

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

**E-commerce Success:
An Empirical Validation and Test of Alternative Models**

By
Ruwanga Jayakody

A Thesis Submitted for the
Degree of
Master of Business Science in Information Systems

Faculty of Commerce
Department of Information Systems
University of Cape Town

August 2004

To My Parents,
Wimal and Damayanthi Jayakody

University of Cape Town

ACKNOWLEDGEMENTS

The advice and guidance of Mr. Irwin T.J. Brown is gratefully acknowledged.

University of Cape Town

ABSTRACT

The business to consumer (B2C) aspect of electronic commerce (e-commerce) is the most visible business use of the Internet. There is a need to identify and understand the relationships between the antecedents of successful B2C e-commerce, and determine a valid measure of the success of an online retail system. Factors that influence Information Systems (IS) Success have been discussed frequently in the academic literature; however significant developments into e-commerce success have been more gradual and are long overdue.

This thesis reports on research conducted into e-commerce success. Existing IS success and e-commerce success models and concepts are reviewed and evaluated, gaps in the existing literature are identified, and a new comprehensive conceptual model is formulated.

180 respondents, reflective of the prevalent e-commerce customer profile in South Africa, were questioned on each of the factors identified as being a component of e-commerce success. The data collected was used to empirically test the comprehensive conceptual model and refinements made to improve the statistical fit of the model, were also tested using the data.

Confirmatory Factor Analysis was performed to examine the validity of the measurement instrument and various Goodness-of-Fit indexes were calculated for each of the models. Structural Equation Modeling was then used to analyze the causal relationships between factors in the models. In the process eighteen different hypotheses were statistically tested. The models were compared and inferences were drawn from the results.

Demographic data was evaluated against findings from previous e-commerce studies conducted in South Africa, and trends in usage and the most popular ecommerce retails sites were identified.

Three variations to the conceptual model are suggested based on the data obtained, and they are re-tested. The IS and e-commerce success models proposed by other researchers are then also tested and the results compared.

The significance of the results to both researchers and practitioners are discussed and avenues for future research suggested.

University of Cape Town

ACKNOWLEDGEMENTS.....	II
ABSTRACT.....	III
1. INTRODUCTION.....	1
1.1 RESEARCH PROPOSAL	1
1.2 CONTEXT AND BACKGROUND	1
1.3 OBJECTIVES OF THE RESEARCH	2
1.3.1 Objective 1: Evaluate existing relevant IS and e-commerce success models	2
1.3.2 Objective 2: Extend existing models and/or develop a new conceptual model.....	2
1.3.3 Objective 3: Empirically validate the conceptual model.....	2
1.3.4 Objective 4: Draw inferences and conclusions from the results.....	2
1.4 THE NEED FOR THIS RESEARCH.....	2
1.4.1 Academic Benefits.....	3
1.4.2 Real World Benefits	3
1.5 KEY CONSTRUCTS AND LAYOUT OF THE REPORT.....	3
2. LITERATURE REVIEW.....	5
2.1 INTRODUCTION.....	5
2.2 DEFINING “E-COMMERCE” AND “SUCCESS”	6
2.3 IS SUCCESS MODELS.....	7
2.3.1 The Original Model of IS Success - Delone and McLean (1992)	7
Discussion	8
System quality	8
Information Quality.....	8
Use	8
User Satisfaction.....	8
Individual Impact	9
Organizational Impact	9
Critique.....	9
2.3.2 Introduction of Causal Relationships – The Path Model - Seddon and Kiew (1996)	9
Discussion	10
2.3.3 Partial Behavioral Theory merger into the IS Success Model – Seddon (1997)	10
Discussion	12
Critique.....	12
2.3.4 Synthesis of IS Success Models.....	13
2.4 E-COMMERCE SUCCESS MODELS.....	13
2.4.1 The E-commerce Success Model – Molla and Licker (2001)	14
Discussion	14
2.4.2 The Updated of the IS Success Model – Delone and McLean (2003).....	15
Discussion	16
Critique.....	18
2.4.3 Synthesis of E-commerce Success Models	18
2.5 CONCEPTS IN E-COMMERCE SUCCESS	19
2.5.1 Satisfaction, Success and Net Benefits.....	19
2.5.2 Perceived Usefulness.....	22
2.5.3 Intention to Use and Actual Use	23
2.5.4 System Quality.....	24
2.5.5 Content Quality.....	25
2.5.6 Support and Service.....	27

2.5.7 Trust.....	28
2.6 CONCEPTUAL MODEL.....	30
2.6.1 Conceptual Model (Jayakody's E-commerce Success Model).....	31
3. RESEARCH METHODOLOGY.....	34
3.1 INTRODUCTION.....	34
3.2 CHOICE OF RESEARCH.....	34
3.3 REVIEW OF METHODOLOGIES EMPLOYED IN SIMILAR STUDIES.....	34
3.4 METHODOLOGY.....	35
3.5 INSTRUMENT DESIGN.....	35
3.6 OPERATIONALIZATION OF CONSTRUCTS.....	36
3.6.1 Operationalization of Systems Quality.....	37
3.6.2 Operationalization of Content Quality.....	38
3.6.3 Operationalization of Perceived Usefulness.....	39
3.6.4 E-commerce Satisfaction.....	41
3.6.5 Intention to Use.....	41
3.6.6 Actual Use.....	42
3.6.7 Trust.....	43
3.6.8 Support and Service.....	45
3.6.9 Loyalty Incentives.....	46
3.6.10 Net Benefits.....	47
3.6.11 Summary of Instruments Used In the Instrument Construction.....	48
3.7 THE QUESTIONNAIRE.....	48
3.8 SAMPLE DESIGN.....	49
3.8.1 Sampling Frame.....	50
3.8.2 Sampling Selection Criteria.....	50
3.8.3 Sample Size.....	51
3.9 PILOT STUDY.....	52
3.10 ETHICAL ISSUES.....	53
3.11 DATA COLLECTION PROCEDURE.....	53
3.12 DATA CAPTURING AND ANALYSIS PROCEDURE.....	54
4. INSTRUMENT VALIDATION AND DATA REFINEMENT.....	57
4.1 INTRODUCTION.....	57
4.2 SURVEY RESPONSES.....	57
4.2.1 Questionnaire Returns.....	58
4.3 ITEM ANALYSIS.....	58
4.3.1 Testing for Validity: Confirmatory Factor Analysis.....	58
4.3.2 Summary of Final Items.....	61
4.4 DISCRIMINANT VALIDITY.....	61
4.5 ALTERATIONS TO THE MODEL TESTING PROCEDURE.....	63
4.5.1 Summary of New Retained Items.....	65
4.6 TESTING FOR RELIABILITY.....	67
4.6.1 Summary of Item Validities and Reliabilities.....	67
4.6.2 Normality Testing.....	72
5. DESCRIPTIVE STATISTICS.....	74
5.1 INTRODUCTION.....	74
5.2 PROFILE OF THE ONLINE RETAIL USERS SURVEYED.....	74

5.3 GENDER OF THE RESPONDENTS	75
5.4 AGE OF THE RESPONDENTS	75
5.5 OCCUPATION	76
5.6 MONTHLY TAXABLE INCOME	76
5.7 INTERNET EXPERIENCE AND ONLINE RETAIL EXPERIENCE	77
5.8 TASKS PERFORMED ON THE INTERNET	78
5.9 PRODUCTS PURCHASED ON THE INTERNET	80
5.10 DESCRIPTIVE STATISTICS FOR E-COMMERCE SUCCESS MEASUREMENT ITEMS	81
5.11 LIMITATIONS OF THE DATA	82
5.11.1 <i>Measurement of Actual Use</i>	82
5.11.2 <i>Using 'Intention to Use' data</i>	82
5.11.3 <i>Possible Bias from respondents in the Information Systems Field</i>	83
6. RESULTS AND HYPOTHESIS TESTING	85
6.1 TESTING THE ORIGINAL HYPOTHESIZED MODEL: STRUCTURAL EQUATION MODELING – GOODNESS OF FIT	85
6.2 MULTIPLE REGRESSION ANALYSIS	88
<i>Regression Analysis Results for Conceptual Model</i>	88
6.3 RESULTS OF THE HYPOTHESIS TESTING	89
6.4 HYPOTHESIS TESTING AND DISCUSSION	91
<i>Hypothesis 1: Accepted</i>	91
<i>Hypothesis 2: Accepted</i>	91
<i>Hypothesis 3: Accepted</i>	91
<i>Hypothesis 4: Accepted</i>	92
<i>Hypothesis 5: Not Accepted</i>	92
<i>Hypothesis 6: Accepted</i>	92
<i>Hypothesis 7: Not Accepted</i>	93
<i>Hypothesis 8: Accepted</i>	93
<i>Hypothesis 9: Accepted</i>	93
<i>Hypothesis 10: Accepted</i>	94
<i>Hypothesis 11: Accepted</i>	94
<i>Hypothesis 12: Not Accepted</i>	94
<i>Hypothesis 13: Not Accepted</i>	95
<i>Hypothesis 14: Accepted</i>	95
<i>Hypothesis 15: Not Accepted</i>	95
<i>Hypothesis 16: Accepted</i>	95
<i>Hypothesis 17: Accepted</i>	96
<i>Hypothesis 18: Not Accepted</i>	96
7. MODEL REFINEMENT AND VALIDATION OF EXISTING MODELS	98
7.1 VARIATION 1 (V1)	98
7.2 VARIATION 2 (V2)	100
7.3 VARIATION 3 (V3)	101
7.4 VALIDATION OF EXISTING MODELS	102
7.4.1 <i>Molla and Licker (2001) Model</i>	102
7.4.2 <i>Seddon (1997) Model</i>	103
7.4.3 <i>Delone and McLean (2003) Model</i>	105
8. CONCLUSIONS	108
8.1 BACKGROUND	108
8.2 MODEL TESTING	108

8.3 KEY FINDINGS.....	109
<i>Net Benefits</i>	109
<i>Customer E-commerce Satisfaction</i>	109
<i>Perceived Usefulness</i>	109
<i>Trust and Support and Service</i>	109
8.4 THE BEST MODEL FIT	110
8.5 LIMITATIONS AND FURTHER RESEARCH.....	111
8.6 IMPLICATIONS FOR IS PRACTITIONERS.....	112
BIBLIOGRAPHY	113
APPENDICES	118
APPENDIX A: THE RESEARCH INSTRUMENT (QUESTIONNAIRE)	118
APPENDIX B: CFA AT 0.6 MINIMUM LOADING	124
APPENDIX C: CFA AT 0.4 MINIMUM LOADING	126
APPENDIX D: RELIABILITY ANALYSIS OF BOTH INSTRUMENTS	128
APPENDIX E: NORMALITY HISTOGRAMS.....	129

FIGURE 2.1: THE ORIGINAL MODEL OF IS SUCCESS (DELONE AND MCLEAN, 1992).....	7
FIGURE 2.2: PATH MODEL WITH CAUSAL RELATIONSHIPS (SEDDON AND KIEW, 1996)	10
FIGURE 2.3: PARTIAL BEHAVIORAL MODEL AND IS SUCCESS MODEL (SEDDON, 1997)	11
FIGURE 2.4: E-COMMERCE SUCCESS MODEL (MOLLA AND LICKER, 2001)	14
FIGURE 2.5: THE UPDATED MODEL – DELONE AND MCLEAN (2003)	16
FIGURE 2.6: CUSTOMER INFORMATION SATISFACTION MODEL (WANG AND TANG, 2001) ..	20
FIGURE 2.7: CONTINUANCE ACCEPTANCE MODEL (BHATTACHERJEE, 2001)	21
FIGURE 2.8: TECHNOLOGY ACCEPTANCE MODEL (DAVIS, 1989)	22
FIGURE 2.9: THE RELATIONSHIPS EMPIRICALLY TESTED AND PROVED BY GEFEN AND STRAUB (2000).....	24
FIGURE 2.10: MODEL EMPIRICALLY VALIDATED BY LEDERER ET AL (2000).	26
FIGURE 2.11: THE RELATIONSHIPS EMPIRICALLY TESTED BY HARRIS AND GOODE (2004) ..	28
FIGURE 2.12: JAYAKODY’S E-COMMERCE SUCCESS MODEL	32
FIGURE 4.1: CFA AT MINIMUM LOADING 0.6.....	60
FIGURE 4.2: CORRELATION MATRIX OF FACTORS AT 0.6	62
FIGURE 4.3: CORRELATIONS AND SQUARES OF CORRELATIONS FOR EACH FACTOR.....	63
FIGURE 4.4: CFA AT MINIMUM LOADING 0.4	64
FIGURE 4.5: CORRELATION MATRIX OF FACTORS AT 0.4	66
FIGURE 5.1: MONTHLY TAXABLE INCOME OF RESPONDENTS	77
FIGURE 5.2: INTERNET EXPERIENCE VS. E-COMMERCE EXPERIENCE	78
FIGURE 5.3 TASKS PERFORMED ON THE INTERNET.....	79
FIGURE 5.4: PRODUCTS PURCHASED ON THE INTERNET	80
FIGURE 6.1: SEM RESULTS OF THE CONCEPTUAL MODEL TESTED	86
FIGURE 7.1: RESULTS OF THE SEM PERFORMED ON MODEL V1	99
FIGURE 7.2: RESULTS OF THE SEM PERFORMED ON MODEL V2	100
FIGURE 7.3: RESULTS OF THE SEM PERFORMED ON MODEL V3	101
FIGURE 7.4: RELATIONSHIPS TESTED ON THE MOLLA AND LICKER (2001) MODEL	102
FIGURE 7.5: RELATIONSHIPS TESTED ON THE SEDDON (1997) MODEL	104
FIGURE 7.6: RELATIONSHIPS TESTED ON THE DELONE AND MCLEAN (2003) MODEL	105

TABLE 2.1: EXPLANATION OF CONSTRUCTS FOR MEASURING E-COMMERCE SUCCESS (DELONE AND MCLEAN, 2003, p16).....	17
TABLE 2.2: SUMMARY OF HYPOTHESES	31
TABLE 3.1: SYSTEM QUALITY CONSTRUCTS	37
TABLE 3.2: INFORMATION QUALITY CONSTRUCTS	39
TABLE 3.3: PERCEIVED USEFULNESS CONSTRUCTS.....	40
TABLE 3.4: E-COMMERCE SATISFACTION CONSTRUCTS.....	41
TABLE 3.5: INTENTION TO USE CONSTRUCTS.....	42
TABLE 3.6: USE CONSTRUCTS.....	43
TABLE 3.7: TRUST CONSTRUCTS.....	45
TABLE 3.8: CUSTOMER SUPPORT CONSTRUCTS.....	46
TABLE 3.9: LOYALTY INCENTIVES CONSTRUCTS	46
TABLE 3.10: NET BENEFITS CONSTRUCTS	47
TABLE 3.11: SUMMARY OF INSTRUMENTS USED	48
TABLE 3.12: USABLE RESPONSE RATE.....	54
TABLE 4.1: BREAKDOWN OF RESPONDENTS.....	58
TABLE 4.2: FINAL ITEMS IN THE INSTRUMENT.....	61
TABLE 4.3: SUMMARY OF NEW ITEMS.....	65
TABLE 4.4: ITEMS REMAINING AFTER PERFORMING CFA WITH LOADING OF 0.6.....	70
TABLE 4.5: VALIDITIES AND RELIABILITIES OF CHANGED ITEMS	72
TABLE 5.1: GENDER OF RESPONDENTS	75
TABLE 5.2: AGE OF RESPONDENTS	75
TABLE 5.3: OCCUPATION OF RESPONDENTS	76
TABLE 5.4: DESCRIPTIVE STATISTICS FOR E-COMMERCE SUCCESS MEASURES.....	81
TABLE 6.1: RESULTS OF REGRESSION ANALYSIS OF CONCEPTUAL MODEL.....	89

1. INTRODUCTION

1.1 Research Proposal

Review and evaluate existing IS Success and E-commerce Success Models. Extend the existing models and/or develop a new E-commerce Success Model and empirically validate it.

1.2 Context and Background

E-commerce and the Internet in particular are having a dramatic impact on business operations. Companies are making large investments in e-commerce applications but are hard pressed to evaluate the success of their e-commerce systems (Delone and McLean, 2003). This growth in e-commerce is probably the reason behind the recent attempts to measure the success of e-commerce.

There have been many articles published on the critical success factors for good [successful] e-commerce websites (Molla and Licker, 2001). These typically include information quality, system quality, security, privacy, reliability and satisfaction. However they not delve deep enough to identify the underlying theory behind e-commerce success. From the literature, one of the most academically valid and useful models of e-commerce success has been The E-commerce Success Model (Molla and Licker, 2001). This is confirmed by inclusion of some of its concepts in the Updated IS Success Model (Delone and McLean Model, 2003). However, neither the E-commerce Success Model (Molla and Licker, 2001) nor the Updated Model (Delone and McLean, 2003) have been empirically validated in an e-commerce context, and there are no clearly defined instruments available to measure some of the factors in these models.

1.3 Objectives of the Research

There are four main objectives of this research.

1.3.1 Objective 1: Evaluate existing relevant IS and e-commerce success models

All literature relevant to this field must be reviewed, evaluated, and gaps identified. This is essential if the research is to yield significant results.

1.3.2 Objective 2: Extend existing models and/or develop a new conceptual model

Shortcomings, outdated concepts or absent relationships or factors in existing research can be identified from the literature review. Recent research and findings should be used to extend the existing e-commerce success models and/or develop a new conceptual model.

1.3.3 Objective 3: Empirically validate the conceptual model

The appropriate research method should be selected and the relevant data gathered in order to test the new model(s), and / or validate the existing models.

1.3.4 Objective 4: Draw inferences and conclusions from the results

The research should be of sufficiently high quality to draw useful inferences and significant conclusions. Future research areas should also be identified.

1.4 The Need for this Research

This research will help both IS researchers and e-commerce practitioners understand the underlying factors that e-commerce success is comprised of. It adds to the knowledge by empirically testing entire models and validating previously untested success models.

1.4.1 Academic Benefits

The primary aim of this research is to add new knowledge to this field of IS research. Either empirically testing a model that has not been previously validated, or developing and testing a new conceptual model will add new knowledge and provide a base upon which further research into this topic may flow.

1.4.2 Real World Benefits

Identifying the factors that influence e-commerce success, the causal relationships between them, and developing instruments to measure them will provide insights to online vendors on how to attract more customers to their online businesses.

1.5 Key Constructs and Layout of the Report

Customer E-commerce Satisfaction, E-commerce success, IS Success, Net Benefits of e-commerce.

This report begins with a literature review, resulting in the development of a conceptual model. Research and data collection methods are then evaluated and the most appropriate ones selected and justified. The descriptive data collected is compared with earlier South African research to identify whether old trends in demographics and online shopping behavior are still applicable. The statistical data is used to validate the conceptual model, and the refinements made to it. The fundamental models in this field of research are also statistically evaluated and comparisons are made. The findings and implications of this research are then discussed and recommendations for future research suggested.

2. LITERATURE REVIEW.....	5
2.1 INTRODUCTION.....	5
2.2 DEFINING “E-COMMERCE” AND “SUCCESS”	6
2.3 IS SUCCESS MODELS.....	7
2.3.1 <i>The Original Model of IS Success - Delone and McLean (1992)</i>	7
Discussion	8
System quality	8
Information Quality	8
Use	8
User Satisfaction.....	8
Individual Impact	9
Organizational Impact	9
Critique.....	9
2.3.2 <i>Introduction of Causal Relationships – The Path Model - Seddon and Kiew (1996)</i>	9
Discussion	10
2.3.3 <i>Partial Behavioral Theory merger into the IS Success Model – Seddon (1997)</i>	10
Discussion	12
Critique.....	12
2.3.4 <i>Synthesis of IS Success Models</i>	13
2.4 E-COMMERCE SUCCESS MODELS.....	13
2.4.1 <i>The E-commerce Success Model – Molla and Licker (2001)</i>	14
Discussion	14
2.4.2 <i>The Updated of the IS Success Model – Delone and McLean (2003)</i>	15
Discussion	16
Critique.....	18
2.4.3 <i>Synthesis of E-commerce Success Models</i>	18
2.5 CONCEPTS IN E-COMMERCE SUCCESS	19
2.5.1 <i>Satisfaction, Success and Net Benefits</i>	19
2.5.2 <i>Perceived Usefulness</i>	22
2.5.3 <i>Intention to Use and Actual Use</i>	23
2.5.4 <i>System Quality</i>	24
2.5.5 <i>Content Quality</i>	25
2.5.6 <i>Support and Service</i>	27
2.5.7 <i>Trust</i>	28
2.6 CONCEPTUAL MODEL.....	30
2.6.1 <i>Conceptual Model (Jayakody's E-commerce Success Model)</i>	31

2. LITERATURE REVIEW

2.1 Introduction

The purpose of this literature review is to examine information systems (IS) and E-commerce Success. Relevant prior research in this field is reviewed and the development of theory and concepts are scrutinized.

The objectives of this review are to:

- Define B2C e-commerce success
- Understand the development and progression of the available research and current theory development in IS and e-commerce success.
- Explain and understand the models from previous research that have bearing on e-commerce success.
- Identify key areas and developments in the available research.
- Summarize the findings and identify where current literature in this field is insufficient or lacking.
- Suggest possible extensions to the current theory based on the literature reviewed.

When compared with the amount of research available on IS success, there has not been much research into e-commerce success models and there is a general shortage of e-commerce success models.

Most of the theory in the field of IS success have stemmed from the original research conducted by Delone and McLean (1992, 2003), Seddon (1997) and others; and End-User Satisfaction Research by Doll and Torkzadeh (1988), Bailey and Pearson (1983) and others.

In order to conduct this research, the concept *E-commerce Success* must be properly understood and defined. The models put forward by researchers must be evaluated and where relevant, their concepts incorporated into the study.

2.2 Defining “E-commerce” and “Success”

Zwass (1999) defines e-commerce as the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks, and several major information technologies and business practices.

The principal technologies directly enabling modern e-commerce are: computer networking and telecommunications; client / server computing; multimedia, information retrieval systems; electronic data interchange (EDI); message handling, groupware and public key cryptography.

The products and structures of e-commerce fall into three categories: consumer oriented commerce, business to business orientated commerce and intra-organizational commerce. The focus of this research study is the consumer market. The consumer e-commerce markets include online retailers, auction sites and reverse markets to name but a few.

The definition of “success” is more elusive and would vary depending on the point of view of the stakeholder. The success of information systems is a controversial issue and despite the large number of empirical studies in IS success, the exact definition of IS success has never been clear (Garritty and Sanders, 1998).

“An information system has many stakeholders, each with a different definition of systems success. From a developer’s perspective, a successful system may be one that is completed on time and under budget, with a complete set of features that are consistent with specification and function correctly. From an innovator’s perspective a successful system is one that attracts a large, loyal and growing community of users. From a

management perspective, a successful system may be one that reduces uncertainty of outcomes and thus lowers risks, and leverages scarce resources. From the end-user's perspective a successful system may be one that improves the user's job performance without inflicting undue annoyance.” (Briggs et al, 2003, p6)

This literature review will examine all the relevant success models and identify the factors that are relevant to e-commerce success.

2.3 IS Success Models

More recent e-commerce success models have been based on the work of Delone and McLean (1992).

