CHAPTER FOUR
RESEARCH RESULTS

This chapter presents the findings of the survey. The survey conducted was able to collect data from forty-three respondents. The responses were collected and converted into suitable format before it was uploaded into SPSS for statistical analysis.

This section begins with a description of the general characteristics of the respondents. This is followed by a summary of the respondents' perceptions towards the importance of forty-six CSFs. Internal consistency reliability assessments will then be conducted to determine whether the composite items were reliable and would be used for subsequent analysis. After that, factor analysis will be performed to identify or select surrogate variables for that associated composite CSFs. Lastly, regression analysis were be carried out to determine the extend of the relationships between composite CSFs and the IS success.

4.1 Characteristics of the Respondents

A total of sixty (60) sets of the questionnaires were distributed for this study. A total of forty-five (45) responses were obtained. Of these, two (2) questionnaires were not useable due to incomplete information and wrong sample group. Thus the data were analyzed using a sample size of forty-three (43) respondents. Based on the data collected, a demographic profile of the respondents was constructed as shown in Tables 1-3.

Table 1 reports statistics related to participants' division in the organization. As shown in Table 1, there were 16 and 27 respondents from Credit Management Division (CMD) and Credit Card Center (CCC) respectively. This amount

constitutes 26.7 percent and 38.1 percent of the total staffs in both departments respectively.

Division	Frequency	Percentage
Credit Management Division (CMD)	16	37.20%
Credit Card Centre (CCC)	27	62.80%
Total	43	100.00%

Table 1: Division Status of Responding End-Users

In terms of working experience, the largest group fell into the 1-3 years category, forming 41.86 percent of the respondents. Respondents with less than one year made up 27.91 percent of the sample. Both 4-6 and 7-10 years categories constituted 13.95 percent of the sample. Another 2.33 percent of the respondents were in more than 10 years category. Statistical related to the responses is reported in Table 2.

Working Experience	Frequency	Percentage
Less than 1 years	12	27.91%
1-3 years	18	41.86%
4-6 years	6	13.95%
7-10 years	6	13.95%
More than 10 years	1	2.33%
Total	43	100.00%

Table 2: Working Experience of Responding End-Users

4.2 Perceptions towards different Critical Success Factors (CSFs)

In this study, the perceptions of the respondents were examined. The items were introduced with the phase "Please rate your perceptions on the importance of a list of CSFs towards successful implementation of IS in your organization". There were altogether a total of forty-six items in section two of the questionnaire. The responses were measured on 5-point Likert scales ranging from "1" (Not Important) to "5" (Very Important).

Running the data through SPSS using the option of descriptive statistics, the mean values of all the items were identified. A summary result of the analysis is provided in Table 3.

Rank	CRITICAL SUCCESS FACTORS	Mean
1	Reliability of application developed	4.6047
2	Accuracy of application developed	4.5581
3	Precision of application developed	4.3488
4.5	Ease of use of application developed	4.2558
4.5	Completeness of application developed	4.2558
7.5	Existence of sufficient budget	4.1395
7.5	Technical competency of IS staff	4.1395
7.5	Training for IS staff	4.1395
7.5	Communication with users of all levels	4.1395
10	Timeliness of service response	4.1250
11	Offering of cost-effective solutions	4.0789
12.5	Timeliness of application developed	4.0698
12.5	Knowledge of the users' business and problems	4.0698
14	Maintenance of user-friendly atmosphere	4.0526
15	User's feeling of control	3.9535
16.5	Top management support	3.9302
16.5	Knowledge of rapid changes in technology	3.9302
18	Quality of end-user training	3.9250
19	Quality of data support	3.9000
20.5	Quality of software support	3.8750
20.5	Clearly define IS mission	3.8750

