDE								0.77		
	ACCDATME								0.76		
	TPABDELP								0.75		
	TPCSYREL								0.73		
	TPCOBDEL								0.71		
	TPADHAGR								0.69		
	TPWSHINF								0.66		
	TPREQUSE									0.86	
	TPRECUSE									0.86	
	TPMANDUS									0.78	
	IPRSPP									0.78	
	PRLOSCAD									0.69	
	PBUYSELL										0.90
	PDIGSIG										0.89
	PCOMCRIM										0.89
	PBOTHTP										0.82

*Factor Analysis is run on sample 50A
*** Loadings < 0.4 not shown

** Variables which do not rotate into recognizable factors have been dropped from analysis

Table 5.19c: Factor Analysis Results (Sample 50B)

Context		Factor Loadings									
	ITEMS	RISK	COST	SECURITY	COMPLEXITY	IT CAPABILITY	TOP MANAGEMENT SUPPORT	INTERNAL CHAMPIONSHIP	INTERORGANIZATIONAL TRUST	EXTERNAL PRESSURE	LEGAL FRAMEWORK
Technological	DISEDMSG	0.80									
	MDEDMSG	0.79									
	REPMSGOR	0.79									
	ERREDMSG	0.79									
	REPMSGRE	0.77									
	UNAUTTXN	0.77									
	INCEDMSG	0.77									
	DELEDMSG	0.77									
	LOSEDMSG	0.77									
	LAUDTRAI	0.72									
	INADRECR	0.69									
	LSIGAUTH	0.67									
	LSTDATRA	0.65									
	PRGOPRER	0.58									
	RCTLINFO	0.58									
	SETUPCOS		0.86								
	MAINCOST		0.83								
	INTCOST		0.82								
	SSTAFCOS		0.79								
	CONSCOST		0.79								
	TRAINCOS		0.76								
	TELECOST		0.70								
	STDINTEG			0.73							
	STDCONFI			0.73							
	DATENCRY			0.72							
	STDAUTHE			0.71							
	DIGSIGSE			0.67							
	PWDSEC			0.65							
	CXFERPRO				0.86						
	STDIF2IM				0.86						
	DIF2USE				0.84						
	UDIFSTD				0.77						
Organizational	GTEUNFR					0.76					
	TSEXPEDI					0.73					
	TSEDIKNO					0.72					
	STRITSUP					0.72					
	ECOMPLIT					0.71					
	COMEMPSP						0.80				
	IPRTCADV						0.78				
	COMTPSUP						0.78				
	ETPIMPT						0.77				
	WTRADOPT						0.70				
	CPRADRES						0.59				
	SIKINTED							0.90			
	SIFAVOPI							0.86			
	SIPROEDI							0.85			
	SISUPEDI							0.82			
Environmental	TPHONBDE								0.79		
	TPCPTASK								0.79		
	TPABDELP								0.75		
	TPWSHINF								0.74		
	TPCSYREL								0.73		
	ACCDATME								0.69		
	TPCOBDEL								0.63		
	TPRECUSE									0.90	
	TPREQUSE									0.89	
	TPMANDUS									0.83	
	IPRSPP									0.73	
	PRLOSCAD									0.72	
	TPADHAGR									0.63	
	PBUYSELL										0.89
	PCOMCRIM										0.89
	PDIGSIG										0.89
	PBOTHTP										0.80

*Factor Analysis is run on sample 50B

** Variables which do not rotate into recognizable factors have been dropped from analysis

*** Loadings < 0.4 not shown

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5.11.1.6 Total Variance Explained (Stage 5)

Table 5.18 shows the table of total variance explained for the technological context for all data samples. The total column is the eigenvalues of 4 factors. Risks, costs, security and complexity explained 30.60%, 18.40%, 13.90% and 12.90% respectively of the total variance for the full sample. These four factors accounted for 75.80% of the total variance for the technological context.

5.11.1.7 Validation of Factor Analysis (Stage 6)

A split-sample of the original data was used to assess the degree of generalizability of the results to the population. The original sample was split into two random subsets of 50:50 proportions of cases for the validation test. The sample was chosen so that the ratio of EDI adopters to EDI non-adopters was the same as that in the original sample, i.e. 30 EDI adopters for every 100 EDI non-adopters. Two subsets (50A and 50B) were selected. Factor analysis was performed on each subset The results of the factor analysis validation tests are discussed in the following sections.