2.3.1 The Original Model of IS Success - Delone and McLean (1992)

The original model was proposed by Delone and McLean (1992). The authors cited 180 articles where IS success was measured in some way. The result was a taxonomy of results of the previous research. The authors concluded that all the factors influencing IS Success could be classified into six factors, as indicated below.

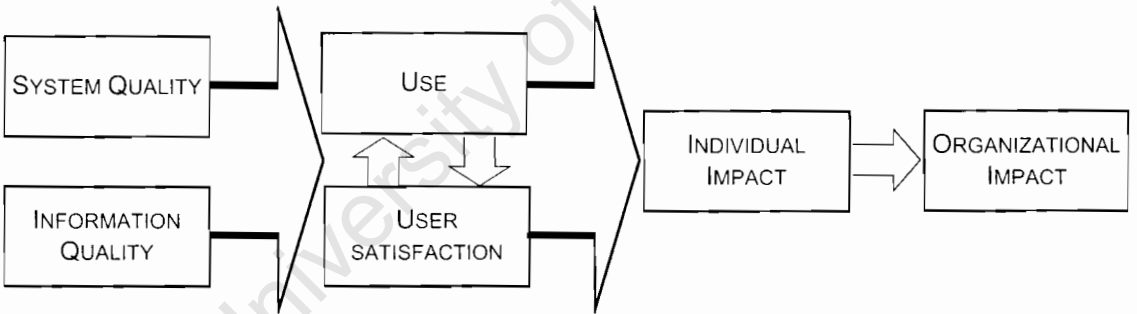


FIGURE 2.1: THE ORIGINAL MODEL OF IS SUCCESS (DELONE AND MCLEAN, 1992)

Discussion

Delone and McLean (1992) concluded that researchers had many variables to choose from when measuring IS success and that this number needed to be reduced so that future research results could be compared. They advocated that Success is a multi-dimensional construct and that more research should be conducted into measuring organization performance. The following are definitions for each of the constructs provided by Delone and McLean (1992).

System quality

System Quality analyses the actual system. The authors noted that there were many distinct and straightforward ways of measuring this, including reliability, response time and flexibility.

Information Quality

This is one measure of the IS output, and focuses on the quality of the output, mainly in the form of the reports produced by the system. Delone and McLean (1992) noted that this was usually assessed from the perspective of the user and was subjective. At that time the measure was not directed at e-commerce systems and was later revised to incorporate web sites (Lederer et al, 2000). In this study information quality and content quality are deemed to be synonymous, since the focus is on e-commerce systems where the terms content and information are often used interchangeably.

Use

Delone and McLean (1992) cited 27 previous studies where *use* was a measure of success. This was because *use* is probably the most objective and easiest variable to quantify.

User Satisfaction

This is measured as the user's response to the overall system, and is the most widely used measure of success. Delone and McLean (1992) cited 33 articles in which *user satisfaction* is used as a measure of success.

Individual Impact

This is the impact of the system and the information it produces on the behavior of the user. Impact is hard to define and is an outward looking measure.

Organizational Impact

This is defined as the effect of the information on the organization's performance. It is difficult to isolate exactly what effect the system has alone, and they suggest that more research be conducted in this area.

Critique

As pointed out by Seddon and Kiew (1996) certain flaws were present in the model. These included:

- The relationships identified by Delone and McLean (1992) do not indicate whether they were causal relationships.
- The *Use* factor has various interpretations, and can be misleading.

2.3.2 Introduction of Causal Relationships – The Path Model - Seddon and Kiew (1996)

Seddon and Kiew (1996), proposed a refined IS Success model. They noted that the arrows in the Figure 2.1 do not clearly depict whether there are causal relationships between System Quality, Information Quality, Use and User Satisfaction. They proposed that Delone and McLean's (1992) model implied causal relationships between the factors affecting the organizational impact of information systems. These implied relationships are shown in their Path Model (Figure 2.2). The model was partially tested, and the relationships shown in the dotted box were empirically validated.

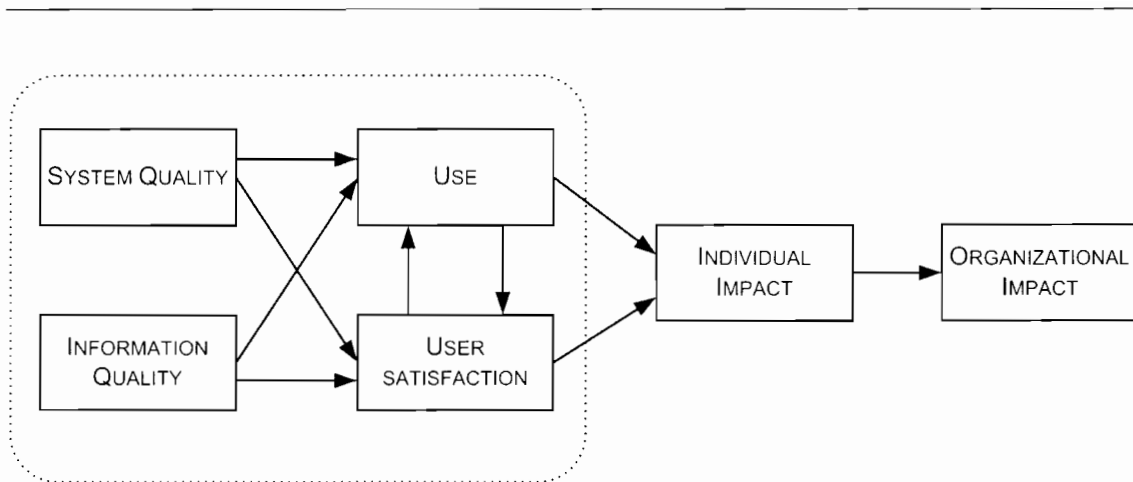


FIGURE 2.2: PATH MODEL WITH CAUSAL RELATIONSHIPS (SEDDON AND KIEW, 1996)

Discussion

It was concluded that causal relationships do exist between system quality, use and user satisfaction; and information quality, use and user satisfaction and two way casual relationships exist between user and user satisfaction. They also concluded that User Satisfaction is the most accurate reflection of Success when the researcher can only, or desires to, use only one factor, and recommend using User Satisfaction as the most general-purpose perceptual measure of system success (Seddon and Kiew, 1996).

This was ground breaking research in this field at the time. However it was still only a partial test and did not measure the entire model.

2.3.3 Partial Behavioral Theory merger into the IS Success Model – Seddon (1997)

Seddon (1997) suggested his own model. He used a Partial Behavioral Model to interpret and clarify the Delone and McLean (1992) IS Success Model.

He pointed out that the term *use* could be interpreted in 3 different ways,

- 1) Use = a variable that can mean the benefits from use
- 2) Use = the future behavior of the user (not a measure of success)
- 3) Use = an event in the process leading to individual and organizational impact

He concluded that only definition (1) was valid in the context of measuring IS success, and merged a partial behavioral model into the Delone and McLean (1992) success model in an attempt to clarify it.

Figure 2.3 below shows the partial behavioral model and IS success model (Seddon, 1997).

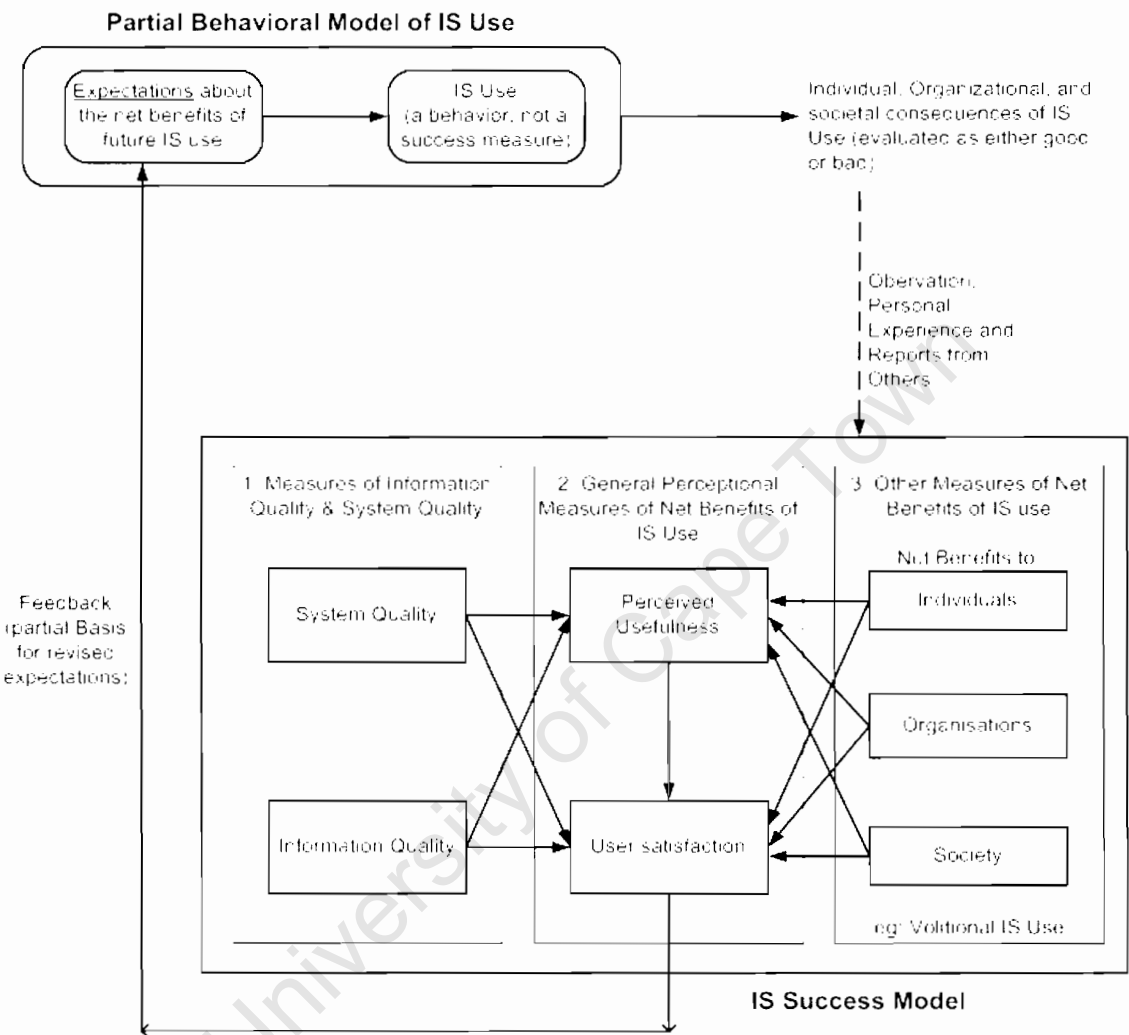


FIGURE 2.3: PARTIAL BEHAVIORAL MODEL AND IS SUCCESS MODEL (SEDDON, 1997)

Discussion

This model implies that IS Success is a measure of the degree to which the person evaluating the system believes the stakeholder is better off from using the system (Seddon, 1997). The conclusions of the paper were to replace Individual Impact and Organisational Impact with Net Benefits, and to replace Use with Perceived Usefulness.

Perceived Usefulness is defined as:

The degree to which the stakeholder believes that using a particular system has enhanced his or her job performance, or his or her group's or organization's performance. (Seddon, 1997, p246)

Seddon (1997) defined Net Benefits as:

An idealized comprehensive measure of all past and expected future benefits less all past and expected future costs attributed to the use of an information technology application. Any use of resources (including time) in building, learning to use and / or using the system is a cost. To measure Net Benefits one has to adopt a stakeholders' point of view as to what is valuable and what is not (p246).

This definition seems very relevant and pertinent to the use of e-commerce, and appears to slot neatly into future models, such as the E-commerce Success Model (Molla and Licker, 2001).

Critique

Although this model seems valid and rigorous, not all schools of thought agree. Seddon (1997) argues for the removal of system use as a success variable in the causal success model, claiming that use is a behavior fit for inclusion in the process model but not in the causal model and that *use* must precede impacts and benefits, but that it does not cause them.

Delone and McLean (2003), argue that *“Seddon has defined use too simplistically and that it is not appropriate when considering the complex nature of use.”* (p15).

Other researchers, such as Whyte et al (1997), have proposed information systems success models based mainly on service attributes. Their research was more from a strategic information systems perspective and the attributes they identified included many lower level business, managerial and organizational elements. Most of the recent literature cites the original Delone and McLean (1992) model as a basis, hence this study also takes the same line of research and focuses on high level success concepts.

2.3.4 Synthesis of IS Success Models

The Delone and McLean (1992) model was never tested. It was the result of previous works where an attempt had been made to measure success. The major shortcoming of the model was that the nature of the relationships between the factors was not known. Seddon and Kiew (1996) went on to expand the Delone and McLean (1992) model by introducing causal relationships between the factors and partially testing the model. Later Seddon (1997) merged the IS Success model with the Partial Behavioral Model of IS Use. The interactions and causal relationships identified by researchers in the IS success field are important to consider in e-commerce success. The principles and factors identified in IS success research, namely, satisfaction, use, system quality and information quality all have bearing on the success of e-commerce systems and are carried through in the research of e-commerce success.

2.4 E-commerce Success Models

Thus far the literature review has focused on the role of IS success models and whether they could be applied to e-commerce success. Possible surrogates to success such as Satisfaction, Perceived Usefulness and Net Benefits have been identified. There has been

recent research that attempts to develop an e-commerce success model. In this section, two e-commerce success models are identified and discussed.

2.4.1 The E-commerce Success Model – Molla and Licker (2001)

Molla and Licker (2001) suggested the model below for e-commerce success (Figure 2.4). They cited many researchers who had investigated the effect of one or two factors on e-commerce success, and noted that *“that little attention has been paid to integrating the various independent variables into a comprehensive model and in defining the dependent variable.”* (p 12).

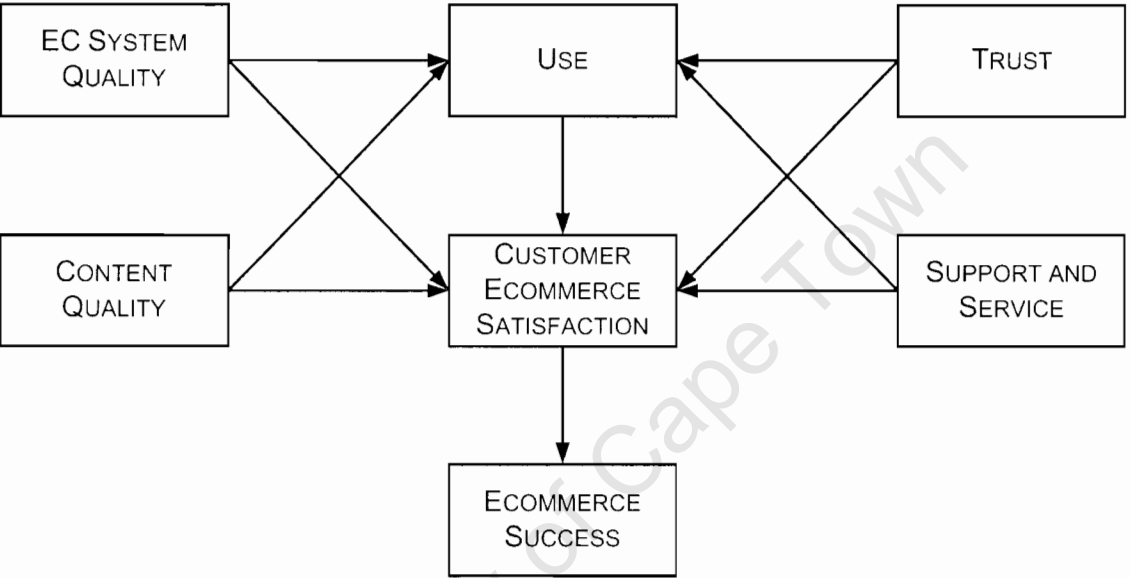


FIGURE 2.4: E-COMMERCE SUCCESS MODEL (MOLLA AND LICKER, 2001)

Discussion

The main differences of this model and previous models by Delone and McLean (1992) and Seddon (1997) are:

- 1) User satisfaction is replaced by customer e-commerce satisfaction
- 2) Information and System quality are replaced by Content and E-commerce system quality respectively

- 3) Trust and Support and Service have been included as factors
- 4) Use as apposed to Usefulness is retained. Molla and Licker (2001) argue that since online retail is completely voluntary, use is appropriate. This should not be measured by simply referring to hot counters though.

If this model is to be validated, it becomes clear that there is a need for an instrument to measure Customer E-commerce Satisfaction – a theoretical **E-commerce Customer Satisfaction Index** (Molla and Licker, 2001).

2.4.2 The Updated of the IS Success Model – Delone and McLean (2003)

Delone and McLean (2003) published an updated version of the Model of IS success (see Figure 2.5). Noticeable changes had been made. The Service Quality factor was included, and the individual and organizational impact factors were replaced with a single factor, Net Benefits. Feedback loops were also introduced to reflect the two way causal relationships that the factors had with each other. The Use factor was also updated with intention to use, as an antecedent, or alternative measure to use; as in the Technology Acceptance Model (TAM) by Davis (1989) where it has been shown that intention to use a system is an alternate predictor of use.

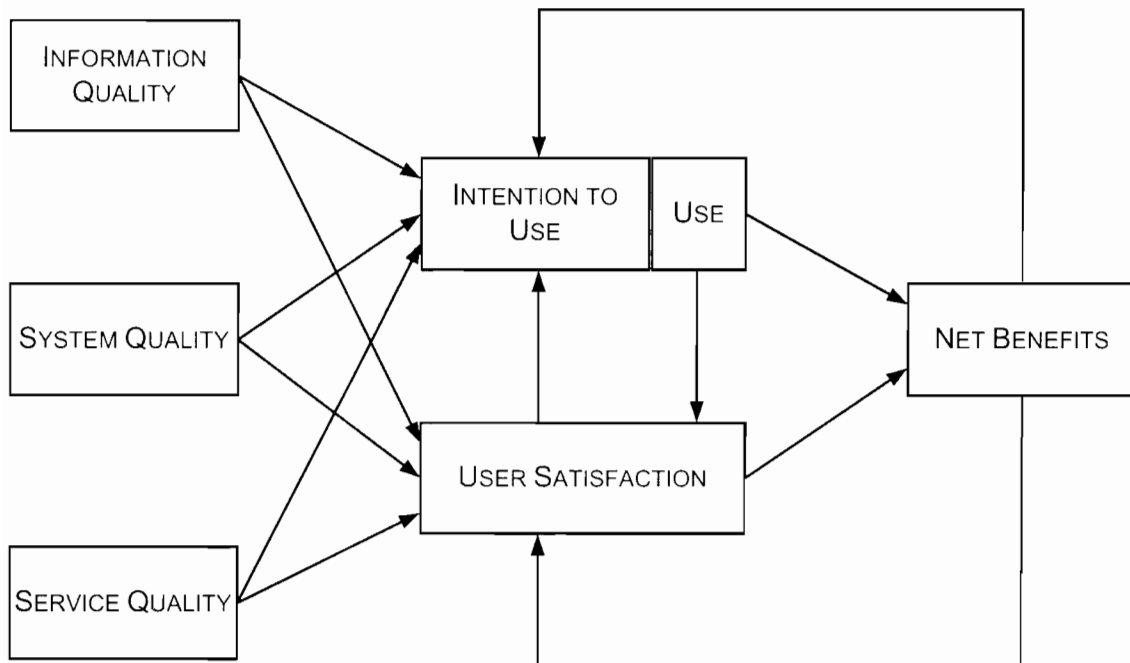


FIGURE 2.5: THE UPDATED MODEL – DELONE AND MCLEAN (2003)

Discussion

Although this model is called the Updated IS Success Model, Delone and McLean (2003) solidly suggest that it is applicable to e-commerce success. They suggest definitions to the constructs in the updated model in the e-commerce success context.

Constructs	Explanation
Systems Quality	This is the measure of the desired characteristics of an e-commerce system. Usability, availability, reliability, adaptability, and response time (e.g.: download time) are qualities valued by e-commerce users.
Information Quality	Web content should be personalized, complete, relevant, easy to understand and secure.
Service Quality	The overall support delivered by the service provider
Usage	Measures everything from a visit to a web site, to navigation within the site, to information retrieval, to execution of a transaction
User Satisfaction	This is an important means of measuring customers' opinions of the e-commerce system and should cover the entire customer experience cycle from information retrieval through purchase, payment and receipt and service
Net Benefits	This is the balance of the positive and negative effects of the e-commerce system on customers, suppliers, employees, organizations, markets, industries, economies and societies

TABLE 2.1: EXPLANATION OF CONSTRUCTS FOR MEASURING E-COMMERCE SUCCESS
(DELONE AND MCLEAN, 2003, P16)

A variety of research is considered in this model indicated by the revisions, namely the inclusion of the relationships between *Intention to Use* and *User Satisfaction*

Also interesting is the how the factor *Net Benefits* has been included in the new model. This is based on Seddon's (1997) research into the merger of partial behavioral theory and the IS Success Model. Net Benefits replaces Individual Impact and Organisational Impact in the original model (Delone and McLean, 1992). Based on the definitions of Net Benefits (see Table 2.1) – it seems very relevant and pertinent to the use of e-commerce,

and appears to fit into Molla and Licker's (2001) e-commerce success model as a surrogate for their e-commerce success factor.

The major conclusions drawn by Delone and Mclean (2003) were that while Seddon's (1997) work did help to clarify the model, it did not add anything substantially new and that their original conclusions were still sound.

Critique

This model takes into account the 10 years of research conducted after the publication of their original Model of IS Success (Delone and McLean, 1992), reflected in inclusion of net benefits and the feedback loops from net benefits to Intention to use and customer satisfaction. They propose that either Intention to Use or Use can be used in the model.

They state that *"Intention to Use is an attitude, whereas Use is a behavior. Substituting the former for the latter may resolve some of the process versus causal concerns that Seddon (1997) has raised. However, attitudes, and their links with behavior, are notoriously difficult to measure; and many researchers may choose to stay with use, but hopefully with a more informed understanding of it"* (Delone and McLean, 2003 p23).

2.4.3 Synthesis of E-commerce Success Models

The e-commerce success literature draws heavily from IS success literature, incorporating principles of satisfaction and use and the users' (customers') perceptions. Molla and Licker's (2001) model uses **e-commerce success** as the dependent variable, while the updated Delone and McLean (2003) model uses **net benefits** from e-commerce. While both models go far in proposing a framework for e-commerce success, the models are yet to be validated. The relationships need to be tested and validated empirically in an e-commerce context as the original Delone and McLean (1992) model was by Seddon (1997) and Rai et al (2002).

2.5 Concepts in E-commerce Success

From the review of the alternative models discussed, the following factors which feature heavily and which have sufficient cause to be explored further were identified.

2.5.1 *Satisfaction, Success and Net Benefits*

Delone and Mclean (1992) identified 33 articles in which *user satisfaction* was used as a measure of success, and according to Seddon (1997), *User Satisfaction* is the most general individual-user perceptual measure of information system success. This leads to the question of whether measuring the satisfaction of e-commerce would provide an accurate indication of the success of the system, and whether traditional measures of IS satisfaction can be applied to B2C e-commerce satisfaction.

(Seddon, 1996) defines User satisfaction as: *“the net feeling of pleasure or displeasure resulting from aggregating all the benefits that a person hopes to receive from interaction with the information system. Each user has a set of expected benefits or aspirations for the information system. To the extent that the system meets or fails to meet each of these aspirations, the user is more or less satisfied.”* (p246).