Rank (cont')	CRITICAL SUCCESS FACTORS (cont')	Mean (cont')
22.5	User's ability to develop a small system	3.8605
22.5	Variety of data support	3.8605
24.5	Variety of functional support	3.8372
24.5	Variety of end-user training	3.8372
26	Effective EUC control procedures	3.8250
27	Organizational acceptance of the IS concept	3.7907
28.5	Quality of functional support	3.7750
28.5	Alignment of IS strategy to organizational strategy	3.7750
30	Management of end-user expectations	3.7368
31	Quality of hardware support	3.7250
32.5	Format of application developed	3.7209
32.5	End-user commitment to the IS concept	3.7209
34	Users' understanding of the IS concept	3.6750
35	User's independence from the IS department	3.6744
36.5	Monitoring and tracking of IS successes	3.6512
36.5	Variety of software tools	3.6512
38	Establishment of priority criteria for application development	3.6053
39	Promotion of IS services	3.6047
40	Coordination of organization's user-developed applications	3.5789
41	User's understanding of information technology	3.5349
42	Variety of hardware support	3.3953
43	Career paths for IS staff	3.3023
44	Appropriate charge back criteria	3.1500
45	Rank of the IS executive	2.9767
46	Number of IS employees	2.8140

Table 3: Ranking of Perception on the Importance of Different CSFs

Ten items were found to be rather important, i.e. having mean scores of 4.1 and above. These items were

- Reliability of application developed (4.6047)
- Accuracy of application developed (4.5581)
- Precision of application developed (4.3488)
- Ease of use of application developed (4.2558)
- Completeness of application developed (4.2558)

- Existence of sufficient budget (4.1395)
- Technical competency of IS staff (4.1395)
- Training for IS staff (4.1395)
- Communication with users of all levels (4.1395)
- Timeliness of service response (4.1250)

The study also found that the respondents generally rated a lower level of importance to two items (i.e. having mean scores of less than 3). The items were

- Rank of the IS executive (2.9767)
- Number of IS employees (2.8140)

As shown in Table 4 below, overall, the respondents considered "quality of user-developed applications " as the most important composite CSF. In addition, the respondents also had highly positive perception about the composite factors such as "quality of services" and "facilitation of EUC".

Rank	COMPOSITE CSFs	Mean
1	Quality of user-developed applications	4.2591
2	Quality of services	3.8875
3	Facilitation of EUC	3.8105
4	Quality of staff	3.7907
5	Variety of services	3.7163
6	Organizational commitment	3.6877
7	IS role definition	3.6600
8	User self-sufficiency	3.5058

Table 4: Ranking of Perception on the Importance of Different Composite CSFs

The result shown in Table 3 and Table 4 indicates that most of the respondents were mainly concerned with the quality of the applications developed by the users. Thus, the ability of the applications to provide reliable, accurate and precision data is perceived to be important in ensuring success of IS. The results suggests that managers should put efforts in monitoring and coaching end-users on the more technical aspects of application development, i.e. the design and testing phases.

Attempts should also be made to improve general computer literacy of users before allowing them develop and operate their own applications. This is because users with higher technical competence are likely to be more confident in their ability to develop high quality applications and thus increase user satisfaction.

The results also identified that supports are essential for the various categories of hardware and software used in IS. A high quality of software support and controls is crucial in monitoring the use of system and prevent unauthorized access of software programs, system software and computer programs. Moreover, it is also important to ensure IS hardware is physically secure. This is because poor quality of hardware supports may cause the hardware to have serious malfunctions or may break down altogether.

Lastly, the respondents perceived that "user self-sufficiency" as of least important. This suggests that most of the end-users still have to depend on IS experts for advice or support during application development.

4.3 Internal Consistency Reliability Assessment

Cronbach's coefficient alpha was used to test for the internal consistency reliability on each of the composite CSFs. The alpha scores for each dimension are presented in Table 5.