5.11.1.8 Factor Analysis Validation Using Subset 50A and 50B

This section presents the factor analysis validation runs on subsets 50A and 50B. Subset 50A and 50B each has 142 cases. Table 5.17 shows the KMO measure of sampling adequacy and Bartlett test of sphericity for subset 50A and 50B. Table 5.18 shows the total variance explained for subset 50A and 50B.

The KMO measure for subset 50A is 0.91 while the Bartlett's test of sphericity has a significance of 0.00. Table 5.19b shows the rotated matrix of factor loadings for subset 50A. Factor rotation of subset 50A produced 5 factors which explained 76.50% of total variance. The 3 risks variables (lack of audit trail, reduced control over information, inadequate record retention) of the "risks2" factor were dropped because there is no theoretical basis to include only three variables in the factor. Another factor analysis run extracted four factors of "risks",

"costs", "security" and "complexity" which respectively accounted for 75.60% of the total variance of the technological context.

Factor analysis was run on the subset 50B. The KMO measure is 0.94 and Bartlett's test of sphericity has a significance of 0.00. Table 5.19c shows the rotated matrix of factor loadings for subset 50B. Factor rotation extracted the same 4 factors of "risks', "costs", "security" and "complexity". The 4 factors explained respectively 79.10% of the total variance of the technological context. No variables were dropped since all the variables in each factor have strong theoretical backing.

5.11.1.9 Summary of Factor Analysis Validation Runs

Table 5.18 shows in four validation runs, the "Risks" factor has the largest variance followed by costs, security and complexity factor. The total variance explained for four validation runs is greater than 75.60%.

3 factor analysis validation runs produced the expected factor model results for the technological context. The results demonstrate that the factor models are stable across the sample. The stability of the technological factor models shows that statistical analysis results can be generalizable to the population.

5.11.2 Full Sample Factor Analysis of Organizational Variables (Stage 1)

18 organizational context variables were factor analyzed to identify the dimensions of the organizational context.

5.11.2.1 Assessing Adequacy of Sample Size (Stage 2, 3)

284 cases (90 minimum cases) are sufficient to run factor analysis. Table 5.17 shows that the Kaiser-Meyer-Olkin measure of sampling adequacy is 0.93 and Bartlett's test of sphericity is 0.00.

5.11.2.2 Factor Rotation (Stage 4, 5)

Table 5.18 shows the total variance explained for the organizational variables. Three factors extracted after varimax rotation explained 75.20% of total variance of the organizational context.

Three compatibility variables were included as part of the "IT Capability" factor in the first factor analysis run. After dropping these variables, a further factor analysis run extracted three factors of "Top Management Support", "Internal Championship" and "Information Technology Capability" which accounted for 77.50% respectively of the total variance of the organizational context.

5.11.2.3 Validation of Factor Analysis (Stage 6)

Subsets 50A and 50B which are split samples of the original data were used for validating factor analysis of the organizational context. Factor analysis validation results are presented in the following sections.

5.11.2.4 Factor Analysis Validation Using Subset 50A and 50B

Subset 50A and 50B each have 142 cases (minimum 90 cases) to run factor analysis. Table 5.17 shows the KMO measure of sampling adequacy and Bartlett test of sphericity for subset 50A and 50B. Table 5.18 shows the total variance explained for subset 50A and 50B. The KMO measure for subset 50A is 0.91 and Bartlett's test of sphericity has a significance of 0.00.

Factor analysis (Table 5.18) extracted the 3 factors of "Top Management Support", "IT Capability" and "Internal Championship" which respectively explained 75.80% of the total variance of the organizational context.

The first factor analysis showed that two compatibility variables are part of the "IT Capability" factor and one compatibility variable is part of the "Internal Championship" factor. After dropping three compatibility variables, the KMO measure for subset 50A is 0.89 and Bartlett's Test of Sphericity has a significance of 0.00. A further factor analysis run

extracted 3 factors of “Top Management Support”, “Internal Championship” and “IT Capability” which respectively explained 78.30% of the total variance of the organizational context.

The KMO measure for subset 50B is 0.93 and Bartlett’s test of sphericity has a significance of 0.00. Factor rotation extracted 3 factors of “IT Capability”, “Top Management Support” and “Internal Championship” which respectively explained. 75.60% of the total variance of the organizational context.