Other researches have measured satisfaction in different ways, using various measures and instruments. Previous studies that have put forward measures of IS satisfaction include: User Information Satisfaction (UIS), proposed by Bailey and Pearson (1983) and End-user Computing Satisfaction (EUCS), proposed by Doll and Torkzadeh, (1988). These focus on the conventional data processing or end-user computing environment and may not be a valid indication of satisfaction when used in the context of consumer e-commerce markets, i.e. web sites that market digital products and services (Wang and Tang, 2001). Wang and Tang (2001) therefore developed a measure of satisfaction for this environment.

This instrument consisted of a 43 item measure (later refined to 21 items) to evaluate Customer Information Satisfaction (CIS) towards Web sites that market digital products and services. This instrument consisted of seven factors as shown in Figure 2.6.

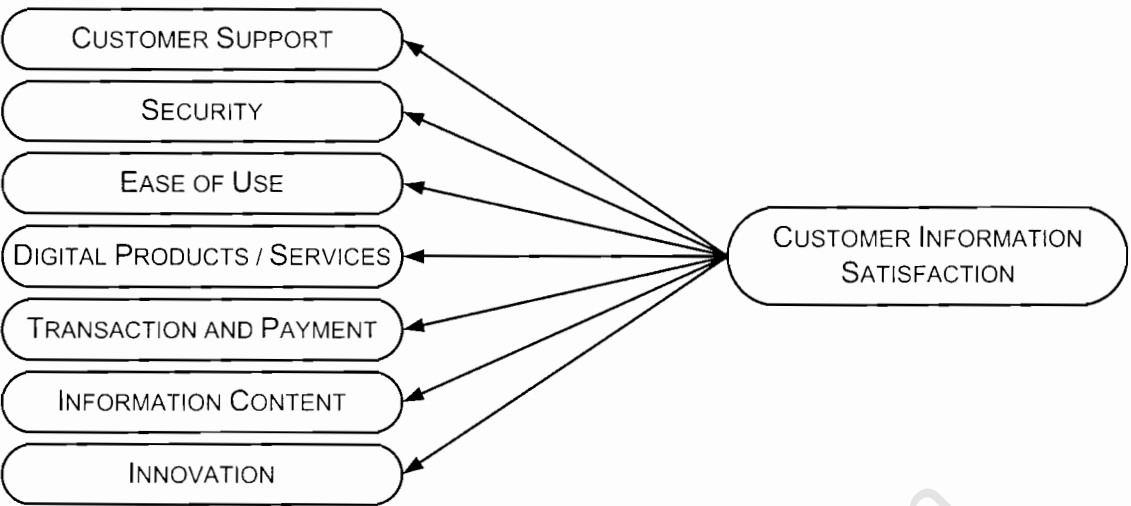


FIGURE 2.6: CUSTOMER INFORMATION SATISFACTION MODEL (WANG AND TANG, 2001)

These factors overlap with some variables in the Delone and McLean (2003) model and the E-commerce Success Model (Molla and Licker, 2001). This shows the similarities between success and satisfaction, and points to the need for a clear definition of constructs within the IS and e-commerce contexts.

Delone and McLean (2003) proposed that satisfaction leads to net benefits and that net benefits would in turn influence satisfaction. Therefore in the conceptual model it is proposed that the first two hypotheses be:

H1: *Customer E-commerce Satisfaction will lead to Net Benefits from E-commerce*

H2: *Net Benefits from E-commerce will lead to Customer E-commerce Satisfaction*

Another avenue of research, identified from the literature, identifies Customer Relationship Marketing (CRM) as an antecedent of use, and attempts to measure the influence of certain items on customers' intention of continuing to use e-commerce

systems (continuance intention). Bhattacharjee (2001) draws on expectation-confirmation theory (ECT) in the consumer behavior, TAM in the IS use literature and agency theory in the organizational economics literature to propose *satisfaction*, *perceived usefulness* and *loyalty incentives* as the three key factors influencing customers' decision to continue using e-commerce systems.

In this research paper, *intention to use* refers to *intention to continue using the e-commerce system* as defined by Bhattacharjee (2001), the reason being that only repeat e-commerce users (and not first time users) are being targeted in this study.

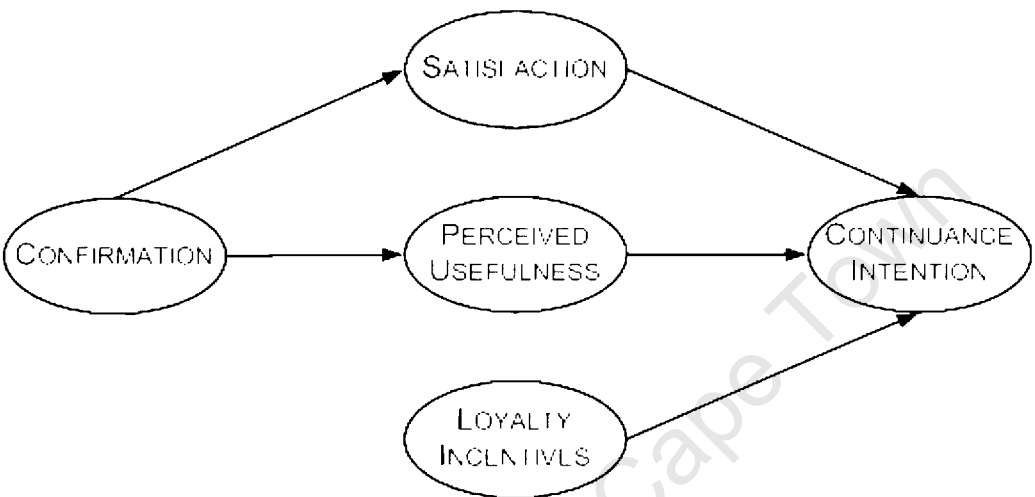


FIGURE 2.7: CONTINUANCE ACCEPTANCE MODEL (BHATTACHERJEE, 2001)

Bhattacharjee (2001) proposed that satisfaction was a key factor when customers were deciding whether to continue using e-commerce systems. Delone and McLean (2003) also hypothesized that an increase in customer e-commerce satisfaction will cause an increase in the intention to use the e-commerce system. From this research, it was decided to include this relationship in the conceptual model.

H3: *An increase in Customer E-commerce Satisfaction will lead to increases in Intention to Use (continue using the e-commerce system).*

Rai, et al (2002) in empirically testing alternative IS success models gauged user satisfaction with a single item measure. They argue that this measure is sufficient when a single global indication of Satisfaction is required. “Based on Baroudi and Orlikowski’s (1988) empirical analysis, they note that a single-item overall measure of satisfaction can be used when only an overall indication of user information satisfaction is desired.” (p58).

2.5.2 Perceived Usefulness

An e-commerce system, such as an online retail web site, is in essence, an information technology. Therefore, online purchase intentions can also be explained in part by the Technology Acceptance Model, TAM (Davis, 1989). Seddon (1997) included perceived usefulness in his model, as a surrogate measure for use.

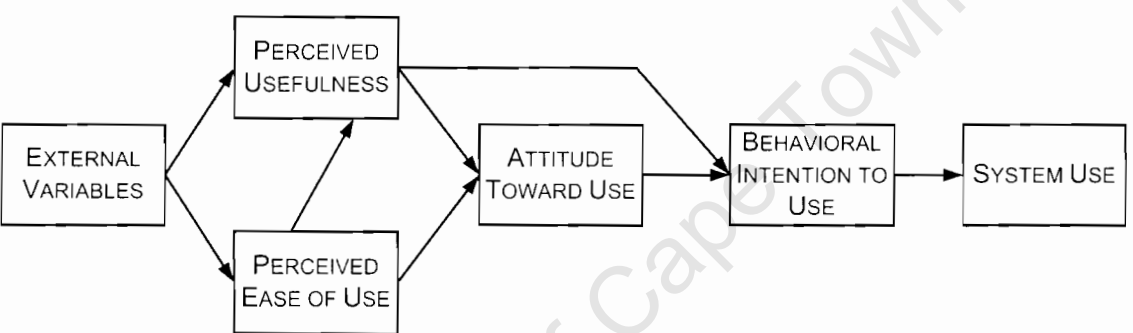


FIGURE 2.8: TECHNOLOGY ACCEPTANCE MODEL (DAVIS, 1989)

Davis (1989) showed that *Perceived Usefulness* and *Perceived Ease of Use* did have an effect on the acceptance of Information Technology. This research provides an explanation to the process leading up to users (customers) using an information system. Bhattacharjee (2001) proposed that if customers are satisfied and have perception that online retailing is useful, they will have the intention to continue using it. When both Intention to Use and Actual Use are measured, all external factors lead to Intention to Use, which leads to Actual Use. (Davis, 1989). Therefore there is a case for including the relationships from Perceived usefulness to Intentions to Use, and hence

H4: *Perceived usefulness will cause increases in Intention to use the e-commerce system*

According to Bhattacharjee (2001), loyalty incentives increase customers' intention to use when the online retail web site is perceived useful. Therefore,

H5: *Perceived usefulness combined with Loyalty incentives leads to increased intentions to use the e-commerce system.*

2.5.3 Intention to Use and Actual Use

The Delone and McLean (2003) model included the intention to use and use factors. Davis (1989) in his TAM model validated the relationship between Intention to Use and Actual Use. More recent researchers such as Chen et al (2002) among others have conducted research on the validity of the TAM model to online retail websites. They have shown that there is a strong relationship between behavioral intention to use and to actual use in an e-commerce context. According to Chen et al (2002), the classic theories on technology acceptance and innovation diffusion / adoption are still valid in explaining and predicting user behaviors in the business to consumer e-commerce context. Based on this previous research the relationship between intention to use and actual use was included in the conceptual model. Hence,

H6: *Increase in Intention to Use will lead to an increase in Actual Use of the e-commerce system.*

According to Molla and Licker (2001), actual use of an ecommerce system is a key factor influencing the success of e-commerce systems - specifically that it leads to satisfaction. Therefore in the conceptual model,

H7: *Increase in actual use leads to the increase in customer e-commerce satisfaction.*

2.5.4 System Quality

Ease of use has been identified as a component of system quality by earlier researchers (Molla and Licker, 2001). Intended use of e-commerce systems is influenced by Perceived Ease of Use (PEOU) and it also does have a significant effect on perceived usefulness (Gefen and Straub, 2000). Their operationalization of ease of use was much the same as **system quality** by other researchers. For example, according to Seddon (1997) system quality is concerned with the consistency of the interface and the **ease of use**. When he measured system quality, he included ease of use as a large component of system quality, and also proposed the relationship between system quality and perceived usefulness.

This provides support for the following hypothesis in the conceptual model.

H8: *Increases in System Quality will lead to increases in Perceived usefulness of the e-commerce system*

Figure 2.9 below shows the relationships that were empirically proved by Gefen and Straub (2000). In their research, e-commerce sites were split up into Inquiry Sites (eg: Paid Articles and Purchase Sites where physical goods were purchased and a third party was involved such as the shipping company. For the purposes of this analysis, it is sufficient to consider Inquiry Sites and Purchase Sites as one entity - Consumer E-commerce Sites.

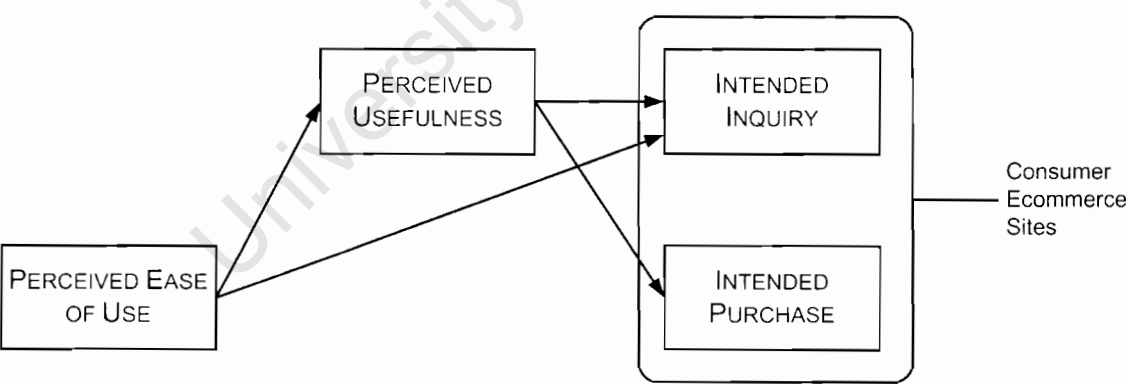


FIGURE 2.9: THE RELATIONSHIPS EMPIRICALLY TESTED AND PROVED BY GEFEN AND STRAUB (2000)

They showed that an online shopping website could be accepted and used by customers through two means, from the Technology Acceptance Model (TAM) perspective.

- 1) By increasing the customers' Perceived Usefulness of the Site.
- 2) By increasing the customers' Perceived Ease of Use of the Site.

Therefore, in the conceptual model it is possible to include the following relationship:

H9: *Increase in System Quality will lead to increases in Intention to use to the e-commerce system.*

Prominent research in this field (Delone and McLean, 2003; Molla and Licker; 2001; Seddon, 1997) suggests that system quality has a significant effect on satisfaction. Molla and Licker (2001) suggested that system quality is very important in determining customer e-commerce satisfaction, hence the next hypothesis proposed in the conceptual model is

H10: *Increase in system quality will lead to increases in Customer e-commerce satisfaction.*

2.5.5 Content Quality

This is referred to by Delone and McLean (2003) as Information Quality. There is a general consensus regarding the requirements for a high quality of content. Web content should be personalized, complete, relevant, easy to understand and secure if prospective buyers are expected to initiate transactions and return to the website (Delone and McLean, 2003). For the purpose of this research, *Information Quality* and *Content Quality* are used interchangeably.

Lederer et al (2000) empirically tested and validated the following model (Figure 2.10) in the context of web sites.

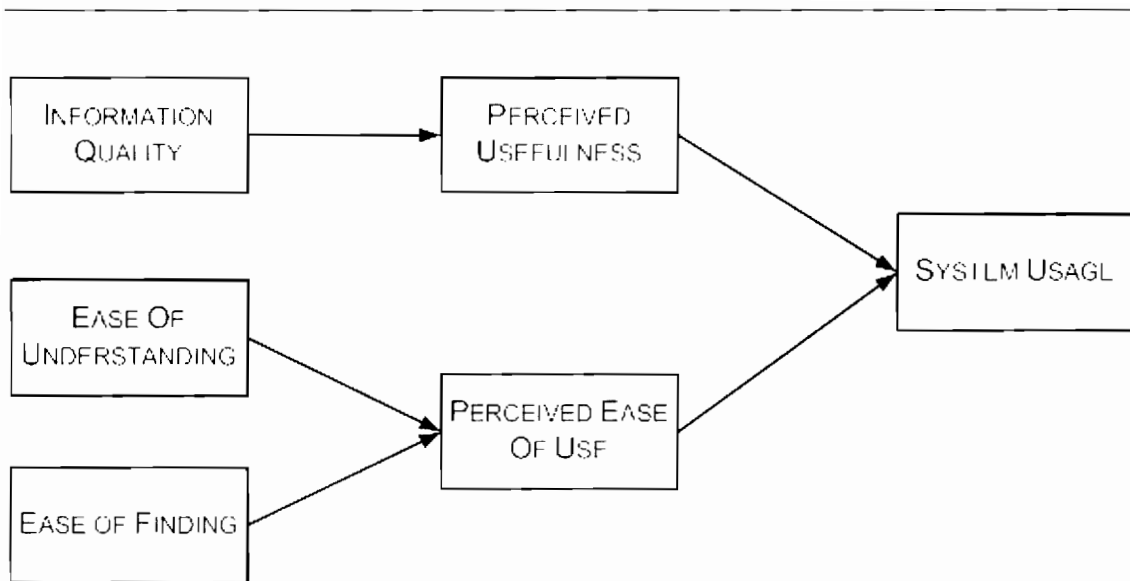


FIGURE 2.10: MODEL EMPIRICALLY VALIDATED BY LEDERER ET AL (2000).

Their research concluded that the use of web sites depends on the user's perceived usefulness and perceived ease of use of the site. Notably, they also found information quality to be a major influence on perceived usefulness, as suggested by Seddon (1997). Hence, in developing the conceptual model, the following relationship was included.

H11: *Increases in Content Quality will lead to increases in Perceived Usefulness of the e-commerce system*

Delone and McLean (2003, 1992) proposed that there was a relationship between information quality and use (or intention to use), and Molla and Licker (2001) who operationalized content quality in much the same way as information quality advocated that it affected e-commerce satisfaction, hence the hypotheses,

H12: *Increase in Content Quality will lead to increase in Customer E-commerce Satisfaction.*

H13: *Increases in Content Quality will lead to increases in Intention to Use the e-commerce system.*

2.5.6 Support and Service

Service quality (and support and service in Molla and Licker, 2001) is defined as the overall support delivered by the service provider (Delone and McLean, 2003). SERVQUAL developed by Zeithaml et al (1990) is a widely used measure of service quality. SERVQUAL attempts to measure the differences between the perceptions of customers, the level of service provided and the potential of improvement. This method is not entirely applicable to e-commerce systems because the level of face to face interaction is significantly reduced (Molla and Licker, 2001).

Delone and McLean (2003) included a relationship between service quality and satisfaction in their updated model. Furthermore, Molla and Licker (2001) also advocate that e-commerce satisfaction is affected by the extent of support and service provided by the e-vendor. This research provided the necessary grounds for including the following hypotheses in the conceptual model. Support and service in this paper refers to all levels of service including, *pre, during and after* sales activities.

H14: *Increases in Support and service will lead to increases in Customer e-commerce satisfaction*

H15: *Increases in Support and service will lead to increases in Actual use of the e-commerce system*

Hennig-Thurau and Klee (1997) and Harris and Goode (2004) found that there was a significant relationship between Service Quality and Trust. Harris and Goode (2004) state “*the issue of service quality appears especially important in online contexts, where it is estimated that online retailers lose nearly \$21 billion per annum due to poor service (Datamonitor, 2001) and where service complaints double in number each year (N.A.C.A.A., 2001). The importance of online service quality is, in part, driven by research that associates service quality with trust.*” And thus, “*service quality has a positive influence on trust.*” (p143). Figure 2.11, below shows the relationships proved by Harris and Goode (2004).

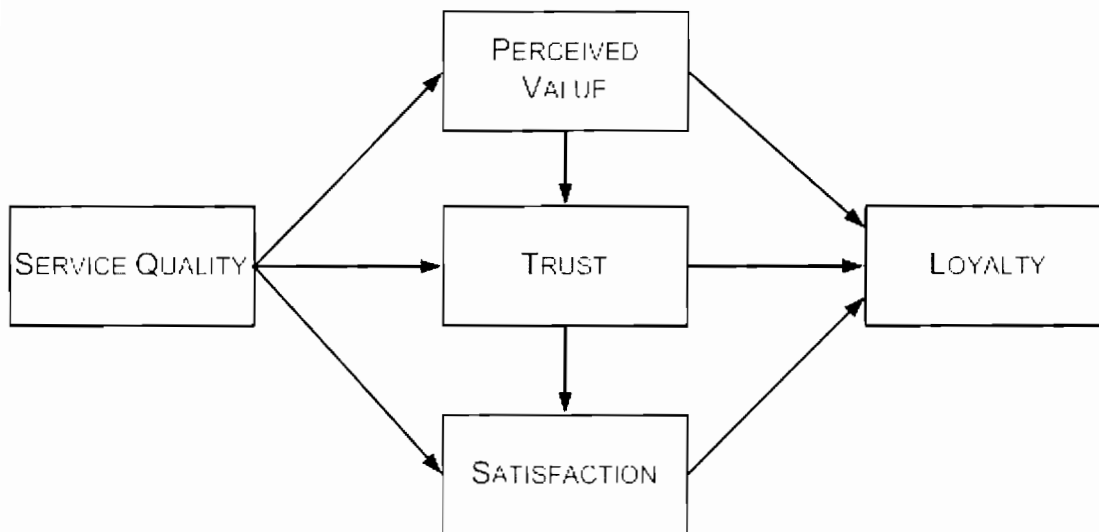


FIGURE 2.11: THE RELATIONSHIPS EMPIRICALLY TESTED BY HARRIS AND GOODE (2004)

This research leads to the inclusion of the following relationship between support and service and trust in the conceptual model,

H16: *Increases in Support and Service causes increases in Trust of the e-commerce system.*

2.5.7 Trust

Molla and Licker (2001) identified from the literature that customers' disposition to privacy and security issues could affect e-commerce satisfaction and success. Customers' fear, whether justified or not, of revealing personal and financial details, such as names, addresses and credit card numbers could hinder the development e-vendor–customer relationships (Molla and Licker, 2001).

Gefen and Straub (2003) defined the concept of trust in terms of four points they identified as constituting trust.

- 1) A set of specific beliefs dealing primarily with integrity, benevolence, ability, and predictability.
- 2) a general belief that another party can be trusted.

- 3) The Affect reflected in feelings of confidence and security in the caring response of the other party.
- 4) A combination of the above.

○ (Gefen and Straub, 2003)

Drawing on the studies of earlier researchers Gefen and Straub (2003) also documented the following trust considerations.

- Social uncertainty and risk with an e-vendor are typically high because the behavior of an e-vendor cannot be guaranteed or monitored (Reichheld and Scheffer 2000).
- Price does not rule the web; trust does. Trust has the nature of stability, it is not easy to break or violate, i.e. it should be based on enough samples plus consistent feedback (Reichheld and Scheffer, 2000).

Gefen and Straub (2003) empirically showed that Trust affected online purchasing decisions of online customers.

The following hypotheses included in the conceptual model are based upon the literature.

H17: *Increases in Trust causes an increase in Customer E-commerce Satisfaction.*

H18: *Increases in Trust causes an increase in Actual Use of the e-commerce system.*

2.6 Conceptual Model

Table 2.2 below is a summary of the proposed hypotheses in the conceptual model.

Hypothesis	Relationship	Reference
H1	<i>Customer E-commerce Satisfaction will lead to Net Benefits from E-commerce</i>	Delone and McLean (2003)
H2	<i>Net Benefits from E-commerce will lead to Customer E-commerce satisfaction</i>	Delone and McLean (2003)
H3	<i>An increase in Customer Satisfaction will lead to increases in Intention to Use</i>	Bhattacharjee (2001)
H4	<i>Perceived usefulness will cause increases in Intention to use</i>	Davis (1989), Lederer et al (2000) Gefen and Straub (2000)
H5	<i>Perceived usefulness X Loyalty incentives leads to Intentions to Use.</i>	Bhattacharjee (2001)
H6	<i>Increase in Intention to Use will lead to an increase in Actual Use</i>	Davis (1989), Lederer (2000)
H7	<i>Increase in Actual Use leads to the increase in Customer E-commerce Satisfaction</i>	Molla and Licker (2001)
H8	<i>Increases in System Quality will lead to increases in Perceived usefulness</i>	Seddon (1997), Gefen and Straub (2000)
H9	<i>Increase in System Quality will lead to increases in Intention to use</i>	Gefen and Straub (2000)
H10	<i>Increase in System Quality will lead to increases in Customer E-commerce Satisfaction.</i>	Delone and McLean (2003), Molla and Licker (2001), Seddon (1997)
H11	<i>Increases in Content Quality will lead to increases in Perceived Usefulness</i>	Seddon (1997), Lederer at al (2000), Delone and McLean (2003)
H12	<i>Increase in Content Quality will lead to increase in Customer E-commerce Satisfaction</i>	Molla and Licker (2001), Delone and McLean (2003)

H13	Increases in <i>Content Quality</i> will lead to increases in <i>Intention to Use</i>	Delone and McLean (2003)
H14	Increases in <i>Support and service</i> will lead to increases in <i>Customer E-commerce Satisfaction</i>	Molla and Licker (2001)
H15	Increases in <i>Support and service</i> will lead to increases in <i>Actual use</i> of the e-commerce system	Molla and Licker (2001)
H16	Increases in <i>Support and Service</i> causes increases in <i>Trust</i>	Harris and Goode (2004)
H17	Increase in <i>Trust</i> causes an increase in <i>Satisfaction</i>	Molla and Licker (2001)
H18	Increase in <i>Trust</i> causes an increase in <i>Actual use</i>	Molla and Licker (2001)

TABLE 2.2: SUMMARY OF HYPOTHESES

2.6.1 Conceptual Model (Jayakody's E-commerce Success Model)

The conceptual model below was produced after reviewing the literature. It combines the results of the latest research conducted by Molla and Licker (2001), Delone and McLean (2003), Seddon (1997), Bhattacharjee (2001), and Harris and Goode (2004) among others.