Composite Critical Success Factors	Mean	Std Dev	Reliability *Cronbach Alpha*
Quality of user-developed applications (7 items)	29.8140	3.0100	0.6195
User self-sufficiency (4 items)	14.0233	2.1435	0.4959
Organizational commitment (7 items)	25.8140	5.0012	0.8638
Quality of staff (7 items)	26.5349	4.3114	0.8070
Variety of services (5 items)	18.5814	3.2163	0.8388
Quality of services (6 items)	23.3250	3.7919	0.8746
Facilitation of EUC (5 items)	19.0526	2.5143	0.7243
IS role definition (5 items)	18.3000	3.3756	0.8084

Table 5: Reliability Coefficients for the Composite Scales

As shown in Table 5, the final alpha scores ranged from 0.6195 to 0.8746 except for reliability coefficient of "user self-sufficiency" (0.4959). Thus this composite CSF did not meet Nunnally's (1978) guideline of between 0.5 to 0.6 and thus considered not reliable. In the subsequent analysis, factor "user self-sufficiency" would be dropped from analysis.

4.4 Factor Analysis

The factor model used was the principal components analysis as the objective was to identify or select surrogate variable which was closely related to that associated factor for use in subsequent analysis. In the component analysis, only factors having latent root (eigenvalue) greater than 1 were considered significant.

As shown in Table 6, all the seven composite CSFs have the total variance greater than 50 percent. The highest was 68.28 percent and the lowest was 55.96 percent. This meant that each factor had good explanatory power. Besides, three of the composite CSFs, i.e. "quality of user-developed applications", "quality of staff" and "facilitation of EUC" loaded on more than one factors. Because the items of these three composite CSFs have no distinctive features, they are treated as only one factor respectively for the remainder of the study.

Then, each of the composite CSFs was interpreted in terms of the items that load high on it. In order words, by examining the factor matrix, the items with highest loading on each composite CSFs would be used as a surrogate variable for the associated factor for the remainder of the study. The surrogate variable for each composite CSF was underlined in Table 6.

Table 6: Factor Analysis

A - Composite CSFs and component items
B - Factor loading
C - Eigenvalue
D - Percentage of variance explained

A	B			C	D
1. Quality of user-developed applications				1.003	67.32
	Factor 1	Factor 2	Factor 3		
• *Accuracy of application developed*	-0.048	0.052	***0.904***		
• Format of application developed	0.053	0.803	0.171		
• Ease of use of application developed	0.258	0.814	0.027		
• Timeliness of application developed	0.633	0.295	-0.022		
• Precision of application developed	0.891	0.113	0.171		
• Reliability of application developed	0.339	0.114	0.661		
• Completeness of application developed	0.540	-0.444	0.324		
2. Organizational commitment				3.917	55.96
	Factor 1				
• *Top management support*	***0.872***				
• Organizational acceptance of the IS concept	0.855				
• End-user commitment to the IS concept	0.706				
• Existence of sufficient budget	0.740				
• Rank of the IS executive	0.706				
• Monitoring and tracking of IS successes	0.702				
• Promotion of IS services	0.622				
3. Quality of staff				1.057	61.92
	Factor 1	Factor 2			
• Technical competency of IS staff	0.728	0.185			
• *Training for IS staff*	***0.883***	0.191			
• Knowledge of rapid changes in technology	0.678	0.165			
• Communication with users of all levels	0.483	0.467			
• Knowledge of the users' business and problems	0.285	0.798			
• Career paths for IS staff	-0.046	0.863			

Table 6: Factor Analysis (cont')

A	B		C	D
4. Variety of services			3.168	63.35
	Factor 1			
• Variety of hardware support	0.851			
• *Variety of software tools*	***0.861***			
• Variety of data support	0.854			
• Variety of functional support	0.773			
• Variety of end-user training	0.613			
5. Quality of services			3.878	64.63
	Factor 1			
• Quality of hardware support	0.825			
• *Quality of software support*	***0.948***			
• Quality of data support	0.880			
• Quality of functional support	0.854			
• Quality of end-user training	0.751			
• Timeliness of service response	0.483			
6. Facilitation of EUC			1.008	68.28
	Factor 1	Factor 2		
• Maintenance of user-friendly atmosphere	0.487	0.604		
• Offering of cost-effective solutions	0.692	0.477		
• Management of end-user expectations	0.845	0.025		
• Establishment of priority criteria for application development	0.738	0.063		
• *Coordination of organization's user-developed applications*	-0.051	***0.916***		
7. IS role definition			2.929	58.58
	Factor 1			
• Alignment of IS strategy to organizational strategy	0.616			
• *Clearly define IS mission*	***0.846***			
• Users' understanding of the IS concept	0.844			
• Appropriate charge back criteria	0.709			
• Effective EUC control procedures	0.786			