Factor analysis showed that 3 compatibility variables are part of the “IT Capability” factor. These 3 compatibility variables were dropped based on theoretical reasoning and factor analysis was run again. The KMO measure for subset 50B is 0.91 and Bartlett’s test of sphericity has a significance of 0.00. Factor analysis extracted 3 factors of “Top Management Support”, “Internal Championship” and “IT Capability” which explained 76.90% of the total variance of the organizational context.

5.11.2.5 Summary of Factor Analysis Validation Runs

Table 5.18 shows that in four of six validation runs, “Top Management Support” has the largest variance. In three of six validation runs “Internal Championship” has the second largest variance. In three of six validation runs “Information Technology Capability” has the third largest variance. In six validation runs, the total variance explained accounted for more than 75.20% of the total variance. Three factor analysis validation runs show that the factor models of the organizational context are stable across the sample. The stability of the organizational factor models shows that statistical analysis results can be generalizable to the population.

5.11.3 Full Sample Factor Analysis of Environmental Variables

20 environmental variables were factor analyzed to identify the dimensions of the environmental context.

5.11.3.1 Assessing Adequacy of Full Sample (Stage 2, 3)

284 cases (90 minimum cases) are sufficient for factor analysis. Table 5.17 shows the Kaiser-Meyer-Olkin measure of sampling adequacy has a value of 0.94 and Bartlett's test of sphericity has a significance of 0.00.

5.11.3.2 Factor Rotation (Stage 4, 5)

Table 5.18 shows the total variance explained for the environmental variables. The three factors extracted "Inter-organizational Trust", "External Pressure" and "Legal Framework" explained 77.70% of the environmental context.

Factor Analysis showed a critical mass variable to be part of the "Inter-organizational Trust" factor. Another two critical mass variables were part of the "External Pressure" factor. These 3 critical mass variables do not belong to the "Inter-organizational Trust" and "External Pressure" factor and were dropped. A further factor analysis run extracted the three factors of "Inter-organizational Trust", "External Pressure" and "Legal Framework" which explained 81.90% of total variance of environmental context.

5.11.3.3 Validation of Factor Analysis (Stage 6)

Subsets of the original sample were used for validating factor analysis of the environmental context. The two subsets were chosen randomly so that 50% of the cases are in the first subset (50A) and the other 50% of the cases are in the second subset (50B). Factor analysis validation results are discussed in the following sections.

5.11.3.4 Factor Analysis Validation Using Subset 50A and 50B

Subset 50A and 50B each have 142 cases (100 minimum cases) to run factor analysis. Table 5.17 shows the KMO measure of sampling adequacy for subset 50A is 0.93 while the Bartlett's test of sphericity has a significance of 0.00. Table 5.18 shows that the three factors, "Inter-organizational Trust", "External Pressure" and "Legal Framework" explained 77.10% of the total variance of the environmental context.

Factor analysis shows that three critical mass variables do not belong to “Inter-organizational Trust” and “External Pressure” factor and were dropped. Table 5.18 shows that the 3 factors of “Inter-organizational Trust”, “External Pressure” and “Legal Framework” explained respectively 80.20% of the total variance of the environmental context.

Factor analysis was run subset 50B. Table 5.17 shows that the KMO measure is 0.93 and Bartlett’s test of sphericity has a significance of 0.00. Table 5.18 shows that the 3 factors “Inter-Organizational Trust”, “External Pressure” and “Legal Framework” explained respectively 79.00% of the total variance of the environmental context.

5.11.3.5 Summary of Factor Analysis Validation Runs

In five validation runs, “Inter-organizational Trust” has the largest variance followed by external pressure and legal framework. The total variance explained for all five validation runs is greater than 77.10% of the total variance of the environmental context.

Five validation runs produced the intended factor model results for the environmental context. This shows that the factor model results are stable across the sample. The stability of the environmental factor models shows that statistical analysis results can be generalizable to the population.

5.12 Multiple Regression

Multiple regression was run for non-adopters using the “Intention to Use” as the dependent variable. There is no significant relationship (R2 = 0.094) between the 14 independent variables and the “intention to use” dependent variable.

5.13 Common Method Biases

This section discusses common method biases which pose a major problem in behavioral sciences research. The steps taken to control for common method biases in this research setting and the reasons for omitting some procedures or statistical remedies are given in the following sections.The main sources of common method biases are (1) Method effects

produced by a common source or rater (2) Method effects produced by item characteristics (3) Method effects produced by item context and (4)Measurement context effects.