It is hoped that this research will provide some insight into the relationships between the various factors involved in measuring the success of B2C e-commerce systems. The process of validating this model will provide some insight into the relationship between Intention to use and Actual Use in the e-commerce context. The research will be valuable because the model in its entirety will be empirically tested, and in the process the relationships proposed by Molla and Licker (2001) and Delone and McLean (2003) but which have not been previously validated can be assessed.

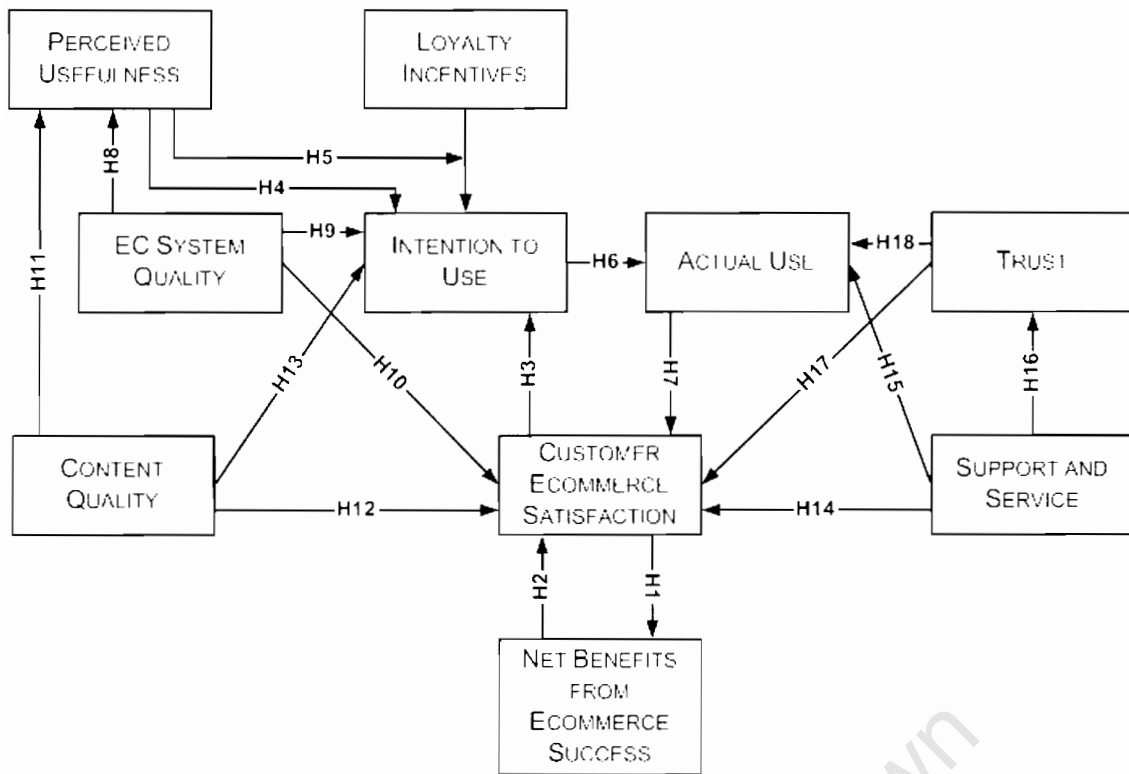


FIGURE 2.12: JAYAKODY'S E-COMMERCE SUCCESS MODEL

3. RESEARCH METHODOLOGY.....	34
3.1 INTRODUCTION.....	34
3.2 CHOICE OF RESEARCH.....	34
3.3 REVIEW OF METHODOLOGIES EMPLOYED IN SIMILAR STUDIES	34
3.4 METHODOLOGY.....	35
3.5 INSTRUMENT DESIGN	35
3.6 OPERATIONALIZATION OF CONSTRUCTS.....	36
3.6.1 Operationalization of Systems Quality	37
3.6.2 Operationalization of Content Quality	38
3.6.3 Operationalization of Perceived Usefulness.....	39
3.6.4 E-commerce Satisfaction	41
3.6.5 Intention to Use	41
3.6.6 Actual Use	42
3.6.7 Trust.....	43
3.6.8 Support and Service.....	45
3.6.9 Loyalty Incentives	46
3.6.10 Net Benefits.....	47
3.6.11 Summary of Instruments Used In the Instrument Construction	48
3.7 THE QUESTIONNAIRE	48
3.8 SAMPLE DESIGN	49
3.8.1 Sampling Frame	50
3.8.2 Sampling Selection Criteria.....	50
3.8.3 Sample Size.....	51
3.9 PILOT STUDY.....	52
3.10 ETHICAL ISSUES	53
3.11 DATA COLLECTION PROCEDURE	53
3.12 DATA CAPTURING AND ANALYSIS PROCEDURE	54

3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology followed to gather the data and explore the research hypothesis. The chapter covers arguments and decisions regarding the basic research approach, sample design, instrument development and procedures for data collection and analysis.

3.2 Choice of Research

There are two fundamental views of enquiry could be identified in most e-commerce studies – the positivistic and interpretivist views (Klein and Myers, 1999). Positivism is the dominant perspective in IS research (Molla, 2002).

The main purpose of the research reported in this thesis is to assess the nature of the relationships between factors present in the concept of e-commerce success. A conceptual model is developed from the literature and the relationships are tested empirically. This type of research falls within the paradigm of positivism.

3.3 Review of Methodologies Employed in Similar Studies

Palvia et al, (2003) conducted an extensive content analysis of all articles published, from 1993 to 1997, in seven acclaimed Information Systems Journals. The top ranking methodology used in IS research was the Survey method. Specifically, the joint top ranking methodology used in research conducted on e-commerce and internet in this period, was the “Case Study” and “Survey” methodologies.

3.4 Methodology

The research reported in this thesis draws mainly from previous Delone and McLean (1992, 2003) frameworks in order to develop hypotheses. These hypotheses are then tested empirically. Hence the research is positivistic and quantitative.

To reduce errors, an important consideration in conducting survey research is to properly design the survey so that possible errors can be avoided. There are four possible sources of error one needs to be wary of in a survey research:

- 1) Measurement error
- 2) Sampling error
- 3) Internal validity error
- 4) Statistical conclusion error

(Straub, 1989 in Molla, 2002)

3.5 Instrument Design

“One of the most significant errors in survey research is the measurement error. One way of controlling such measurement error and ensuring accuracy and validity, is using instruments that are sufficiently validated and that have been applied in similar research.” (Molla, 2002, p139)

Existing instruments were identified and a number of them suitable for assessing e-commerce success and the factors associated with it were found. However there was no instrument that could be used in its entirety to measure e-commerce success and all the factors identified by the literature review. The major problems were either, that the existing instruments did not measure all the factors or if they did, they contained items that overlapped into other factors.

In order to produce the most valid instrument to test the conceptual model, a combination of existing validated instruments was used. Individual instruments that measured each factor present in the model (in the correct context), were gathered and the most appropriate used. Instruments were chosen, in which, at least three items were included per construct for adequate reliability, as recommended by Nunnally (1978).

3.6 Operationalization of Constructs

There were various approaches and items used by previous researchers to operationalize the constructs in measuring success. The majority of research conducted in the field of IS Success use constructs and items originally developed by Davis (1989), Doll and Torkzadeh (1988) and Bailey and Pearson (1983). Recent researchers have made slight changes in the wording to adapt it to the system they were testing.

Wang and Tang's (2001) Customer Information Satisfaction (CIS) instrument is the first one that provides real changes geared towards modern consumer e-commerce sites. However it was not possible to use the CIS instrument to measure the independent variables in the conceptual model that affect satisfaction. The literature review revealed that the various constructs used to measure factors relevant in e-commerce success contained items that overlapped (i.e.: items used to measure one factor in a model were similar or identical to items used to measure another factor in another model, e.g.: the satisfaction measure of the CIS instrument (Wang and Tang, 2001) overlapped with the constructs in the e-commerce success models.

For the purpose of this research, it was decided that pre-existing validated instruments be used to test the conceptual model. In order to preserve the validity of the various instruments, they were used in their entirety and initially items could not be removed (Bhattacharjee, 2001).

A detailed search of instruments used by previous researchers was conducted. Various instruments measuring each factor in the model were then compared and the most

appropriate selected. The following section provides a description of previously validated instruments used by precedent researchers, and justification of why each instrument was selected.

3.6.1 Operationalization of Systems Quality

Delone and McLean (2003) state that in the context of measuring e-commerce success, systems quality is the measure of the desired characteristics of an e-commerce system. Usability, availability, reliability, adaptability, and response time (e.g.: download time) are qualities valued by e-commerce users. Various instruments have been developed by researchers. Table 3.1 below shows the various instruments used by previous researchers to operationalize systems quality.

Delone and McLean (2003)	System Quality Metrics Adaptability Availability Reliability Response Time Usability
Seddon (1997)	System Quality Construct The System is easy to use. The System is user friendly. Compared to other computer software, The System is easy to learn I find it easy to get The System to do what I want it to do It is easy for me to become skilful at using The System I believe that The System is cumbersome to use My using The System require a lot of mental effort Using The System is often frustrating.
Rai et al (2002)	Ease of Use Construct Is the system easy to use? Is the system user friendly?
Wang and Tang (2001)	Ease of Use Construct The website is user friendly The output format is easy to read The website is easy to use

TABLE 3.1: SYSTEM QUALITY CONSTRUCTS

The instrument used by Seddon (1997) was used to measure System Quality in this research. This was used because it is the most comprehensive and the results are widely accepted by the research community. The Delone and McLean (2003) instrument was not used because it had not been validated and the number of sub-items in each of the metrics would have made the survey impractical.

3.6.2 Operationalization of Content Quality

In order to have information quality, web content should be personalized, complete, relevant, easy to understand and secure (Delone and McLean, 2003). Table 3.2 shows the available instruments.

Delone and McLean (2003)	Information Quality Metrics Completeness Ease of Understanding Personalization Relevance Security
Seddon (1997)	Information Quality Construct Does the system provide the precise information you need? Are you satisfied with the accuracy of the system? Is the information clear? Is the system accurate? Does the system provide sufficient information? Does the system provide reports that seem to be just about exactly what you need? Do you think the output is presented in a useful format? Do you get the information you need in time? Does the information content meet your needs? Does the system provide up-to-date information?
Rai et al. (2002)	Information Quality Construct Does the system provide the precise information you need? Are you satisfied with the accuracy of the system? Does the system provide output that is exactly what you need?

	Does the system have errors in the program that you must work around? Does the system provide sufficient information to enable you to do your tasks? Is the information provided helpful regarding your questions or problems? Are the output options (print types, page sizes allowed for, etc.) sufficient for your use?
Wang and Tang (2001)	Information Content Construct The website provides information that exactly fits your needs The website provides accurate information The website provides information that you trust

TABLE 3.2: INFORMATION QUALITY CONSTRUCTS

The instrument used by Rai et al (2002) was chosen over other instruments used by Seddon (1997) and others because it had fewer questions and less items overlapping with items in the Systems Quality construct. This measure was a more adequate measure of information quality in the context of consumer e-commerce websites. The questions were slightly re-worded to make it more applicable to online retail web sites. The word ‘system’ was changed to ‘web site’.

3.6.3 Operationalization of Perceived Usefulness

Instruments found to measure Perceived Usefulness found were all based on Davis’ (1989) instrument.

Rai et al. (2002)	Perceived Usefulness Construct Using the system enables me to accomplish student-related tasks more quickly. Using the system improves my job performance. Using the system in my job increases my productivity. Using the system enhances my effectiveness on the job. Using the system makes it easier to do my job.
-------------------	---

	I find the system useful on my job.
Seddon (1997)	Perceived Usefulness Construct Using The System in my job enables me to accomplish my tasks more quickly Using The System improves my job performance Using The System in my job increases my productivity Using The System enhances my effectiveness in the job Using The System makes it easier to do my job Overall, I find The System useful to my job.
Gefen et al (2003)	Perceived Usefulness Construct ABC improves my performance in book searching and buying. ABC enables me to search and buy books faster. ABC enhances my effectiveness in book searching and buying. ABC makes it easier to search for and purchase books. ABC increases my productivity in searching and purchasing books. ABC improves my performance in book searching and buying.
Suh and Han (2002)	Perceived Usefulness Construct Using this Internet banking site enhances the productivity of my banking activities Using this Internet banking site has a critical role in supporting my banking activities Using this Internet banking site makes it easier to do my banking activities Using this Internet banking site enables me to accomplish banking activities Using this Internet banking site improves my performance of banking activities I find this Internet banking site useful for my banking activities

TABLE 3.3: PERCEIVED USEFULNESS CONSTRUCTS

The instruments were all similar and the instrument used by Suh and Han (2002) was chosen because it was specifically geared for an online context, and required the least amount of re-wording.

3.6.4 E-commerce Satisfaction

User Satisfaction is “an important means of measuring customers’ opinions of the e-commerce system and should cover the entire customer experience cycle from information retrieval through purchase, payment and receipt and service” (Delone and McLean, 2003, pp16). The table below shows the various instruments used by previous researchers to operationalize satisfaction.

Delone and McLean (2003)	User Satisfaction Metrics Repeat Purchases Repeat Visits User Surveys
Seddon (1997)	Overall satisfaction Construct How adequately do you feel the system meets the information processing needs of your area of responsibility?
Rai et al. (2002)	User Satisfaction Construct How would you rate your satisfaction with the system?
Wang and Tang (2001)	Customer Satisfaction Construct (global measure) You are satisfied with the website

TABLE 3.4: E-COMMERCE SATISFACTION CONSTRUCTS

The single item measure of satisfaction used by Rai et al (2002) was selected because it was the most appropriate instrument (in the e-commerce context), and did not have overlapping items in other constructs.

3.6.5 Intention to Use

Gefen and Straub (2000)	Intended Purchase Construct I would use my credit card to purchase from ABC. I would not hesitate to provide information to ABC.
-------------------------	---

	I am very likely to buy books from ABC. Number of Transactions executed
Gefen and Straub (2000)	Intended Inquiry Construct I would use ABC to retrieve information. I would use ABC to inquire what readers think of a book. I would use ABC to find out about the author of a book. I would use ABC to inquire about book ratings.
Dishaw and Strong (1999)	Intention to use Construct I will use the software maintenance tools rather than manual methods to complete this project. My intention is to use the software maintenance tools rather than manual methods in completing this project. In completing this project, I would rather use the software maintenance tools than use manual methods alone.
Bhattacharjee (2001)	Continuance Intention Construct I want to continue using my OLB rather than discontinue its use. My intentions are to continue using my OLB rather than any alternative means. If I could, I would like to <i>discontinue</i> use of my OLB.

TABLE 3.5: INTENTION TO USE CONSTRUCTS

The instrument used by Bhattacharjee (2001) was selected to measure to Intention to Use because the context in which it was designed and the dimensions it contained were most appropriate. It was suitable to the context of the study, where repeat users were the target, and not new users. Once again the questions were slightly re-worded, ‘OLB’ was changed to ‘web site’.

3.6.6 Actual Use

This concept measures everything from a visit to a web site, to navigation within the site, to information retrieval, to execution of a transaction (Delone and McLean, 2003).

Delone and McLean (2003)	Use Metrics Nature of Use Navigation Patterns Number of Site Visits Number of Transactions executed
Seddon (1997)	Use Construct If DAS were not mandatory, I would still use it On average, I spend approximately _____ hours/week working with DAS. This represents ____ % of my work.
Yang and Yoo (2003)	IS Use Construct On average I use the software: Infrequently Frequently On average I use the software __ times per month
Suh and Han (2002)	Use Construct How many times do you use this Internet banking site in a week? How frequent is your use of this Internet banking site?

TABLE 3.6: USE CONSTRUCTS

The instruments used by Suh and Han (2002) and Yang and Yoo (2003) are essentially the same. This instrument used by Suh and Han (2002) was selected because it measured the frequency of use in the context of an e-commerce system most comprehensively.

3.6.7 Trust

There were comprehensive instruments to measure trust in an e-commerce context available in the literature. Many measured trust as the sum of the multiple dimensions of a complex factor, and were very similar to that used by McKnight et al (2002).

McKnight et al (2002)	General Trust Construct I feel good about how things go when I do purchasing or other activities on the Internet. I am comfortable making purchases on the Internet.
McKnight et al (2002)	Benevolence Trust Construct I feel that most Internet vendors would act in a customers' best interest. If a customer required help, most Internet vendors would do their best to help Most Internet vendors are interested in customer well-being, not just their own wellbeing.
McKnight et al (2002)	Integrity Trust Construct I am comfortable relying on Internet vendors to meet their obligations. I feel fine doing business on the Internet since Internet vendors generally fulfill their agreements. I always feel confident that I can rely on Internet vendors to do their part when I interact with them.
McKnight et al (2002)	Competence Trust Construct In general, most Internet vendors are competent at serving their customers. Most Internet vendors do a capable job at meeting customer needs. I feel that most Internet vendors are good at what they do.
McKnight et al (2002)	Assurance Trust Construct The Internet has enough safeguards to make me feel comfortable using it to transact personal business. I feel assured that legal and technological structures adequately protect me from problems on the Internet. I feel confident that encryption and other technological advances on the Internet make it safe for me to do business there. In general, the Internet is now a robust and safe environment in which to transact business.
Suh and Han (2002)	Trust Construct This Internet banking site is trustworthy. I trust in the benefits of the decisions of this Internet banking site. This Internet banking site keeps its promises and commitments This Internet banking site keeps customers' best interests in mind This Internet banking site would do job right even if not monitored

I trust this Internet banking site	
TABLE 3.7: TRUST CONSTRUCTS	
The instrument used by Suh and Han (2002) had an ideal number of items and was geared towards e-commerce web sites.	
3.6.8 Support and Service Service quality is the overall support delivered by the service provider (Delone and McLean, 2003). This is similar to the Support and Service construct proposed by Molla and Licker (2001).	
Delone and McLean (2002)	Service Quality Metrics Assurance Empathy Responsiveness
Harris and Goode (2004)	Service Quality Items Providing services as promised Dependability in handling customers' service problems Performing services right the first time Providing services at the promised time Keeping customers informed about when services will be performed Prompt service to customers Willingness to help customers Readiness to respond to customers' requests Web site should instill confidence in its customers Making customers feel safe when buying online The web site is polite and courteous Web site provides useful information to answer customer questions Individual attention is given That the web site is designed to provide a caring service Having the customer's best interest at heart The web page should understand the needs of their customers Modern design and graphics are used
Wang and Tang (2001)	Customer Support Construct

	You are satisfied with the customer support provided by the website
	You are satisfied with the after-sales service provided by the website
	The website understands your problems and requests
	The website responds to your requests fast enough

TABLE 3.8: CUSTOMER SUPPORT CONSTRUCTS

The Harris and Goode (2004) instrument contained too many items to fit into the questionnaire, and contained some overlapping items. It was decided that it would not be practical to use it due to the time it would take respondents to complete.

The Wang and Tang (2001) Customer Support instrument was a shorter validated instrument, and it had a more appropriate number of items given the time constraints that the respondents would have in completing the questionnaire, thus it was selected.

3.6.9 *Loyalty Incentives*

This construct was included into the model as a result of reviewing the research conducted by Bhattacharjee (2001). His study measured loyalty incentives and a new instrument was developed and validated. Other Loyalty studies simply questioned customers on their loyalty to a web site, and not on specific incentives and rewards that e-commerce vendors provide in hope of culturing loyal customers.

Bhattacharjee (2001)	Loyalty Incentives Construct
	My OLB offers incentives for its continued use, such as frequent flier miles or bonus points.
	I get rewarded for my continued patronage of my OLB.
	My OLB generally does <i>not</i> give me any loyalty incentives for my continued use of its service.

TABLE 3.9: LOYALTY INCENTIVES CONSTRUCTS

This instrument was reworded from ‘OLB’ to ‘online retail web site’ to better fit the research topic.

3.6.10 Net Benefits

Delone and McLean (2003) define Net Benefits as “the balance of the positive and negative of the e-commerce system on customers, suppliers, employees, organizations, markets, industries, economies and societies” (p 16)

Seddon (1997) defines Net Benefits as “An idealized comprehensive measure of all past and expected future benefits less all past and expected future costs attributed to the use of an information technology application” (p 246)

Delone and McLean (2003)	Net Benefits Metrics Cost Savings Expanded Markets Incremental Additional Sales Reduced Search Costs
Seddon (1997)	Net Benefits Construct The total benefits of using this online retail site to make purchases outweigh the total of all other costs to use it (including time taken to learn, infrastructure cost etc.)

TABLE 3.10: NET BENEFITS CONSTRUCTS

Based on the above definition, a one factor measure based on Seddon’s (1997) definition was deemed the most appropriate way to measure the dependent variable in the model.

3.6.11 Summary of Instruments Used In the Instrument Construction

Table 3.11 shows the instruments used to create the questionnaire. A few had to be slightly reworded for this study, but no changes that altered the fundamental concept that the item was measuring were made.

Construct	Summary of Items Used	
	Nr of Items	Reference
System Quality	7	Seddon (1997)
Content Quality	7	Rai et al. (2002)
Perceived Usefulness	6	Suh and Han (2002)
Loyalty Incentives	3	Bhattacharjee (2001)
E-commerce satisfaction	1	Rai et al. (2002)
Intention to Use	3	Bhattacharjee (2001)
Actual Use	2	Suh and Han (2002)
Trust	6	Suh and Han (2002)
Support and Service	4	Wang and Tang (2001)
Net Benefits	1	Seddon (1997)

TABLE 3.11: SUMMARY OF INSTRUMENTS USED

3.7 The Questionnaire

The following requirements are important considerations when designing the questionnaire:

- **Assurances of anonymity:** People, in general, do not want to give away any personal details, particularly regarding their addresses, contact details and financial transactions.
- **Quick to complete:** Due to the fact that many people are extremely busy with their normal business, and have no immediate gain from filling out the survey, it was important that the survey was quick to complete.
- **Easy to complete:** People generally do not like to complete long surveys, and should be able to complete them in a short time, thus reducing the chance that

they will simply ignore it. People also dislike writing out long answers and would rather circle or tick correct answers. Thus it was important that the survey required as little writing as possible and was easy to complete.