4.5 Regression Analysis

In order to investigate the relationships among the composite CSFs and IS success, a stepwise regression analysis was performed on all the seven composite CSFs. In this procedure, the most significant contributor (composite CSFs) to explain the variation of dependent variable (IS success) will be entered into the equation and followed by the next significant one until the statistical significant value reaches the pre-set cut-off point.

First, the relationships among the seven composite CSFs (independent variables) and IS success (dependent variable) were investigated as first-level effect. As reported in Table 7a, two of the seven composite CSFs demonstrated a direct and significant impact upon IS success. These two primary composite CSFs were "quality of staff " and "IS role definition".

The significant value is less than 0.05, show that the regression model is significant. In step 1, the "quality of staff" explains about 25.7 percent of the variation in the dependent variable, IS success. This is indicated by the adjusted R square value of 0.257. The model also suggest that the higher the "quality of staff", the higher IS success since the regression coefficient is positive.

In step 2, which is the next most significant to explain the variation of IS success, has also a positive relationship. Besides, this composite CSF "IS role definition" explain about 8.2 percent (0.339-0.257) in variations of IS success.

Table 7a: Regression Results – First-Level Relationships

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.525[a]	.276	.257	.75
2	.611[b]	.373	.339	.71

a. Predictors: (Constant), QSFF2

b. Predictors: (Constant), QSFF2, ISRD2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.362	.542		4.355	.000
	QSFF2	.491	.129	.525	3.805	.001
2	(Constant)	1.364	.659		2.069	.046
	QSFF2	.440	.124	.471	3.562	.001
	ISRD2	.311	.130	.317	2.395	.022

a. Dependent Variable: SATISFAC

While the remaining composite CSFs did not have a significant direct impact on IS success, they could have a strong relationship with the two primary composite CSFs and thereby indirectly affect IS success. Accordingly, the next task was the identification of second-level effects. Successive regression analysis utilized each of the two primary composite CSFs as the dependent variable and the five remaining composite CSFs as independent variables.

As shown in Table 7b, "variety of services" and "organizational commitment" were found to be significantly related to one of the primary composite CSF, "IS role definition". The significant value is less than 0.05, thus, the regression model is significant.

In step 1, the "organizational commitment" explains about 32.2 percent of the variation in the dependent variable, "IS role definition". This is indicated by the

adjusted R square value of 0.322. From the coefficient value, it also suggests that these two composite CSFs were highly positively correlated. In step 2, which is the next most significant to explain the second-level relationships, showed that "variety of services" explain about 6.8 percent (0.390-0.322) in variations of "IS role definition".

Table 7b: Regression Results – Second-Level Relationships

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.582[a]	.339	.322	.73
2	.649[b]	.421	.390	.69

a. Predictors: (Constant), OC1

b. Predictors: (Constant), OC1, VS2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.003	.439		4.563	.000
	OC1	.474	.107	.582	4.418	.000
2	(Constant)	1.188	.548		2.169	.037
	OC1	.368	.112	.452	3.291	.002
	VS2	.343	.150	.315	2.291	.028

a. Dependent Variable: ISRD2

Table 7c shown that "organizational commitment" was correlated significantly and positively to primary composite CSFs, "quality of staff ". The regression model is very significant because the significant value is 0.003, which is less than 0.05.

The adjusted R square value of 0.194 indicates that the "organizational commitment" was be able to explain about 19.4 percent of the variation in the dependent variable, "quality of staff". From the coefficient value, it suggests that this composite CSFs were highly positively correlated with the dependent variable.