Following the recommended steps from Podsakoff et al. (2003), the method for controlling for common method variance in our research settings is situation 6 with the following remedial procedures. (1) Use all procedural remedies relation to questionnaire design (2) Separate measurement of predictor and criterion variables psychologically and guarantee response anonymity. (3) Use single-common–method factor approach and Multiple common-method-factor approach.

It is not always possible or even practical to eliminate all forms of common method biases. The best course of action is to identify the most important common method biases that have the greatest impact on this research and to correct for them.

It is observed that common method variances could be problematic in studies of relationships involving attitude or behavioral intent in IS models such as TAM. Many of these studies use the structural equation modelling technique where the path coefficients which are measured could be inflated. We have not chosen the SEM methodology and also not chosen to study any behavioral intention-related variables. Therefore the issue of common method biases being a problem is not likely to occur.

5.13.1 Common Rater Biases

The method effects caused by a single respondent are not significant in our research setting. For example, it is neither socially desirable nor otherwise for accepting or rejecting the use of a neutral technology such as EDI. Leniency biases do not come into play because this is an impersonal technology and not a person of itself. Since this study is on the business decision to adopt EDI and the responses are completed by top management who are impartial, there is little likelihood that negative affectivity, acquiescence response or consistency motif will have much bearing on their responses. The conclusion drawn is that method effects produced by common rater is insignificant in our research.

5.13.2 Item Characteristics

The items to measure the research's constructs have no social desirability characteristics and are neutral to the respondent. Moreover, the items have been carefully identified after much in-depth literature review, pilot tested with experts in the field, and amended to ensure that the wording is simple and specific.. Finally, the research undertaken do not use negatively worded items which may be a source of method bias. It can be concluded that there is negligible influence from method effects produced by item characteristics.

5.13.3 Item Context

Priming effects are irrelevant in our research context since the items in each context (technology/organization/environment) do not make other items appear more salient to the respondents. There are no mood influencing questions in the research questionnaire. Our scales contain sufficient items and there is no intermixing of different constructs. It is concluded that there is insignificant influence from method effects produced by item context.

5.13.4 Measurement Context Effects

We cannot control for the time and location that the respondent will complete the questionnaire since it is self-administered. However, it is most likely to be completed in an office during office hours because it is targeted to top management such as chief executive officer or general manager or some person in a similar position within an organization. As such we can eliminate biases arising from interviewer characteristics. We can conclude that measurement context effects should not be a major concern in this study.

5.13.5 Arguments against Procedural Remedies

The reasons why procedural remedies are not feasible are presented below. It is not feasible to collect the data from more than one source in our survey research. The solution to separate the measurement of predictor and criterion variable either through a temporal separation or a psychological separation is not practical. The reassurance that the identity of

the respondent will be kept anonymous is communicated to the respondent in the questionnaire and maintained throughout the analysis and reporting stage.

5.13.6 Statistical Remedies

The reasons why some statistical remedies are applied while others are not are presented below.The multi-trait-multi-method (Campbell and Fiske, 1959) cannot be applied fully. We are restricted by our research setting to only one method (one type of respondent and one type of instrument-based scale) but the use of multiple trait is allowable (Kenny, 2012). In this case, we used a modified MTMM by leaving out the methods factor. In this way, we can prove convergent and discriminant validity. We have proven construct validity of the measures used by establishing convergent and discriminant validity. In addition we provide corroborative evidence of the scale's internal consistency and factor structure. Conway and Lance (2010) argue that it is reasonable to expect from authors of journal articles or dissertation to provide construct validity evidence when assessing the effects of common method biases in their work. Conway and Lane (2010) further state that regarding common method bias, reviewers should verify that there is sufficient evidence that the authors took proactive design steps to mitigate the threats of methods effects. All of the recommendations by Conway and Lane (2010) have been adhered to in this research.

The use of Harman's single factor test is not applied in our research because it is an insensitive test and is not recommended by Podsakoff et al. (2003). The use of partial correlation procedures are not used because we are not attempting to partial out social desirability or general affectivity which incidentally is non-existent. We are not going to identify a marker variable since there is no theoretical basis to identify a marker variable for a non behavioral based relationship unlike that of Malhotra et al. (2006) where they identified marker variables for TAM model and concern for information privacy (CFIP) model. We are not going to use the latent variable model by modelling the presumed cause of method bias as a latent construct since the use of latent variables is not relevant to our research framework.