- **Unbiased:** The way the questions are structured should not imply that certain types of purchases, amount spent or perceptions regarding security and privacy are better or worse than others. The respondents should feel that all responses are equally valid and that accuracy and honesty is appreciated. The questions should be objectively worded, and not hint at any of the author's own personal perceptions.

The review of existing instruments resulted in the questionnaire shown in Appendix A.

The research instrument consisted of 15 main questions. It was divided into two sections. The first section, questions 1 to 10, measured the different factors in the conceptual e-commerce success model and concentrates on the perceptions and opinions of the respondent regarding Perceived Usefulness, System Quality, Content Quality, Intention to Use, Actual Use, Customer E-commerce Satisfaction, Trust, Support and Service, Loyalty Incentives, and Net Benefits.

The second section, questions 11 to 15, focused on general demographic information such as age range, income level, gender, hours per week spent on internet, frequency of e-commerce participation. The questions were made up of a five point Lickert scale where the respondents could simply circle the appropriate number.

3.8 Sample Design

In order for the study to be valid and constructive, the appropriate sample had to be identified and then a decision taken as to whether or not it was realistic that the data necessary for this study was accessible and obtainable. The sampling frame, selection criteria and sample size were considered as in Molla (2002).

3.8.1 Sampling Frame

This study seeks to sample a population of e-commerce users, specifically online retail customers in South Africa. There were no age, gender or race requirements. This study is focused on the online retail market. Anyone who makes or has made purchases on the internet in South Africa was part of the target sample.

The most comprehensive academic study into the typical e-commerce user in South Africa was that conducted by De Villiers and Van Der Merwe (2001). It included a mailing list of 6000 internet users in South Africa. This was used as the primary source of data used to determine the appropriate sampling frame.

They found that the largest groups of e-commerce users in South Africa were in the 30 to 39 years age group, followed by the 20 to 29 years age group, making up 46.6% and 29.7% of online shoppers in South Africa respectively.

Their research also showed that 37% of e-commerce users in South Africa had a Bachelors degree and 31% had an Honours degree or higher. The study also revealed that 86% of online shoppers in South Africa had an annual income of R 50 000 or more.

3.8.2 Sampling Selection Criteria

With the sampling frame defined, the next step was to formulate a way to distribute the questionnaire to the appropriate group and receive the results with maximum efficiency without exceeding the budget. The following alternatives were considered:

- 1) Host a questionnaire online and mass email the link to it to internet users
- 2) Post a link to the questionnaire on a well-known online retail web site.
- 3) Obtain a mailing list of customers of a well known online retail and email them.
- 4) Distribute a paper based questionnaire to e-commerce users, namely post graduate university students.

Option (4) could be considered as slightly biased as the respondents would be part of a specialized group, and could be argued that they are non-representative of the greater South African e-commerce user. After careful consideration it was decided that option (4) was still the best option to use, as 1) it was convenient and 2) post graduate students fit the profile of e-commerce users in South Africa. Previous IS and e-commerce studies have used university students as samples (Van Der Heijden, 2003), so the use of students in this study was not seen as a problem.

A graduate school of business at a leading university in Cape Town provided the most appropriate sample group. The survey was also distributed to commerce information systems students at the same university. The business school requires all those that enroll have at least 5 years work experience. The profile of post graduate students is the same as that of the typical e-commerce user in South Africa, in terms of age, education and income.

All those surveyed were mature individuals who are working and continuing their studies either part-time or full-time. In addition, the relative ease of access to these students meant that the data could be obtained quickly.

3.8.3 Sample Size

De Villiers and Van Der Merwe (2001) collected a sample of 255 Internet users during November 2000. The profile was found to be 58% male, mostly between 20 and 40 years of age, high-income earners and well educated. The most significant descriptive statistic is by far the finding that 47% of the online community engage in e-commerce. There were 2 million internet users and 940 000 e-commerce users in South Africa in 2001

A realistic sample for a positivistic study of this nature would therefore be in the region of 200 to 250 post graduate students and professionals, given the budget and the time constraints of this research. This figure would be more than sufficient to carry out the envisioned statistical tests, namely structural equation modeling (SEM), regression

analysis (RA), and confirmatory factor analysis (CFA) (Molla, 2002). Post graduate Information Systems (IS) classes, including post graduate diploma, part time IS Honors and IS Masters classes were approached, followed by the MBA and Associate in Management (AIM) classes at the business school.

3.9 Pilot Study

Before printing the questionnaire, a pilot study was conducted. The purpose of the pilot study was to establish the basic soundness of the instrument. It was conducted to check for poorly worded questions, questions with ambiguous interpretations, and that it read well and was clear and concise.

The respondents for the pilot study were ten Information Systems Masters students, similar to the sample population, at a leading university in Cape Town. They were considered an appropriate sample because of their experience in quantitative research, and were able to provide some valuable feedback.

The participants in the pilot study revealed that they were confused when answering some questions because they had used some excellent e-commerce retail sites which they had a high regard for and some retail sites of significantly lesser quality. This made the responses less accurate. To make the results the more objective, the respondents were instructed to base their responses on their last e-commerce experience, rather than their general perceptions. Responses based on the last e-commerce site used ensure that the responses to each question are objective and comparable. Asking questions that relate to the most recent service encounter, enables the researcher to elicit attitudes with respect to a specific experience (Shankar et al, 2003).

3.10 Ethical Issues

There were a few ethical issues that needed to be resolved before collecting the data.

The major issue was that of handing out a large number of unsolicited questionnaires to respondents and then personally appealing to them. Permission was obtained from the director of the business school and the relevant authorities in charge of the post graduate IS classes to approach the specific individuals. It was explained that participation in the study was completely voluntary.

Another factor to consider was the extent of personal questions that could be asked. From a research point of view, the more detailed the data was, the better. However, it would not be ethical to ask for any sort of personally identifiable information, unless it was essential, and even in that case, the respondent was to be given the option not to provide any personal information. The questionnaire was reviewed and approved by the UCT Commerce Ethics Board, before being sent to the printers.

3.11 Data Collection Procedure

Based on the sample selection criteria, it was decided that a paper-based questionnaire would be used. This would be done by distributing the questionnaires to respondents personally, and appealing to them to complete it in the interest of academia. Reasons for the questionnaire were stated on the cover page. Table 3.12 below shows the responses received.

Class	Responses				
	Questionnaires Distributed	Nr of Responses	Unusable (discarded) Responses	Nr. of Usable Responses	Usable Response Rate
Full-time MBA	60	48	7	41	85.4%
Part-time MBA	75	66	6	60	90.9%
Full-time AIM (Asst in Management)	30	27	0	27	100.0%
Full-time Information Systems Masters	10	4	0	4	100.0%
Part-time Information Systems Honors	20	12	1	11	91.7%
Part-time post graduate diploma in IS	27	19	1	18	94.7%
Other Responses	4	4	0	4	100.0%
Total	226	180	15	165	91.7%

TABLE 3.12: USABLE RESPONSE RATE

The students were asked to fill in the questionnaires before they left the class. This method was very effective as the response was immediate and the results received immediately. A small number of other people, who were e-commerce users, also took part in the survey.

3.12 Data Capturing and Analysis Procedure

Each response was given a unique sequential identification number. The data was entered into an Excel Spreadsheet in the format that each row consisted of a separate individual response. Each column in the spreadsheet related to a specific question. It was essential to have this format in order to perform some statistical tests.

Statistica 6.0 was used to perform all statistical tests, while the descriptive and graphical representations of the data were created using Microsoft Excel. In addition to the descriptive statistical analysis such as mean and correlation analysis, discriminant analysis, confirmatory factor analysis item / reliability analysis, and goodness-of-fit analysis were used to investigate the collected data (Molla, 2002; Bhattacharjee, 2001). In all cases, missing data was excluded and a five percent (p=0.05) significance level was maintained unless indicated otherwise.

University of Cape Town

4. INSTRUMENT VALIDATION AND DATA REFINEMENT	57
4.1 INTRODUCTION.....	57
4.2 SURVEY RESPONSES	57
4.2.1 <i>Questionnaire Returns</i>	58
4.3 ITEM ANALYSIS.....	58
4.3.1 <i>Testing for Validity: Confirmatory Factor Analysis</i>	58
4.3.2 <i>Summary of Final Items</i>	61
4.4 DISCRIMINANT VALIDITY	61
4.5 ALTERATIONS TO THE MODEL TESTING PROCEDURE	63
4.5.1 <i>Summary of New Retained Items</i>	65
4.6 TESTING FOR RELIABILITY	67
4.6.1 <i>Summary of Item Validities and Reliabilities</i>	67

University of Cape Town

4. INSTRUMENT VALIDATION AND DATA REFINEMENT

4.1 Introduction

The research survey yielded 180 responses. Before proceeding with the analysis, it was essential that the data was free of any measurement error and that all responses were sufficiently valid, complete and reliable. This chapter discusses the steps taken to check for validity, reliability and data usability.

The first step once the data was captured into the Excel spreadsheet was to derive the average scores for each construct measured in the questionnaire. Where required, the scores of the negative items were reversed before the average value for the particular research variable was calculated.

4.2 Survey responses

The survey was conducted over a period of three weeks. Each of the classes was personally visited, the questionnaires handed out, and the completed ones collected at that time. No effort was made to follow up any respondent that did not hand back the questionnaire. This was done to uphold the assurance made that it was completely voluntary to participate in this study.

This approach ensured that the response rate achieved was 90%. 180 out of 200 questionnaires distributed were returned.

Of the 180 returned questionnaires, 15 were eliminated based on their response to Question 14.5, (see Appendix A), which asked how often they used the internet to make purchases. This provided a means of eliminating outlying data as the responses not

considered in the statistical analysis had never used e-commerce before. There were 165 *usable* responses left to analyze.

4.2.1 Questionnaire Returns

The breakdown of respondents is as follows:

Group	Breakdown of Respondents	
	Number	Percentage
AIM	27	16%
PG Diploma in IS	18	11%
Part Time Honors	11	7%
Full Time MBA	41	25%
Part Time MBA	60	36%
Full Time IS Masters	4	2%
Colleagues in the IS Sector	4	2%
Total	165	100%

TABLE 4.1: BREAKDOWN OF RESPONDENTS

4.3 Item Analysis

Before the data can be used to perform any sort of significant statistical test, it must be tested for validity and reliability.

4.3.1 Testing for Validity: Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) can be used to assess the construct validity (Molla, 2002). Since the questionnaire was devised from previously validated instruments, CFA was used to validate and refine the measurement model. Each item was then assessed to make sure that the items had a reliability (Cronbach Alpha) exceeding the standard acceptance norm of 0.80. (Bhattacharjee, 2001; Wang and Tang, 2001) This approach is consistent with those used by previous researchers who also used pre-existing instruments.

When performing the CFA, four commonly applied decision rules are used (Wang and Tang, 2001).

- 1) Use a minimum eigenvalue of 1 as a cutoff value for extraction;
- 2) Delete items with factor loadings of less than 0.5 on all factors or greater than 0.5 on two or more factors;
- 3) Use a simple factor structure;
- 4) Exclude single item factors from the standpoint of parsimony.

The iterative sequence of factor analysis and deletion was repeated, until the distinct factors were identified (Wang and Tang, 2001).

As a result of the CFA, 11 of the original 40 items were deleted, because they did not load well onto the model. The CFA confirmed the presence of 7 distinct factors, namely Perceived Usefulness, Content Quality, System Quality, Actual Use, Trust, Loyalty Incentives and Support and Service, and 2 one factor variables, E-commerce Satisfaction and Net Benefits.

The general criterion is that if the items for each variable load together in factor analysis, but do not cross load onto other factors, then there is evidence of construct validity (Nunnally, 1978). There was no cross loading in the CFA at the 0.6 level.

Below is the final stage of the Confirmatory Factor Analysis, all items which had a loading of less than 0.6 were eliminated. Using 0.6 as a cut-off value is higher than most research of this nature. All steps to the CFA are shown in Appendix B and C.

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.600000)						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	0.09	0.75	0.05	0.09	0.15	0.09	0.09
PU2	-0.05	0.69	0.09	0.17	0.15	0.39	0.04
PU3	0.10	0.80	-0.08	0.17	0.18	0.06	0.14
PU4	0.14	0.78	-0.09	0.01	0.07	0.16	0.11
PU5	0.16	0.69	0.06	0.12	-0.16	0.09	0.25
PU6	0.10	0.78	-0.09	0.30	0.13	-0.00	0.20
CQ1	0.15	0.27	0.06	0.76	0.09	0.08	0.10
CQ2	0.18	0.05	-0.02	0.79	-0.04	0.04	0.05
CQ3	0.20	0.20	-0.00	0.63	0.20	0.01	0.21
CQ5	0.02	0.04	-0.00	0.67	0.16	0.06	0.29
CQ7	0.26	0.17	0.07	0.75	-0.01	-0.07	0.04
SQ5	0.23	0.27	0.08	0.12	0.64	-0.18	0.27
SQ6	0.13	0.12	0.02	-0.03	0.82	0.05	0.16
SQ7	0.15	0.07	0.05	0.24	0.74	0.18	0.14
AU1	0.08	0.30	0.11	0.02	0.08	0.82	0.17
AU2	0.09	0.18	0.06	0.04	0.02	0.88	0.12
TR1	0.16	0.24	-0.02	0.21	0.25	0.05	0.76
TR2	0.20	0.24	0.02	0.08	0.09	0.10	0.75
TR3	0.35	0.23	-0.02	0.17	0.22	0.14	0.64
TR6	0.25	0.09	0.08	0.27	0.14	0.15	0.72
LI1	0.12	0.02	0.91	0.02	0.08	0.06	0.08
LI2	0.17	-0.05	0.93	0.03	0.05	0.08	0.05
LI3	-0.03	-0.03	0.80	0.02	-0.01	0.03	-0.07
SS1	0.77	0.08	0.04	0.14	0.27	0.13	0.18
SS2	0.75	0.16	0.12	0.16	0.20	0.09	0.25
SS3	0.76	0.15	0.13	0.27	-0.01	-0.06	0.23
SS4	0.79	0.11	0.04	0.25	0.10	0.06	0.16
Expl.Var	3.00	3.98	2.44	3.19	2.10	1.82	2.70
Prp.Totl	0.11	0.15	0.09	0.12	0.08	0.07	0.10

FIGURE 4.1: CFA AT MINIMUM LOADING 0.6

Unfortunately, the CFA resulted in the complete elimination of the *Intention to Use* factor. This was a set-back in the research as it meant that the proposed model could not be tested with data of an irrefutable level of item validity, as originally hoped.

4.3.2 Summary of Final Items

Construct Items	Final Instrument Items	
	Items	Nr. of Items
Percieved Usefulness	PU1, PU2, PU3, PU4, PU5, PU6	6
Content Quality	CQ1, CQ2, CQ3, CQ5, CQ7	5
System Quality	SQ4, SQ5, SQ6, SQ7,	4
Actual Use	AU1, AU2	2
Trust	TR1, TR2, TR3, TR6,	4
Loyalty Incentives	LI1, LI2, LI3	3
Support and Service	SS1, SS2, SS3, SS4,	4
Customer Ecommerce Satisfaction	ES1	1
Net Benefits	NB1	1
Total		30

TABLE 4.2: FINAL ITEMS IN THE INSTRUMENT

4.4 Discriminant Validity

Discriminant Validity refers to the degree to which a variable differs from other variables (Wang and Tang, 2001). To claim discriminant validity, an item should correlate more strongly with other items of the same variable than with items of other variables (Molla, 2002). It is accessed by counting the number of times (K) that an item correlates more strongly with items of other factors than with items of its own factor. Wang and Tang (2001) suggest that the value of K should be less than one-half of the potential comparisons.

An examination of the summary table and the correlation matrix, from which the summary table was drawn, shows that there are no violations of discriminant validity in a total of 162 comparisons. Another test to determine whether the constructs are unidimensionally and factorially distinct, is if there are no cross-construct loadings that exceed 0.5. (Van Der Heijden, 2003). The CFA showed that there were no cross loadings and hence there is sufficient evidence of both convergent and divergent validity. Therefore the instrument is considered adequate to generate quality data to the current investigation. Figure 4.2 below shows the Correlation Matrix.

Factor	Correlations (Clean Data1.1)																											
	Marked correlations are significant at p < .05000																											
	N=166 (Casewise deletion of missing data)																											
	PU1	PU2	PU3	PU4	PU5	PU6	CQ1	CQ2	CQ3	CQ5	CQ7	SQ5	SQ6	SQ7	AU1	AU2	TR1	TR2	TR3	TR6	LI1	LI2	LI3	SS1	SS2	SS3	SS4	
PU1	1.00	0.58	0.62	0.55	0.41	0.57	0.35	0.14	0.25	0.21	0.15	0.30	0.20	0.21	0.32	0.24	0.35	0.29	0.38	0.19	0.12	0.07	-0.06	0.21	0.25	0.24	0.24	
PU2	0.58	1.00	0.57	0.51	0.48	0.57	0.34	0.23	0.21	0.17	0.19	0.16	0.26	0.27	0.48	0.41	0.30	0.30	0.29	0.22	0.12	0.08	0.06	0.15	0.17	0.13	0.18	
PU3	0.62	0.57	1.00	0.68	0.48	0.68	0.37	0.21	0.30	0.26	0.29	0.34	0.27	0.26	0.33	0.24	0.43	0.35	0.36	0.28	0.01	-0.07	-0.08	0.23	0.31	0.26	0.25	
PU4	0.55	0.51	0.68	1.00	0.53	0.58	0.23	0.07	0.23	0.18	0.20	0.24	0.18	0.20	0.36	0.31	0.31	0.32	0.36	0.21	-0.04	-0.07	-0.05	0.25	0.28	0.20	0.20	
PU5	0.41	0.48	0.48	0.53	1.00	0.61	0.29	0.16	0.31	0.16	0.26	0.29	0.04	0.11	0.34	0.28	0.34	0.29	0.30	0.37	0.08	0.03	0.03	0.20	0.28	0.33	0.24	
PU6	0.57	0.57	0.68	0.58	0.61	1.00	0.47	0.28	0.44	0.25	0.40	0.40	0.23	0.25	0.33	0.18	0.42	0.40	0.41	0.34	-0.00	-0.08	-0.12	0.26	0.31	0.30	0.25	
CQ1	0.35	0.34	0.37	0.23	0.29	0.47	1.00	0.56	0.57	0.47	0.56	0.28	0.09	0.34	0.22	0.15	0.32	0.29	0.36	0.37	0.10	0.08	0.06	0.25	0.33	0.37	0.38	
CQ2	0.14	0.23	0.21	0.07	0.16	0.28	0.56	1.00	0.49	0.41	0.53	0.11	0.04	0.20	0.02	0.11	0.28	0.23	0.22	0.27	0.02	0.04	0.02	0.25	0.26	0.35	0.36	
CQ3	0.25	0.21	0.30	0.23	0.31	0.44	0.57	0.49	1.00	0.43	0.46	0.36	0.21	0.33	0.20	0.12	0.17	0.33	0.42	0.39	0.08	0.08	-0.03	0.35	0.42	0.37	0.31	
CQ5	0.21	0.17	0.26	0.18	0.16	0.25	0.47	0.41	0.43	1.00	0.50	0.26	0.16	0.28	0.14	0.12	0.41	0.21	0.39	0.38	0.10	0.06	-0.05	0.25	0.24	0.29	0.28	
CQ7	0.15	0.19	0.29	0.20	0.26	0.40	0.56	0.53	0.46	0.50	1.00	0.25	0.08	0.18	0.07	0.08	0.28	0.15	0.26	0.33	0.10	0.13	0.04	0.31	0.34	0.42	0.38	
SQ5	0.30	0.16	0.34	0.24	0.29	0.40	0.28	0.11	0.36	0.26	0.25	1.00	0.53	0.47	0.10	0.08	0.44	0.31	0.43	0.39	0.14	0.13	0.01	0.35	0.44	0.31	0.34	
SQ6	0.20	0.26	0.27	0.18	0.04	0.23	0.09	0.04	0.21	0.16	0.08	0.53	1.00	0.50	0.19	0.11	0.36	0.28	0.33	0.30	0.11	0.06	0.02	0.31	0.30	0.19	0.24	
SQ7	0.21	0.27	0.26	0.20	0.11	0.25	0.34	0.20	0.33	0.28	0.18	0.47	0.56	1.00	0.24	0.18	0.38	0.30	0.35	0.37	0.14	0.14	0.02	0.41	0.33	0.25	0.29	
AU1	0.32	0.48	0.33	0.36	0.34	0.33	0.22	0.02	0.20	0.14	0.07	0.10	0.19	0.24	1.00	0.71	0.24	0.30	0.32	0.33	0.18	0.17	0.08	0.24	0.25	0.16	0.16	
AU2	0.24	0.41	0.24	0.31	0.28	0.18	0.15	0.11	0.12	0.12	0.08	0.08	0.11	0.18	0.71	1.00	0.22	0.21	0.28	0.27	0.13	0.15	0.06	0.19	0.25	0.08	0.18	
TR1	0.35	0.30	0.43	0.31	0.34	0.42	0.32	0.28	0.35	0.41	0.28	0.44	0.36	0.38	0.24	0.22	1.00	0.62	0.62	0.65	0.08	0.05	-0.04	0.44	0.46	0.36	0.34	
TR2	0.29	0.30	0.35	0.32	0.29	0.40	0.29	0.23	0.33	0.21	0.15	0.31	0.28	0.30	0.30	0.21	0.62	1.00	0.61	0.54	0.10	0.12	-0.03	0.35	0.37	0.39	0.39	
TR3	0.38	0.23	0.36	0.36	0.30	0.41	0.36	0.27	0.42	0.39	0.26	0.43	0.33	0.35	0.32	0.28	0.62	0.61	1.00	0.55	0.15	0.10	-0.09	0.50	0.52	0.44	0.47	
TR6	0.19	0.22	0.28	0.21	0.37	0.34	0.37	0.27	0.39	0.38	0.33	0.39	0.30	0.37	0.33	0.27	0.65	0.54	0.55	1.00	0.17	0.15	0.03	0.35	0.48	0.47	0.42	
LI1	0.12	0.12	0.01	-0.04	0.08	-0.00	0.10	0.02	0.08	0.10	0.10	0.14	0.11	0.14	0.18	0.13	0.08	0.10	0.15	0.17	1.00	0.99	0.54	0.19	0.22	0.24	0.15	
LI2	0.07	0.08	-0.07	-0.07	0.03	-0.08	0.08	0.04	0.08	0.06	0.13	0.13	0.06	0.14	0.17	0.15	0.05	0.12	0.10	0.15	0.99	1.00	0.61	0.21	0.25	0.24	0.18	
LI3	-0.06	0.06	-0.08	-0.05	0.03	-0.12	0.06	0.02	-0.03	-0.05	0.04	0.01	0.02	0.02	0.08	0.06	-0.04	-0.03	-0.09	0.03	0.54	0.61	1.00	-0.00	0.09	0.04	0.03	
SS1	0.21	0.15	0.23	0.25	0.20	0.26	0.29	0.25	0.35	0.25	0.31	0.35	0.31	0.41	0.24	0.19	0.44	0.35	0.50	0.39	0.19	0.21	-0.00	1.00	0.68	0.56	0.63	
SS2	0.25	0.17	0.31	0.28	0.28	0.31	0.33	0.26	0.42	0.24	0.34	0.44	0.30	0.33	0.25	0.25	0.46	0.37	0.52	0.48	0.22	0.25	0.09	0.63	1.00	0.64	0.60	
SS3	0.24	0.13	0.26	0.20	0.33	0.30	0.37	0.35	0.37	0.29	0.42	0.31	0.19	0.25	0.16	0.08	0.36	0.39	0.44	0.47	0.24	0.24	0.04	0.56	0.64	1.00	0.68	
SS4	0.24	0.18	0.25	0.20	0.24	0.25	0.38	0.36	0.31	0.28	0.38	0.34	0.24	0.29	0.16	0.18	0.34	0.39	0.47	0.41	0.15	0.18	0.03	0.63	0.60	0.68	1.00	

FIGURE 4.2: CORRELATION MATRIX OF FACTORS AT 0.6

4.5 Alterations to the Model Testing Procedure

Performing the CFA with a minimum loading of 0.6 resulted in the elimination of the entire *Intention to Use* factor. This meant that it was impossible to test its associations in the proposed model. In order to gain maximum use from the data collected, a second CFA was performed with a minimum loading of 0.4. Hair et al. (1995) in Tan and Teo (2000), suggest that a factor loading of 0.3 is significant and classify data with minimum level of 0.4, as more significant.