Table 7c: Regression Results – Second-Level Relationships

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.463[a]	.215	.194	.83

a. Predictors: (Constant), OC1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.534	.503		5.034	.000
	OC1	.397	.123	.463	3.224	.003

a. Dependent Variable: QSFF2

The last three composite CSFs, "quality of user-developed applications", "quality of services", and "user self-sufficiency" were not significant in any of the first or second level regression. Successive regression using each of the second level composite CSFs, i.e. "variety of services" and "organizational commitment" as the dependent variable and the last three composite CSFs as the independent variable were completed next.

As detailed in Table 7d, "quality of user-developed applications" was found to be significantly related to "organizational commitment". In addition, Table 7e shown that "quality of services " was exhibited significant positive correlations with

"variety of services". Thus, these two composite CSFs, "quality of user-developed applications" and "quality of services" were in the third-level effects.

In Table 7d, the significant value is less than 0.05, thus, the regression model is considered significant. From the adjusted R square value, it shows that the "quality of user-developed applications " was be able to explain about 9.1 percent of the variation in the dependent variable, "quality of staff".

Table 7d: Regression Results – Third-Level Relationships

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.338[a]	.114	.091	1.03

a. Predictors: (Constant), QA1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.977	.906		2.182	.035
	QA1	.434	.196	.338	2.215	.033

a. Dependent Variable: OC1

In Table 7e, the significant value is less than 0.05, thus, the regression model is also considered significant. From the adjusted R square value, it shows that the "quality of user-developed applications " was be able to explain about 10.0 percent of the variation in the dependent variable, "quality of services ".

Table 7e: Regression Results – Third-Level Relationships

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.350[a]	.123	.100	.77

a. Predictors: (Constant), QS2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.079	.671		3.097	.004
	QS2	.393	.170	.350	2.305	.027

a. Dependent Variable: VS2

From the results, it is interesting that although "quality of staff" and "IS role definition" were not perceived as the most important factors, they shown direct impact contributing to IS implementation success. These results strengthen the evidence that strategic planning is the most important aspect of the entire IS effort.

Carefully defined the IS mission is needed to ensure that IS mission is align with the organizational strategy. In order to achieve this, top-level management must be responsible to review the existing IS mission and make appropriate changes where necessary so that the design of IS is capable to meet the requirements of the organization. Further, role clarity requires that management establish clear control procedures to ensure standards and policies of IS are followed.

Another primary composite CSF was "quality of staff", this suggests that technical competence of the end-users has a direct impact on IS success. This is because the high quality staff will help to define the information and capabilities for the

initial IS. Moreover, they are also able to provide follow-up observations and commitment after the IS is built. Thus, they must be both technical excellence and business expertise.

The high quality of staff will also play an important role in the selection process of hardware and software in order to provide a flexible and user-friendly system. They must also be able to help in solving technical problems and offering consulting services after the initial IS is developed.

Diagramming the significant effects discovered in the regression analysis yielded a basic structure of relationships among the composite CSFs and IS success considered in this study. This model for IS success is shown in Figure 1.

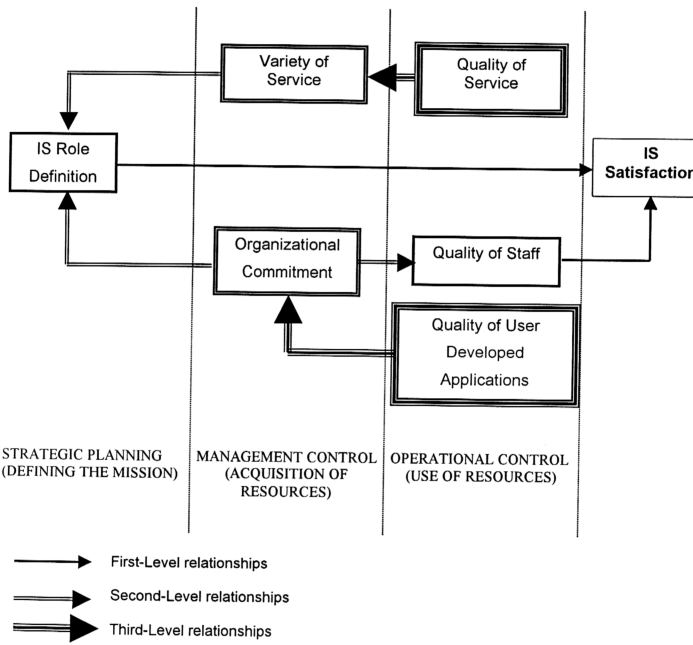

Figure 1: A model of end-user satisfaction with IS based on composite CSFs

4.6 Discussion of the model of IS success

This model shows that IS success determinants are closely related to three level of managerial activity, i.e. strategic planning, management control and operational control (Anthony, 1965).