Using a 0.4 loading, nine items were eliminated this time. The factor *Intention to Use* now loads with *Perceived Usefulness*. Although most researchers eliminate one of the factors that load with another, as in this case, Tan and Teo (2000) show that there is a case to retain both factors in certain circumstances. Teo and Lim (1999) claim that if the square of the correlations between each factor is less than 0.5. This is the case in this research. Figure 4.3 below shows both the correlations (in *italics*) and square of the correlations (in **bold**).

Variable	Correlations (Clean Data1.1.sta) Marked correlations are significant at p < .05000 N=165 (Casewise deletion of missing data) Key: <i>italic</i> = correlation, bold = square of correlation									
	PU	CQ	SQ	IU	AU	TR	LI	SS	ES	NB
PU	1.00	<i>0.42</i>	<i>0.38</i>	<i>0.63</i>	<i>0.43</i>	<i>0.43</i>	<i>0.01</i>	<i>0.32</i>	<i>0.45</i>	<i>0.52</i>
CQ	<i>0.17</i>	1.00	<i>0.39</i>	<i>0.41</i>	<i>0.16</i>	<i>0.47</i>	<i>0.08</i>	<i>0.40</i>	<i>0.41</i>	<i>0.37</i>
SQ	<i>0.15</i>	<i>0.15</i>	1.00	<i>0.47</i>	<i>0.21</i>	<i>0.54</i>	<i>0.11</i>	<i>0.39</i>	<i>0.46</i>	<i>0.29</i>
IU	<i>0.40</i>	<i>0.17</i>	<i>0.22</i>	1.00	<i>0.38</i>	<i>0.45</i>	<i>0.00</i>	<i>0.30</i>	<i>0.49</i>	<i>0.44</i>
AU	<i>0.18</i>	<i>0.03</i>	<i>0.04</i>	<i>0.14</i>	1.00	<i>0.36</i>	<i>0.15</i>	<i>0.28</i>	<i>0.23</i>	<i>0.25</i>
TR	<i>0.19</i>	<i>0.22</i>	<i>0.29</i>	<i>0.20</i>	<i>0.13</i>	1.00	<i>0.15</i>	<i>0.53</i>	<i>0.52</i>	<i>0.39</i>
LI	<i>0.00</i>	<i>0.01</i>	<i>0.01</i>	<i>0.00</i>	<i>0.02</i>	<i>0.02</i>	1.00	<i>0.17</i>	<i>0.13</i>	<i>0.16</i>
SS	<i>0.10</i>	<i>0.16</i>	<i>0.15</i>	<i>0.09</i>	<i>0.08</i>	<i>0.28</i>	<i>0.03</i>	1.00	<i>0.48</i>	<i>0.37</i>
ES	<i>0.20</i>	<i>0.17</i>	<i>0.21</i>	<i>0.24</i>	<i>0.05</i>	<i>0.28</i>	<i>0.02</i>	<i>0.23</i>	1.00	<i>0.60</i>
NB	<i>0.27</i>	<i>0.14</i>	<i>0.09</i>	<i>0.20</i>	<i>0.06</i>	<i>0.16</i>	<i>0.02</i>	<i>0.14</i>	<i>0.36</i>	1.00

FIGURE 4.3: CORRELATIONS AND SQUARES OF CORRELATIONS FOR EACH FACTOR

Both factors, *Perceived Usefulness (PU)* and *Intention to Use (IU)*, were retained because, the square of the correlations were less than 0.5 and both PU and IU load

highest on their own factors. “Two items...found to load less than 0.4 for their respective constructs, but when compared across factors, it was found that they still loaded highest on their own factors. Therefore, these items were retained in their respective measures”. (Tan and Teo, 2000 p 40). Figure 4.4 below shows the CFA with minimum factor loading of 0.4. Cross loading occurs on factor 2, however based on Tan and Teo’s (2000) research both are **retained**.

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.400000)						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	0.08	0.77	0.05	0.16	0.07	0.13	-0.07
PU2	0.14	0.69	0.11	0.08	0.37	-0.04	0.03
PU3	0.14	0.79	-0.09	0.15	0.06	0.14	0.07
PU4	-0.00	0.77	-0.09	0.04	0.17	0.15	0.09
PU5	0.11	0.68	0.05	-0.12	0.07	0.14	0.31
PU6	0.28	0.78	-0.09	0.12	-0.02	0.12	0.15
CQ1	0.75	0.28	0.06	0.10	0.09	0.16	0.07
CQ2	0.78	0.04	-0.03	-0.04	0.07	0.18	0.05
CQ3	0.63	0.22	0.01	0.24	-0.01	0.18	0.17
CQ5	0.67	0.10	0.01	0.19	0.03	-0.01	0.23
CQ7	0.75	0.14	0.05	0.03	-0.02	0.25	0.05
SQ4	0.24	0.06	-0.02	0.56	0.15	0.20	0.12
SQ5	0.10	0.28	0.07	0.65	-0.18	0.23	0.21
SQ6	-0.08	0.13	0.02	0.79	0.04	0.11	0.13
SQ7	0.20	0.10	0.07	0.71	0.17	0.10	0.15
IU1	0.26	0.51	0.02	0.27	0.27	0.11	0.21
IU3	0.18	0.56	-0.05	0.38	0.14	-0.10	0.13
AU1	-0.01	0.35	0.14	0.08	0.76	0.05	0.18
AU2	0.01	0.22	0.10	0.01	0.83	0.04	0.13
TR1	0.20	0.30	-0.04	0.33	0.02	0.16	0.66
TR2	0.07	0.28	0.00	0.13	0.06	0.23	0.69
TR4	0.29	0.15	0.12	0.05	0.26	0.33	0.52
TR5	0.00	-0.19	0.07	0.21	0.27	0.12	0.48
TR6	0.25	0.16	0.07	0.19	0.10	0.22	0.72
LI1	0.03	0.03	0.91	0.11	0.03	0.12	0.03
LI2	0.03	-0.05	0.93	0.08	0.05	0.15	0.04
LI3	0.02	-0.06	0.79	-0.07	0.05	-0.02	0.04
SS1	0.14	0.11	0.05	0.31	0.14	0.74	0.13
SS2	0.15	0.17	0.12	0.25	0.11	0.73	0.24
SS3	0.26	0.12	0.12	0.02	-0.04	0.76	0.28
SS4	0.24	0.12	0.05	0.10	0.06	0.78	0.16
Expl.Var	3.33	4.72	2.50	2.72	2.05	3.02	2.55
Prp.Totl	0.10	0.15	0.08	0.08	0.06	0.09	0.08

FIGURE 4.4: CFA AT MINIMUM LOADING 0.4

4.5.1 Summary of New Retained Items

Below is a summary of the remaining items. Most of the factors did not change at all, meaning that the measurement instrument remained mostly the same. The only changes (highlighted) were:

- 1) Intention to Use is now included
- 2) System Quality is measured with 4 items rather than 3.
- 3) Trust is now measured with 5 items rather than 4.

Construct	Construct Items	
	Items	Nr. of Items
Perceived Usefulness	PU1, PU2, PU3, PU4, PU5, PU6	6
Content Quality	CQ1, CQ2, CQ3, CQ5, CQ7	5
System Quality	SQ4, SQ5, SQ6, SQ7	4
Intention to Use	IU1, IU3	2
Actual Use	AU1, AU2	2
Trust	TR1, TR2, TR4, TR5 TR6,	5
Loyalty Incentives	LI1, LI2, LI3	3
Support and Service	SS1, SS2, SS3, SS4,	4
Customer Ecommerce Satisfaction	ES1	1
Net Benefits	NB1	1
Total		33

TABLE 4.3: SUMMARY OF NEW ITEMS

Below is the Correlation Matrix of the factors remaining after performing the CFA with the lowered minimum loading level 0.4. Performing the Campbell and Fiske test as before, revealed 84 instances where items correlated more strongly with items of other factors than with items of its own factor ($K=84$), however this was still less than half of the 217 possible comparisons. Therefore the data was still acceptable as being discriminant, albeit being to a lesser degree.

	Correlations (Clean Data1.1) Marked correlations are significant at p < .05000 N=165 (Casewise deletion of missing data)																																			
	PU1	PU2	PU3	PU4	PU5	PU6	CQ1	CQ2	CQ3	CQ5	CQ7	SQ4	SQ5	SQ6	SQ7	IU1	IU3	AU1	AU2	TR1	TR2	TR4	TR5	TR6	LI1	LI2	LI3	SS1	SS2	SS3	SS4					
PU1	1.00	0.57	0.62	0.55	0.41	0.57	0.35	0.13	0.25	0.20	0.14	0.23	0.29	0.19	0.20	0.42	0.45	0.33	0.23	0.34	0.28	0.17	-0.06	0.18	0.11	0.06	-0.05	0.21	0.24	0.23	0.24					
PU2	0.57	1.00	0.56	0.50	0.48	0.57	0.34	0.22	0.21	0.16	0.18	0.12	0.15	0.25	0.26	0.44	0.43	0.49	0.40	0.29	0.29	0.29	0.03	0.21	0.12	0.07	0.07	0.15	0.17	0.11	0.17					
PU3	0.62	0.56	1.00	0.68	0.48	0.68	0.37	0.20	0.30	0.25	0.28	0.20	0.34	0.26	0.25	0.45	0.45	0.33	0.23	0.42	0.35	0.23	0.01	0.27	0.00	-0.08	-0.08	0.23	0.30	0.25	0.24					
PU4	0.55	0.50	0.68	1.00	0.53	0.58	0.22	0.06	0.23	0.17	0.19	0.15	0.23	0.17	0.19	0.46	0.45	0.37	0.30	0.30	0.31	0.32	0.01	0.21	-0.04	-0.07	-0.05	0.24	0.28	0.19	0.19					
PU5	0.41	0.48	0.48	0.53	1.00	0.61	0.29	0.15	0.31	0.15	0.25	0.19	0.29	0.03	0.10	0.42	0.40	0.34	0.27	0.33	0.29	0.33	0.10	0.36	0.07	0.03	0.03	0.20	0.28	0.32	0.23					
PU6	0.57	0.57	0.68	0.58	0.61	1.00	0.46	0.27	0.44	0.24	0.39	0.23	0.40	0.22	0.25	0.49	0.47	0.34	0.17	0.41	0.39	0.29	0.00	0.33	-0.01	-0.09	-0.12	0.26	0.31	0.28	0.25					
CQ1	0.35	0.34	0.37	0.22	0.29	0.46	1.00	0.56	0.57	0.47	0.56	0.25	0.28	0.08	0.34	0.40	0.29	0.22	0.15	0.32	0.29	0.35	0.08	0.37	0.10	0.08	0.07	0.29	0.33	0.37	0.38					
CQ2	0.13	0.22	0.20	0.06	0.15	0.27	0.56	1.00	0.49	0.40	0.52	0.20	0.10	0.02	0.19	0.21	0.15	0.03	0.10	0.27	0.22	0.31	0.05	0.25	0.01	0.03	0.03	0.24	0.25	0.34	0.35					
CQ3	0.25	0.21	0.30	0.23	0.31	0.44	0.57	0.49	1.00	0.43	0.46	0.35	0.36	0.21	0.33	0.28	0.32	0.20	0.11	0.35	0.33	0.32	0.12	0.39	0.08	0.07	-0.02	0.35	0.42	0.37	0.31					
CQ5	0.20	0.16	0.25	0.17	0.15	0.24	0.47	0.40	0.43	1.00	0.49	0.25	0.24	0.14	0.27	0.33	0.27	0.15	0.11	0.40	0.20	0.36	0.07	0.37	0.09	0.05	-0.04	0.24	0.23	0.28	0.26					
CQ7	0.14	0.18	0.28	0.19	0.25	0.39	0.56	0.52	0.46	0.49	1.00	0.28	0.24	0.06	0.17	0.35	0.18	0.07	0.06	0.27	0.14	0.30	0.13	0.32	0.09	0.12	0.05	0.30	0.33	0.41	0.36					
SQ4	0.23	0.12	0.20	0.15	0.19	0.23	0.25	0.20	0.35	0.25	0.28	1.00	0.40	0.36	0.36	0.34	0.24	0.17	0.18	0.37	0.27	0.31	0.20	0.27	0.12	0.11	-0.09	0.33	0.34	0.28	0.23					
SQ5	0.29	0.15	0.34	0.23	0.29	0.40	0.28	0.10	0.36	0.24	0.24	0.40	1.00	0.52	0.47	0.34	0.31	0.10	0.07	0.43	0.30	0.28	0.15	0.38	0.13	0.12	0.02	0.35	0.44	0.29	0.33					
SQ6	0.19	0.25	0.26	0.17	0.03	0.22	0.08	0.02	0.21	0.14	0.06	0.36	0.52	1.00	0.50	0.17	0.31	0.20	0.10	0.35	0.27	0.16	0.23	0.29	0.10	0.06	0.03	0.31	0.29	0.18	0.23					
SQ7	0.20	0.26	0.25	0.19	0.10	0.25	0.34	0.19	0.33	0.27	0.17	0.36	0.47	0.50	1.00	0.36	0.39	0.24	0.17	0.39	0.29	0.32	0.25	0.36	0.14	0.14	0.03	0.41	0.33	0.24	0.28					
IU1	0.42	0.44	0.45	0.46	0.42	0.49	0.40	0.21	0.28	0.33	0.35	0.34	0.34	0.17	0.36	1.00	0.61	0.39	0.34	0.48	0.32	0.38	0.18	0.36	0.11	0.07	-0.05	0.41	0.39	0.25	0.29					
IU3	0.45	0.43	0.45	0.45	0.40	0.47	0.29	0.15	0.32	0.27	0.18	0.24	0.31	0.31	0.39	0.61	1.00	0.32	0.24	0.36	0.23	0.27	0.06	0.31	0.02	-0.03	-0.10	0.20	0.22	0.12	0.17					
AU1	0.33	0.49	0.33	0.37	0.34	0.34	0.22	0.03	0.20	0.15	0.07	0.17	0.10	0.20	0.24	0.39	0.32	1.00	0.72	0.24	0.31	0.28	0.20	0.33	0.18	0.17	0.08	0.24	0.25	0.17	0.17					
AU2	0.23	0.40	0.23	0.30	0.27	0.17	0.15	0.10	0.11	0.11	0.06	0.18	0.07	0.10	0.17	0.34	0.24	0.72	1.00	0.21	0.20	0.29	0.16	0.26	0.13	0.14	0.07	0.19	0.24	0.06	0.16					
TR1	0.34	0.29	0.42	0.30	0.33	0.41	0.32	0.27	0.35	0.40	0.27	0.37	0.43	0.35	0.38	0.48	0.36	0.24	0.21	1.00	0.61	0.42	0.25	0.64	0.07	0.04	-0.03	0.44	0.46	0.35	0.33					
TR2	0.28	0.29	0.35	0.31	0.29	0.39	0.29	0.22	0.33	0.20	0.14	0.27	0.30	0.27	0.20	0.32	0.23	0.31	0.20	0.61	1.00	0.50	0.21	0.53	0.10	0.11	-0.02	0.35	0.37	0.38	0.38					
TR4	0.17	0.29	0.23	0.32	0.33	0.29	0.35	0.31	0.32	0.36	0.30	0.31	0.28	0.16	0.32	0.38	0.27	0.28	0.29	0.42	0.50	1.00	0.26	0.49	0.18	0.18	0.16	0.39	0.43	0.50	0.44					
TR5	-0.06	0.03	0.01	0.01	0.10	0.00	0.08	0.05	0.12	0.07	0.13	0.20	0.15	0.23	0.25	0.18	0.06	0.20	0.16	0.25	0.21	0.26	1.00	0.28	0.08	0.13	0.12	0.19	0.27	0.26	0.17					
TR6	0.18	0.21	0.27	0.21	0.36	0.33	0.37	0.25	0.39	0.37	0.32	0.27	0.38	0.29	0.36	0.36	0.31	0.33	0.26	0.64	0.53	0.49	0.25	1.00	0.10	0.14	0.04	0.38	0.48	0.46	0.41					
LI1	0.11	0.12	0.00	-0.04	0.07	-0.01	0.10	0.01	0.08	0.09	0.09	0.12	0.13	0.10	0.14	0.11	0.02	0.18	0.13	0.07	0.10	0.18	0.08	0.16	1.00	0.90	0.55	0.19	0.22	0.23	0.15					
LI2	0.06	0.07	-0.08	-0.07	0.03	-0.09	0.08	0.03	0.07	0.05	0.12	0.11	0.12	0.06	0.14	0.07	-0.03	0.17	0.14	0.04	0.11	0.13	0.13	0.14	0.90	1.00	0.61	0.20	0.24	0.23	0.17					
LI3	-0.05	0.07	-0.08	-0.05	0.03	-0.12	0.07	0.03	-0.02	-0.04	0.05	-0.09	0.02	0.03	0.03	-0.05	-0.10	0.08	0.07	-0.03	-0.02	0.16	0.12	0.04	0.55	0.61	1.00	0.00	0.10	0.05	0.04					
SS1	0.21	0.15	0.23	0.24	0.20	0.26	0.29	0.24	0.35	0.24	0.30	0.33	0.35	0.31	0.41	0.41	0.20	0.24	0.19	0.44	0.35	0.39	0.19	0.38	0.19	0.20	0.00	1.00	0.68	0.56	0.63					
SS2	0.24	0.17	0.30	0.28	0.28	0.31	0.33	0.25	0.42	0.23	0.33	0.34	0.44	0.29	0.33	0.39	0.22	0.25	0.24	0.46	0.37	0.43	0.27	0.48	0.22	0.24	0.10	0.68	1.00	0.64	0.60					
SS3	0.23	0.11	0.25	0.19	0.32	0.28	0.37	0.34	0.37	0.28	0.41	0.28	0.29	0.18	0.24	0.25	0.12	0.17	0.06	0.35	0.38	0.50	0.26	0.46	0.23	0.23	0.05	0.56	0.64	1.00	0.67					
SS4	0.24	0.17	0.24	0.19	0.23	0.25	0.38	0.35	0.31	0.26	0.36	0.23	0.33	0.23	0.28	0.29	0.17	0.17	0.16	0.33	0.38	0.44	0.17	0.41	0.15	0.17	0.04	0.63	0.60	0.67	1.00					

FIGURE 4.5: CORRELATION MATRIX OF FACTORS AT 0.4

Although Intention to Use was retained at a minimum CFA loading level of 0.4, this factor measure is not as statistically rigorous as the other measures, which all had minimum loadings of 0.6.

4.6 Testing for Reliability

One of the most widely and commonly used indicators of instrument quality is internal consistency reliability. According to Churchill (1979), the recommended measure of internal consistency is provided by the coefficient alpha or Cronbach Alpha (Molla, 2002; Wang and Tang, 2001; Straub, 1989). The Cronbach Alpha was calculated for each of the remaining items and all items had an alpha value of 0.90 or more, exceeding the minimum value of 0.8 suggested by Nunnally (1978).

As a result of performing two CFA’s, with minimum loadings of 0.6 and 0.4, two instruments were obtained. One instrument did not measure Intention to Use (30 items), while the other instrument did measure Intention to Use (33 items).

Both Instruments had reliability (Cronbach Alpha) exceeding 0.9. All constructs, except system quality had a Cronbach alpha exceeding 0.81. All the items had an alpha greater than the conventionally acceptable 0.70 (Nunnally, 1978), and are thus acceptable.

4.6.1 Summary of Item Validities and Reliabilities

Table 4.4 below is a summary of the validities and reliabilities the items remaining after CFA with factor loading 0.6 was performed. These items were used in the final analysis of the model.

Item Code	Lickert Scale Construct	Nr of Items	Mean	Standard Deviation	Cronbach Alpha	Standardized Factor Loadings
	<i>Perceived Usefulness</i>	6	3.72	0.795	0.885	
PU1	Using this online shopping site enhances the productivity of my shopping activities.		3.76	0.969		0.751792
PU2	Using this online shopping site has a critical role in supporting my shopping activities.		3.19	1.139		0.697314
PU3	Using this online shopping site makes it easier to do my shopping activities.		3.91	0.971		0.8029
PU4	Using this online shopping site enables me to accomplish shopping activities more quickly.		3.87	1.038		0.780324
PU5	Using this online shopping site improves my performance of shopping activities.		3.73	1.009		0.681304
PU6	I find this online shopping site useful for my shopping activities.		3.85	0.843		0.780922
	<i>Content Quality</i>	5	3.46	0.59	0.832	
CQ1	This online retail site provides the precise information I need.		3.48	0.952		0.756036
CQ2	This online retail site provides output that is exactly what I need.		3.11	0.988		0.784589
CQ3	This online retail site provides sufficient information to enable you to do my tasks.		3.56	0.865		0.631916

CQ5	I am satisfied with the accuracy of information provided by this online retail site.		3.59	0.841		0.664504
CQ7	The information provided is helpful regarding my questions or problems.		3.4	0.901		0.75022
	System Quality	3	3.72	0.72	0.75	
SQ5	I believe that this online retail site is cumbersome to use.		3.65	0.882		0.639705
SQ6	To use this online retail site requires a lot of mental effort.		3.74	0.889		0.824149
SQ7	I get frustrated when I use this online retail site.		3.77	0.86		0.740476
	Actual Use	2	2.41	0.86	0.813	
AU1	How often do you use this online retail site to make online purchases or for information seeking?		2.31	0.892		0.812604
AU2	How many times have you used this online retail site for purchases or information seeking in the last six months?		2.51	1.018		0.886452
	Loyalty Incentives	3	2.97	0.97	0.861	
LI1	This online retail site offers incentives for its continued use, such as frequent flier miles or bonus points.		3.03	1.082		0.90646
LI2	I get rewarded for my continued patronage of this online retail site.		2.899	1.061		0.92482
LI3	This online retail site generally does not give me any loyalty incentives for my continued use of its service.		2.988	1.155		0.808977

	<i>Trust</i>	4	3.77	0.68	0.857	
TR1	This online retail site is trustworthy.		3.905	0.781		0.748549
TR2	I trust in the benefits of the decisions made by this online retail site. i.e.: I trust the specials offered and the recommendations made by the site.		3.704	0.884		0.755377
TR3	This online retail site keeps its promises and commitments.		3.8	0.811		0.626559
TR6	I trust this online retail site.		3.68	0.782		0.71763
	<i>Support and Service</i>	4	3.37	0.8	0.873	
SS1	I am satisfied with the customer support provided by this online retail site.		3.5	0.875		0.75817
SS2	I am satisfied with the after-sales service provided by this online retail site.		3.34	0.984		0.744726
SS3	This online retail site understands my problems and requests.		3.196	0.911		0.766543
SS4	This online retail site responds to my requests fast enough.		3.46	0.996		0.7893

TABLE 4.4: ITEMS REMAINING AFTER PERFORMING CFA WITH LOADING OF 0.6

Table 4.5 below is a summary of validities and reliabilities of items that changed when the CFA with factor loading 0.4 was performed.

Item Code	Lickert Scale Construct	Nr of Items	Mean	Standard Deviation	Cronbach Alpha	Standardized Factor Loadings
	<i>System Quality</i>	4	3.76	0.64	0.76	
SQ4	Using this online shopping site enhances the productivity of my shopping activities.		3.89	0.726		0.5551
SQ5	Using this online shopping site has a critical role in supporting my shopping activities.		3.65	0.882		0.651782
SQ6	Using this online shopping site makes it easier to do my shopping activities.		3.74	0.889		0.785339
SQ7	Using this online shopping site enables me to accomplish shopping activities more quickly.		3.77	0.86		0.711932
	<i>Intention to Use</i>	2	3.94	1.36	0.71	
IU1	I want to continue using this online retail site rather than discontinue its use.		3.93	0.727		0.505846
IU3	I would like to discontinue the use of this online retail site.		3.95	0.825		0.564289
	<i>Trust</i>	5	3.57	0.602	0.772	
TR1	This online retail site is trustworthy.		3.91	0.78		0.662052

TR2	I trust in the benefits of the decisions made by this online retail site. i.e.: I trust the specials offered and the recommendations made by the site.		3.708	0.884		0.690135
TR4	This online retail site keeps customers' best interests in mind.		3.47	0.765		0.517787
TR5	This online retail site would do the job right even if not monitored.		3.077	0.935		0.479926
TR6	I trust this online retail site.		3.684	0.783		0.71875

TABLE 4.5: VALIDITIES AND RELIABILITIES OF CHANGED ITEMS

4.6.2 Normality Testing

As part of the item validation, and before any statistical tests were carried out, the data for each variable was tested to ensure it followed a normal distribution. Normal distribution is a prerequisite when performing statistical techniques such as structural equation modeling, used in determining the goodness of fit of the conceptual model (Molla, 2002). This was done using Statistica 6.0 package which produces histograms from the data. The expected frequencies of a normal data set are then superimposed. As expected, the data did not deviate significantly from the expected values. The graph for each variable is contained in Appendix E. Missing values in the data were eliminated and not used.

5. DESCRIPTIVE STATISTICS	74
5.1 INTRODUCTION.....	74
5.2 PROFILE OF THE ONLINE RETAIL USERS SURVEYED.....	74
5.3 GENDER OF THE RESPONDENTS	75
5.4 AGE OF THE RESPONDENTS	75
5.5 OCCUPATION	76
5.6 MONTHLY TAXABLE INCOME.....	76
5.7 INTERNET EXPERIENCE AND ONLINE RETAIL EXPERIENCE.	77
5.8 TASKS PERFORMED ON THE INTERNET	78
5.9 PRODUCTS PURCHASED ON THE INTERNET	80
5.10 DESCRIPTIVE STATISTICS FOR E-COMMERCE SUCCESS MEASUREMENT ITEMS	81
5.11 LIMITATIONS OF THE DATA	82
5.11.1 <i>Measurement of Actual Use</i>	82
5.11.2 <i>Using 'Intention to Use' data</i>	82
5.11.3 <i>Possible Bias from respondents in the Information Systems Field</i>	83

5. DESCRIPTIVE STATISTICS

5.1 Introduction

This section describes the respondents and attempts to identify important factors and patterns in the sample. It describes the demographic details of the people who responded to the survey. Having eliminated any misleading questions, unusable items or problems from the results in the previous chapter, the results are analyzed and discussed. It concludes with a scrutiny of the data and a review of shortcomings and limitations.

5.2 Profile of the Online Retail users surveyed.

The sampling frame was selected based on an assortment of demographic data from previous e-commerce studies, and because it was a realistic way of obtaining responses from a large number of working professionals who would likely have access to the internet and also possess a credit card. It was chosen because of the ease of access to a wide variety of people who had different professions. However since 90% of the respondents were post graduate students, any inference made about the sector and size of online retail users in South Africa should be made with due consideration of the sampling population.

Fundamental demographic data is stated in tables and graphs and then later combined to identify any trends and patterns.

5.3 Gender of the Respondents

Of the 165 usable responses received, all indicated their gender, except one. It is not possible to make any useful inferences about the gender of the typical e-commerce user profile from this data alone because it is completely dependent on the proportion of males and females at the institution under study. It is however useful when attempting to explain other trends such as what goods are purchased online.

Gender	Gender of Respondent	
	Frequency	Percentage
Male	113	69%
Female	51	31%
Unknown	1	1%
Total	165	100%

TABLE 5.1: GENDER OF RESPONDENTS

This demographic reflect the dominance of males in most managerial posts in South Africa.

5.4 Age of the Respondents

Age Range	Age of Respondents	
	Frequency	Percentage
Under 18	2	1%
18 to 24	3	2%
25 to 34	113	68%
35 to 44	42	25%
45 to 54	3	2%
55+	0	0%
Unknown	2	1%
Total	165	100%

TABLE 5.2: AGE OF RESPONDENTS

The majority of the respondents in the survey are in the 25 to 44 age group – up and coming young professionals, and hence show that the sample group was representative of

the typical e-commerce user in South Africa, as identified by De Villiers and Van Der Merwe (2001).

5.5 Occupation

Profession	Profession of Respondents	
	Frequency	Percentage
Full time Student	35	21%
Professional	73	44%
Technician	3	2%
Artisan	2	1%
Academic	2	1%
Clerk	0	0%
Manager	36	22%
Retired	0	0%
Housewife	0	0%
Unemployed	0	0%
Other	8	5%
Unknown	6	4%
Total	165	100%

TABLE 5.3: OCCUPATION OF RESPONDENTS

Professionals were the largest group, followed by managers. Some of the other occupations stated were IT officers, specialists, developers, property investor, sales personnel and entrepreneurs.

5.6 Monthly Taxable Income

Socio-economic conditions in South Africa dictate that only a small percentage of the population earn enough income to afford a computer and connect to the Internet. In 1998 approximately half of South African households earned R 6839 per annum or less. (Orkin, 1998). The sample population was targeted because it was known that this group would more than likely be able to afford a computer and connect to the internet. This is

confirmed by the fact that 87% of the respondents earn monthly taxable of R 5000 or more. Figure 5.1 below shows the proportion people in each income group.

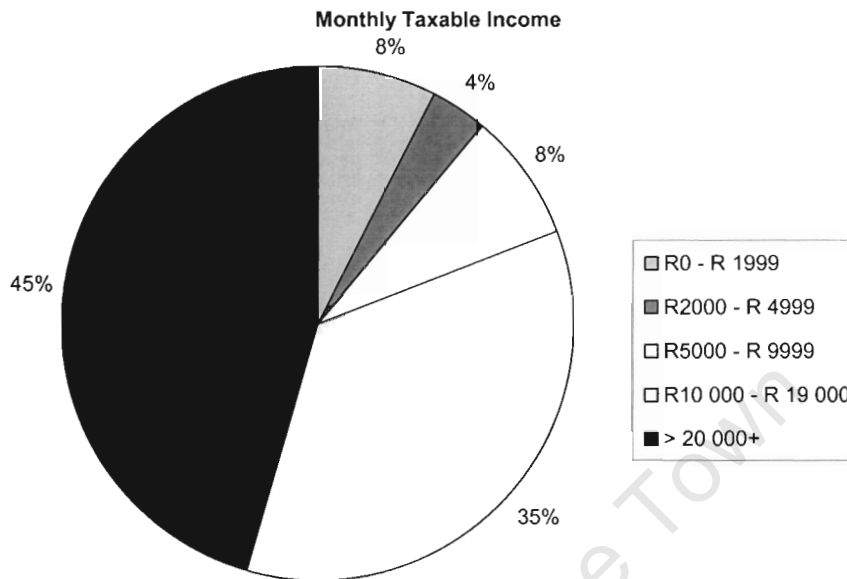


FIGURE 5.1: MONTHLY TAXABLE INCOME OF RESPONDENTS

5.7 Internet Experience and Online Retail Experience.

Of the total surveyed, all 180 respondents had used the Internet (165 of which were e-commerce users). This was not surprising as the sample frame consisted of post graduate students and some IT professionals. 91.2% of respondents spent half an hour or more on the Internet on an average day.

97.8% of people had been using the internet for more than a year and 67% had been using the internet for 5 years or more. However of that group, 59% had been using online retail sites for 3 years or less.

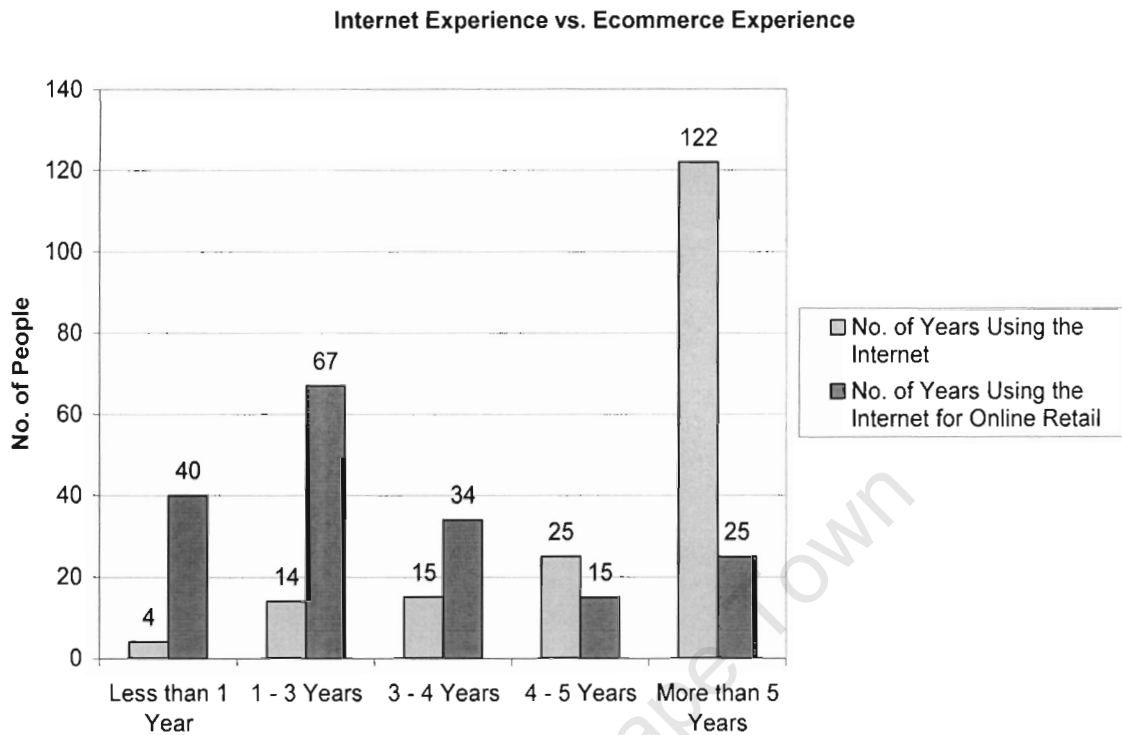


FIGURE 5.2: INTERNET EXPERIENCE VS. E-COMMERCE EXPERIENCE

5.8 Tasks Performed on the Internet

Question 14 on the questionnaire asked the respondents how often they use the internet to perform common tasks. Communication was the most common use for the Internet, with 87% of respondents using email or chat once a day or more. This finding is consistent with the results found by De Villiers and Van Der Merwe (2001). 43% indicated that they used the Internet to get information and product support. Figure 5.3 below shows the results.

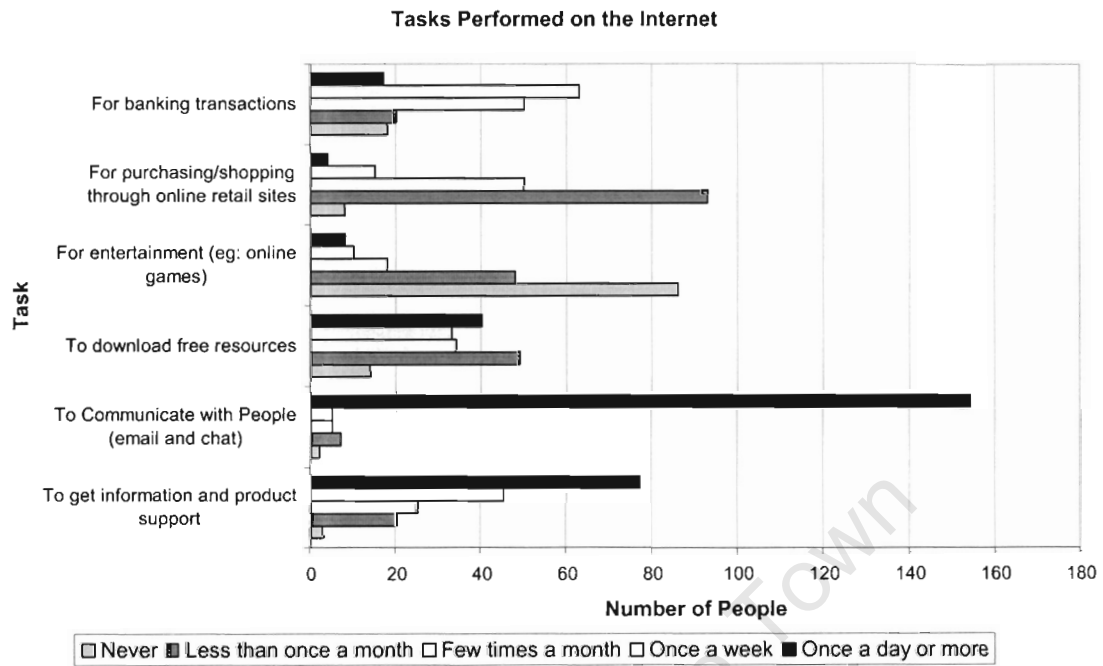


FIGURE 5.3 TASKS PERFORMED ON THE INTERNET

5.9 Products Purchased on the Internet

Respondents were asked what products they purchased on the internet.

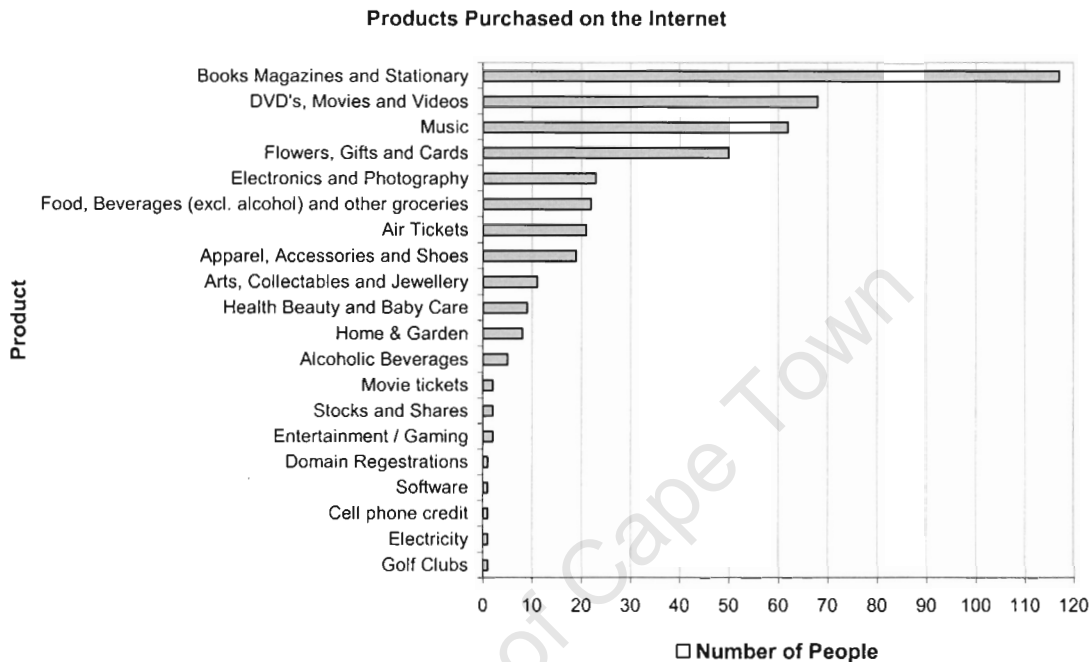


FIGURE 5.4: PRODUCTS PURCHASED ON THE INTERNET

Books, Magazines and Stationary were by far the most popular products purchased through online vendors. The respondents were asked what web sites they used, again this was an option question and so not everyone filled it in. The most popular web site visited by the respondents was Amazon.com, with fifty-two respondents indicating that they used Amazon.com. Other popular web sites included Kalahari.net, Kulula.com, Picknpay.co.za, Interflora.co.za, and Inthebag.co.za.

These results are consistent with those of De Villiers and Van Der Merwe (2001), who also found that Books were the most popular product purchased online by South African consumers.

Interestingly, the most popular site visited by the respondents in this study was Amazon.com. This is also consistent with De Villiers and Van Der Merwe’s (2001) research, in which they state: “*It should be of concern for local Internet entrepreneurs that Amazon.com, an American site, is by far the most popular site for local Internet users.*” (de Villiers and Van Der Merwe, 2001, pp 13). The results indicate that South African e-vendors have not been able to dislodge Amazon.com’s dominance in the books market in the three years since the study was done.

Reviewing the descriptive statistics on the variety of good purchased and the actual use, revealed that there were significant shortcomings in the measurement of Actual Use. These limitations are discussed in greater detail in Section 5.11.

5.10 Descriptive Statistics for E-commerce Success Measurement Items

Below are summary statistics of the e-commerce success measurement items.

Variable	Descriptive Statistics (Clean Data1.2_0.sta)				
	Valid N	Mean	Minimum	Maximum	Std.Dev.
Perceived Usefulness	165	3.72	1	5	0.793
Content Quality	165	3.42	1	5	0.706
System Quality	165	3.76	2	5	0.644
Intention to Use	165	3.94	2	5	0.684
Actual Use	165	2.40	1	5	0.874
Trust	165	3.57	2	5	0.602
Loyalty Incentives	165	2.97	1	5	0.975
Support and Service	165	3.41	1	5	0.925
Ecommerce Satisfaction	165	3.85	1	5	0.801

TABLE 5.4: DESCRIPTIVE STATISTICS FOR E-COMMERCE SUCCESS MEASURES

The summary table shows that *Actual Use* had the lowest mean of all the e-commerce success measures. Paradoxically, *Intention to Use* had the highest mean. This contradiction can be explained by the fact that Actual Use was a measure of the

frequency of use, where intention to use was the users intention to continue using that web site. This means that, although the users *intended* to make the next purchase online, the products that were purchased, such as books, were purchased intermittently, and hence the site not used frequently.

Previous researches into how 'Actual Use' influences a particular system are all based on how a particular sample group uses one particular system (Rai et al, 2002; Seddon, 1997). In this research, it was impossible to take a similar approach because the sample group used different online retail web sites and were questioned on their last online retail experience. The limitations of the Actual Use and Intention to Use data are discussed in the section.

5.11 Limitations of the Data

5.11.1 Measurement of Actual Use

Certain products are purchased less frequently than others. For example, a customer may order groceries online once a week from a variety of e-vendors, and purchase air tickets only once a year, but from only one e-vendor. Measuring actual Use in this instance would not provide an accurate reflection of e-commerce success, while the customer could have been thoroughly satisfied with purchasing an airline ticket from an online vendor and *intended* to purchase his next ticket from the same vendor, he would not necessarily revisit that site until he or she needed to purchase another ticket.

5.11.2 Using 'Intention to Use' data

The data obtained from the survey was of a very high quality, in that all the factors in the instrument displayed a very high level of validity (even with a minimum factor loading of 0.6). The exception was Intention to Use, which only displayed discriminant validity at a minimum loading of 0.4.

5.11.3 Possible Bias from respondents in the Information Systems Field

Another possible shortcoming of the responses is that some of the survey responses could be biased. Since three of the classes that participated in this study were post graduate students Information Systems, it is possible that these respondents could have a bias towards using e-commerce retail sites due to the fact that their field of study is related to the subject of this thesis. i.e.: they were more likely to have a significantly more favorable or unfavorable position towards ecommerce retail sites due to their expert knowledge of information systems than the other users of e-commerce retail sites.

University of Cape Town

6. RESULTS AND HYPOTHESIS TESTING	85
6.1 TESTING THE ORIGINAL HYPOTHESIZED MODEL: STRUCTURAL EQUATION MODELING – GOODNESS OF FIT.....	85
6.2 MULTIPLE REGRESSION ANALYSIS.....	88
<i>Regression Analysis Results for Conceptual Model</i>	<i>88</i>
6.3 RESULTS OF THE HYPOTHESIS TESTING.....	89
6.4 HYPOTHESIS TESTING AND DISCUSSION	91

University of Cape Town

6. RESULTS AND HYPOTHESIS TESTING

6.1 Testing the original Hypothesized Model: Structural Equation Modeling – Goodness of Fit

Structural Equation Modeling (SEM) and Regression testing are commonly used and accepted methods of evaluating goodness-of-fit and the strength of association between factors in the model. These methods have been used extensively by previous researchers. The first step in SEM is to test the goodness of fit of the hypothesized research model. This is typically done using chi square (χ^2) test, however such tests are sensitive to sample size, and the probability of rejecting any model increases as the sample size increases, even when the model is minimally false (Bhattacharjee, 2001).

Bentler and Bonnet (1980) quoted in Bhattacharjee (2001), suggest that χ^2 / df (degrees of freedom) ratio is a more appropriate measure of model fit. This ratio should not exceed 5 for models with good fit. The χ^2 / df ratio in the conceptual model was 3.58 ($\chi^2 = 1703.71$, $df = 476$).

Other commonly used good-of-fit measures include Bentler-Bonnet Normed Fit Index (NFI), Bentler-Bonnet Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI). Though each test has its shortcomings, the NFI, NNFI and CFI collectively provide reasonable estimation of goodness-of-fit (Bhattacharjee, 2001).

Rai et al (2002) refer to a study in which the Goodness-of-Fit Index (GFI) and the adjusted Goodness of Fit Index (AGFI) outperforms other indices as an indication of goodness of fit. It has been argued that a GFI of 0.9 and AGFI of 0.8 are the threshold values for goodness-of-fit in IS research, (Rai et al, 2002). For this research it was decided to make use of all available Goodness-of-Fit indicators.

Below is the tested conceptual model, followed by a discussion.