4.6.1 Strategic Planning

From the model, it is clearly shown that strategic planning is the most important aspect of the entire IS effort. Organizations that lack an adequate plan for the creation of an information system can be sure the effort is likely to fail. Thus, during the IS development process, MIS managers should consider each of the issues described in the following sections.

(a) Definition of Information System's Mission and Objectives

The strategic planning function involves definition of IS mission and establishment of mechanisms to ensure that the mission is achieved. On top of this, MIS managers must first make a concerted effort to understand the importance of information technology as a source of competitive advantage. In addition, steps must be taken to ensure that the stated IS mission is understood by all and proper control mechanisms are established to ensure that IS functions within this mission.

(b) Determine Whether an Information System Can Support that Mission

Even If an organization intends to develop its information technology as a competitive weapon, the information system may not be an effective vehicle for

that purpose. EUC support pays for itself only if the organization intends to encourage such decentralized growth. The organization that is dedicated to strong centralized control of MIS will probably not profit from an information system. So, senior management must make a conscious effort to treat the IS as a strategic issue rather than merely an output from EUC.

(c) Develop a Charter for the Information System

When decisions are formalized, they should be put into the information system's charter. A charter is a written document or mission statement for the IS. The charter should be specific enough to provide direction to the IS but flexible enough to allow for shifts in that direction and it should define IS objectives, responsibilities, organizational position, and operational philosophy.

4.6.2 Management Control

Management control is concerned with the medium term. At this level of planning, the focus is on establishment and acquisition of the infrastructure that needed to achieve the stated IS mission. This level of management is often the domain of middle managers, and the IS manager must work with top management to ensure that the resources needed by the IS are identified and justified.

(a) Sell the Concept to Senior Management and Selected Users

Certainly, the success of a fledgling IS depends on a favorable attitude by the senior executives of the organization. An effective and proactive alignment with

the strategies of the organization should solidify the support of senior management. The key to this support is a well-presented, value-added argument.

While garnering senior management support, MIS managers must establish a base of enthusiastic supporters among the end-user community. It would be beneficial if these users were also in political favour with senior management.

(b) Prepare Formal Plans for the Information System

Creating a multi-phase plan for the IS provides a good foundation for MIS managers to manage the changes that inevitably occur as the IS matures. Such a foundation not only accomplishes the obvious long-term advantages associated with planning but also helps obtain senior management support.

4.6.3 Operational Control

Although strategic issues represent the driving force for creating the IS, the effective implementation of those strategies produces the successful IS. Operational control focuses on the short term and is concerned with the effective utilization of resources. It involves enhancement of the quality aspects of staff, services, and developed applications.

(a) Identify and Recruit Individual Staff

The individual staff of the IS should be carefully selected. The one central theme to initiating a successful IS is to establish a positive image and a winning record as soon as possible. Too many IS have experienced near-disastrous results because of ill-planned beginnings. A large part of that beginning depends on the

attitudes and expectations of the first wave of individual staff to pass through the IS. Therefore, those initial individual staff should be sold on the advantages of an IS.

To ensure this, MIS managers should find out the needs of these individuals as soon as possible. When these needs have been established, the IS staff must determine the skills and capabilities necessary to meet them. It is essential that the organization provide the necessary training, hardware, and software to meet these needs.

(b) Prepare for Information System Growth

Implementing the charge back system, marketing the IS, leveraging IS resources, and refining initial policies are the future issues and objectives that should be take into considered by MIS. As a result of effective planning, it will allows the IS to maintain a proactive posture in the organization.