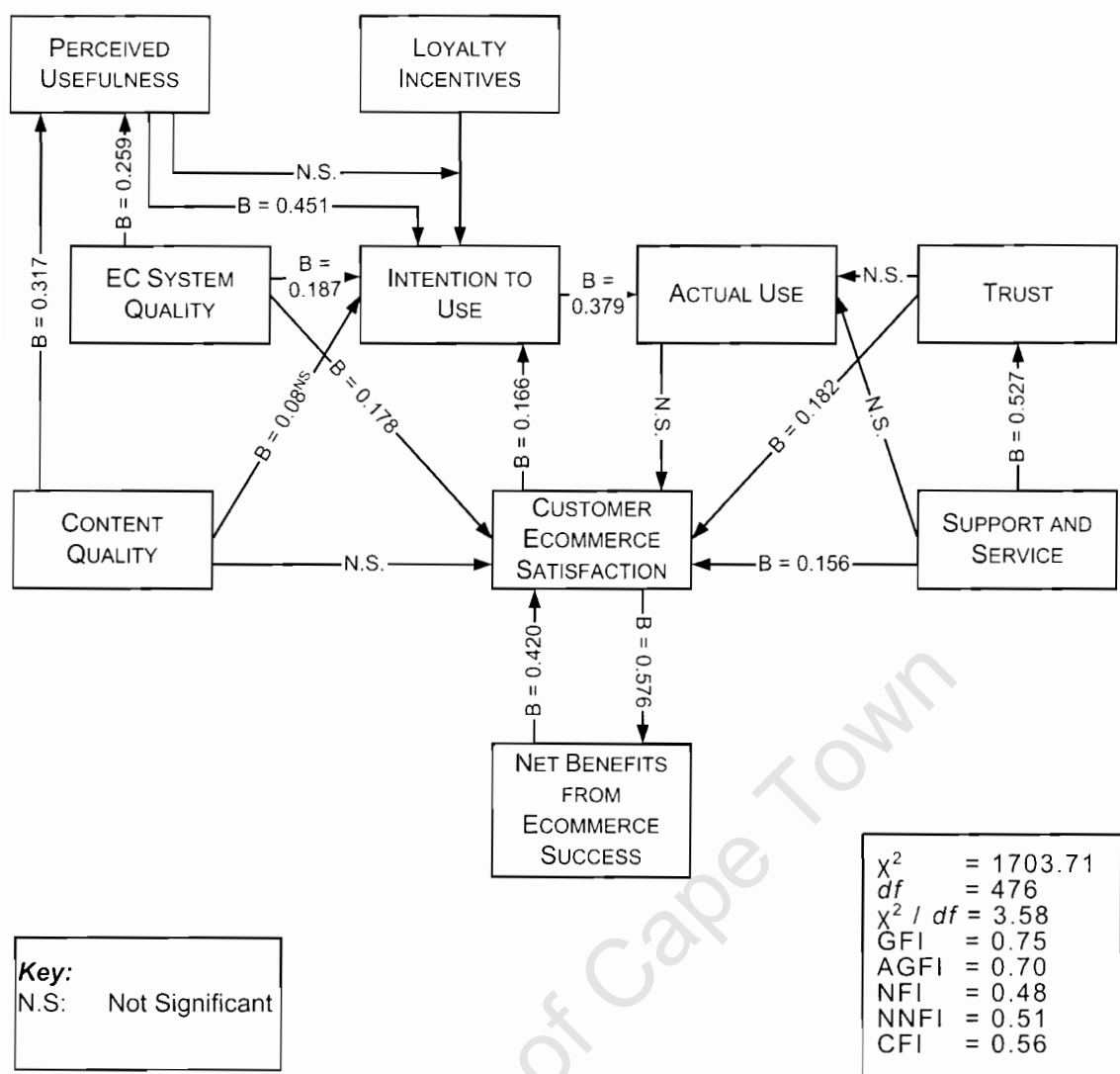


FIGURE 6.1: SEM RESULTS OF THE CONCEPTUAL MODEL TESTED

In general, it is accepted that NFI, NNFI and a CFI of greater than 0.9 are indicative of a good fit. The hypothesized model had a NFI of 0.48, NNFI of 0.51 and CFI of 0.56. The NFI, NNFI and CFI figures are lower than 0.9, and hence do not meet the criteria for a *good fit*.

The GFI in this model is 0.75 and the AGFI is 0.70. The figures are slightly lower than the prescribed values of a good fit (GFI of 0.9 and AGFI of 0.8), but are high enough to suggest a reasonable fit.

There are 2 main factors that are most likely the cause of the lower than expected goodness-of-fit indices. They are

1. The factor 'Intention to Use' which was a central part of the original model did not produce data that loaded well. Therefore it was necessary to lower the desired minimum loading value when performing the factor analysis so that it could be used to test the model. In so doing, it crossed loaded with perceived usefulness.
2. The major limitations present in the 'Actual Use' data, i.e.: data was based on different online retail sites selling different products.

6.2 Multiple Regression Analysis

The second step in model estimation is to calculate the path significance of each association in the model. Recursive simultaneous equation models, such as this one, can be estimated by using multiple regressions applied to each equation separately (Pindyck and Rubinfeld, 1998). Multiple regression is used to calculating the beta value (B) of each relationship and the variance explained (R^2) of each of the factors (Van Der Heijden, 2003; Lederer et al 2000).

Regression Analysis Results for Conceptual Model

H	Independent Variable	Dependent Variable	Association	Beta	R ²	Variance explained by the independent variable	P level
H1	Ecommerce Satisfaction	Net Benefits	ES → NB	0.576	0.363	36.30%	0
H2	Net Benefits	Ecommerce Satisfaction	NB → ES	0.42	0.388	38.80%	0
H3	Ecommerce Satisfaction	Intention to Use	ES → IU	0.166	0.023	2.30%	0
H4	Perceived Usefulness	Intention to Use	PU → IU	0.451	0.4	40%	0
H5	Perceived Usefulness and Loyalty Incentives	Intention to Use	PU x LI → IU	N.S.		0%	
H6	Intention to Use	Actual Use	IU → AU	0.379	0.143	14.3%	
H7	Actual Use	Ecommerce Satisfaction	AU → ES	N.S.		0%	
H8	System Quality	Perceived Usefulness	SQ → PU	0.258	0.059	5.90%	0
H9	System Quality	Intention to Use	SQ → IU	0.187	0.06	6%	0

H10	System Quality	Ecommerce Satisfaction	SQ → ES	0.178	0.012	1.20%	0.04
H11	Content Quality	Perceived Usefulness	CQ → PU	0.317	0.174	17.40%	0
H12	Content Quality	Ecommerce Satisfaction	CQ → ES	N.S.		0%	
H13	Content Quality	Intention to Use	CQ → IU	N.S		0%	
H14	Support and Service	Ecommerce Satisfaction	SS → ES	0.156	0.016	1.60%	0.02
H15	Support and Service	Actual Use	SS → AU	N.S.		0%	
H16	Support and Service	Trust	SS → TR	0.527	0.277	27.70%	0
H17	Trust	Ecommerce Satisfaction	TR → ES	0.182	0.097	9.70%	0
H18	Trust	Actual Use	TR → AU	N.S.		0%	

TABLE 6.1: RESULTS OF REGRESSION ANALYSIS OF CONCEPTUAL MODEL

6.3 Results of the Hypothesis Testing

Below is a summary of the Proposed Hypotheses and whether or not the data supported them.

H1: Increases in *Customer Ecommerce Satisfaction* will cause increases *Net Benefits* - **Accepted ✓**

H2: Increases in *Net Benefits* will cause increases in *Customer E-commerce Satisfaction* - **Accepted ✓**

H3: Increases in *Customer E-commerce Satisfaction* will cause increases intention to *Use* - **Accepted ✓**

H4: Increases in *Perceived Usefulness* will cause increases in *intention to use* - **Accepted ✓**

H5: *Loyalty Incentives* have a significant effect on *Intention to Use*, when the E-commerce system is perceived useful - **Not accepted ✗**

-
- H6: Increases in *intention to use* will cause *Use* -
Accepted ✓
- H7: Increases in *Use* will cause increases *Customer E-commerce Satisfaction* -
Not accepted ✗
- H8: Increases in *E-commerce System Quality* will cause increases in *Perceived Usefulness* -
Accepted ✓
- H9: Increases in *E-commerce System Quality* will cause increases in *Intention to Use*
Accepted ✓
- H10: Increases in *E-commerce System Quality* will cause increases in *Customer Ecommerce Satisfaction*
Accepted ✓
- H11: Increases in *Content quality* will cause increases in *Perceived Usefulness*
Accepted ✓
- H12: Increases in *Content quality* will cause increases in *Customer E-commerce satisfaction* -
Not Accepted ✗
- H13: Increases in *Content quality* will cause increases in *intention to use* -
Not Accepted ✗
- H14: Increases in *Support and Service* will cause increases *Customer E-commerce Satisfaction* -
Accepted ✓
- H15: Increases in *Support and Service* will cause increases in *Use* -
Not accepted ✗
- H16: Increases in *Support and Service* will cause increases in *Trust* -
Accepted ✓
- H17: Increases in *Trust* will cause increases *Customer E-commerce Satisfaction* -
Accepted ✓
- H18: Increases in *Trust* will cause increases *Use*
Not accepted ✗

6.4 Hypothesis Testing and Discussion

In this section, the original hypotheses stated in Chapter 2 are tested. Each of the factors is discussed individually, and the hypothesis relevant to it is tested.

Hypothesis 1: Accepted

Increases in *Customer E-commerce Satisfaction* will cause increases in *Net benefits from E-commerce Success*

The results showed significant statistical evidence to accept this hypothesis. It is important to note, however, that a single item instrument was used to measure both Customer E-commerce Satisfaction and Net Benefits from E-commerce Success. As explained earlier in Chapter 3. This was the most appropriate measure for online retail sites available and it is advisable that the development and use of a multiple item measure for the measurement of these factors is needed for the further validation of this relationship. Further research into this topic could possibly be to develop new instruments specifically for online retail web sites.

Hypothesis 2: Accepted

Increases in *Net benefits from E-commerce Success* will cause increases in *Customer E-commerce Satisfaction*

The data provided strong support for this hypothesis. This validates the feedback loop suggested by Delone and McLean (2003). Once again a multiple item measure is recommended for the further validation of this relationship.

Hypothesis 3: Accepted

Increases in *Customer E-commerce Satisfaction* will cause increases *intention to Use*

There was a weak, yet significant relationship between Satisfaction and Intention to Use, and hence the hypothesis is accepted. The association between Customer E-commerce

Satisfaction and intention to Use had a $B = 0.166$ and explained 2.3% of the variance of Intention to Use. It was expected that Customer E-commerce Satisfaction would account for more of the variance in Intention to Use. A possible reason why this figure was so low is that the original instrument by Bhattacharjee (2001) was developed in the context of one online system, an online brokerage system. It is possible that when it is applied to a broad spectrum of online retail sites, it weakens its reliability of the instrument. Further research is recommended.

Hypothesis 4: Accepted

Increases in *Perceived Usefulness* will cause increases in *Intention to Use*

The data showed a strong relationship between Perceived Usefulness and Intention to Use and therefore the hypothesis is accepted. Perceived Usefulness explained 40% of the variance of Intentions. The association of Perceived Usefulness and System Quality with Intention to Use had a $B = 0.451$ and $B = 0.187$ respectively. Combined they explained 46% of the variance of Intention to Use. This is consistent with the results of previous TAM studies, conducted by Van Der Heijden (2003), Chen et al (2002) and others.

Hypothesis 5: Not Accepted

Loyalty Incentives have a significant effect on *Intention to Use*, only when the E-commerce system is perceived useful.

There was no significant relationship found to support this hypothesis, therefore it is not accepted. It is not possible to make a conclusive inference about this hypothesis as previous research has confirmed the presence of this relationship (Bhattacharjee, 2001). The only difference in the testing of this relationship was that Bhattacharjee (2001) tested it using one online system, where in this research the respondents assessed the last online retail web site they used. Once again, the application of the intention to use instrument to a broad spectrum of online retail sites could have weakened the instrument. Further research is recommended to determine if this is indeed the case.

Hypothesis 6: Accepted

Increases in *Intention to Use* will cause *Actual Use*

The relationship between Intention to Use and Actual Use was supported by the data. Therefore this hypothesis is accepted. This is a key relationship in the TAM (Davis, 1989). Although possible limitations in the instruments to measure intention to use and actual use have been made visible in the testing of Hypothesis 3 and Hypothesis 7, this fundamental relationship of the TAM was still proved providing further validation to the TAM model.

Hypothesis 7: Not Accepted

Increases in *Actual Use* will cause increases *Customer E-commerce Satisfaction*

The results did not support this hypothesis. This was not surprising considering the limitations in the actual use data. It is likely that if the data had measured many customers' use of one particular system, this hypothesis would be supported. Previous researchers such as Molla and Licker (2001) identified Actual Use having a direct effect on customer e-commerce satisfaction. It is recommended that in further research, all the respondents gauge one online retail web site, or a new instrument be developed to assess multiple online retail sites.

Hypothesis 8: Accepted

Increases in *System Quality* will cause increases in *Perceived Usefulness*

The results supported this hypothesis, therefore it is accepted. The relationship between System Quality and Perceived Usefulness and Content Quality and Perceived Usefulness had a $B = 0.258$ and 0.317 respectively. Together they accounted for 23.3% of the variance of Perceived Usefulness. These findings are consistent with the similar relationships identified by Seddon (1997), and tested by Rai et al (2002) between Ease of Use (System Quality in this model) and Perceived Usefulness. The results confirm also the validity of this relationship identified by Davis (1989).

Hypothesis 9: Accepted

Increases in *System Quality* will cause increases *intention to use*

The results showed there was a weak, yet significant, relationship between System Quality and Intention to Use, therefore the hypothesis is accepted. System quality explained 6% of the variance in customers' intention to use the online retail site. This further verified Lederer et al's (2000) research on external factors (such as system quality) influencing use.

Hypothesis 10: Accepted

Increases in *System Quality* will cause increases in *Customer E-commerce satisfaction*

This hypothesis was accepted. The results show that system quality explains 1.2% of the variance in customer e-commerce satisfaction. This figure was lower than expected, and can once again be attributed to the indirect effect. System quality (an external variable) has a greater effect on the perceived usefulness which in turn affects the intentions which in turn affects satisfaction (Davis, 1989).

Hypothesis 11: Accepted

Increases in *Content quality* will cause increases in *Perceived Usefulness*

The results supported this hypothesis, therefore it is accepted. This further confirms the relationships proposed by Lederer et al (2000). This relationship was originally tested with IS systems. Lederer et al (2000) applied and tested it using web sites. This shows the generalisability of the original hypothesis.

Hypothesis 12: Not Accepted

Increases in *Content quality* will cause increases in *Customer E-commerce satisfaction*

There was strong support for Hypothesis 4, and hence Hypothesis 12 could not be accepted although a positive relationship was initially expected. However, once again this can be attributed to the indirect effect. Content quality does have an effect on customer e-commerce satisfaction (indirectly through perceived usefulness and intention to use), but all direct effects are also being measured in this model and hence the indirect ones fall away.

Hypothesis 13: Not Accepted

Increases in *Content quality* will cause increases in *intention to use*

The hypothesized association between Content Quality and Intention to Use was not found. There was no statistically significant data to support this hypothesis. According to Lederer et al (2000), content quality affects intention to use indirectly, i.e: content quality affects perceived usefulness and that in turn affects intention to use. The relationship between content quality and perceived usefulness was shown in Hypothesis 11. When statistically testing a series of direct and indirect relationships, it is not uncommonly that the indirect ones will fall away in the presence of the direct ones. Therefore, in hind sight, this result is not surprising and raises a possible flaw in the research design in that many direct and indirect relationships are statistically tested together.

Hypothesis 14: Accepted

Increases in *Support and Service* will cause increases *Customer E-commerce Satisfaction*

This Hypothesis was accepted and it verifies the relationships proposed by Delone and McLean (2003) and Molla and Licker (2001), confirming much marketing research that states that support and service plays a prominent part in customer satisfaction

Hypothesis 15: Not Accepted

Increases in *Support and Service* will cause increases in *Use*

Once again, as in the case of Trust (hypothesis 8), there was no statistically significant data to show that and an increase in Support and Service causes an increase in Actual Use. Although the relationship between Support and Service and Trust causing increases in Use has been documented by previous researchers such as Molla and Licker (2001) and Delone and McLean (2003), the data did not support this. This finding is, however inconclusive, and the limitations of the data obtained from attempting to measure Intentions and Actual Use should be taken into consideration.

Hypothesis 16: Accepted

Increases in *Support and Service* will cause increases in *Trust*

The relationship between Support and Service and Trust was found to be very strong in all the models. It had a $B = 0.534$ (this decreased marginally when Intention to Use was included in the model). The R^2 value was 0.285, which is very high, considering the multidimensional nature of Trust. Therefore we accept the hypothesis. This is consistent with research conducted by Harris and Goode (2004).

Hypothesis 17: Accepted

Increases in *Trust* will cause increases *Customer E-commerce Satisfaction*

The results showed a weak, yet significant relationship between trust and customer e-commerce satisfaction. Therefore, the hypothesis was accepted. Further research with an instrument that measures trust in the context of online retail web sites is recommended to further determine the effects of trust on customer e-commerce satisfaction, and use.

Hypothesis 18: Not Accepted

Increases in *Trust* will cause increases *Use*

The data showed that there was no statistically significant data to show that Increases in Trust causes an increase in Actual Use. The hypothesis was not accepted. Once again the limitations of the actual use data, stated above, were significant in the rejection of this hypothesis. Although this result is not what was expected, it is recommended that further research be undertaken to determine the direct and indirect effects of trust on online retail web site use. Perhaps a shortcoming of the conceptual model was that trust was linked to actual use and not intention to use as Suh and Han (2002) had done previously.

7. MODEL REFINEMENT AND VALIDATION OF EXISTING MODELS	98
7.1 VARIATION 1 (V1).....	98
7.2 VARIATION 2 (V2).....	100
7.3 VARIATION 3 (V3).....	101
7.4 VALIDATION OF EXISTING MODELS	102
7.4.1 Licker and Molla (2001) Model.....	102
7.4.2 Seddon (1997) Model.....	103
7.4.3 Delone and McLean (2003) Model.....	105

University of Cape Town

7. MODEL REFINEMENT AND VALIDATION OF EXISTING MODELS

As discussed in Chapter 5.11, page 85, the limitations of the intention to use and actual use data was a likely reason for the overall mediocre model fit. In order to gain maximum use from the data collected, it was decided to refine the model and to re-test the relationships using only the highest quality data.

Three variations to the conceptual model were developed and tested. Variation 1 was a refinement of the conceptual model that did not contain the *actual use* but all other factors remained. The conceptual model was refined again to produce Variation 2, which included Actual use, but not *Intention to use*. Variation 3 did not have actual use or intention to use.

7.1 Variation 1 (V1)

As stated previously, the measurement of actual use was a major limitation in our data. For this reason it was decided to test a model that did not have 'Actual Use'. The first variation was a model where 'Actual Use' is replaced by Intention to Use. This is consistent with concepts proposed by Delone and McLean (2003).

The model was re-tested using exactly the same statistical procedures as before, and the results are shown graphically on the following page.

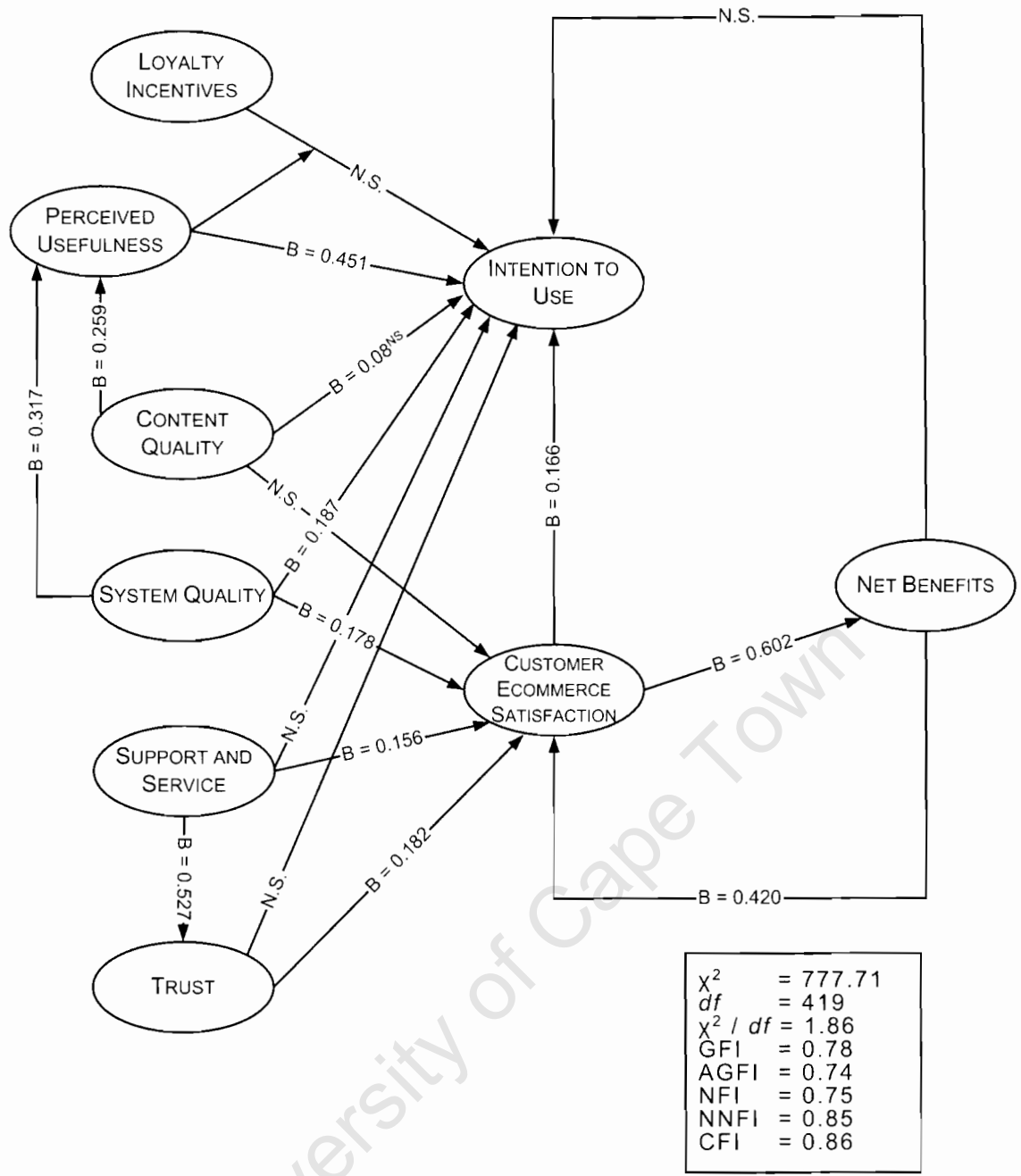


FIGURE 7.1: RESULTS OF THE SEM PERFORMED ON MODEL V1

Eliminating Actual Use from the model resulted in a slightly better fit. However it was still not as good a fit as hoped for. This was most probably because Intention to Use was still included which meant that data with a minimum cross loading of 0.4 had to be used.

7.2 Variation 2 (V2)

As stated previously, in order to use Intention to Use, data that valid only at a minimum factor loading of 0.4 had to be used. It was decided to test a model using the more rigorous data that was valid at a minimum factor loading of 0.6. Hence, the second variation was a model with did not include Intention to Use as a success factor, but still included Actual Use.

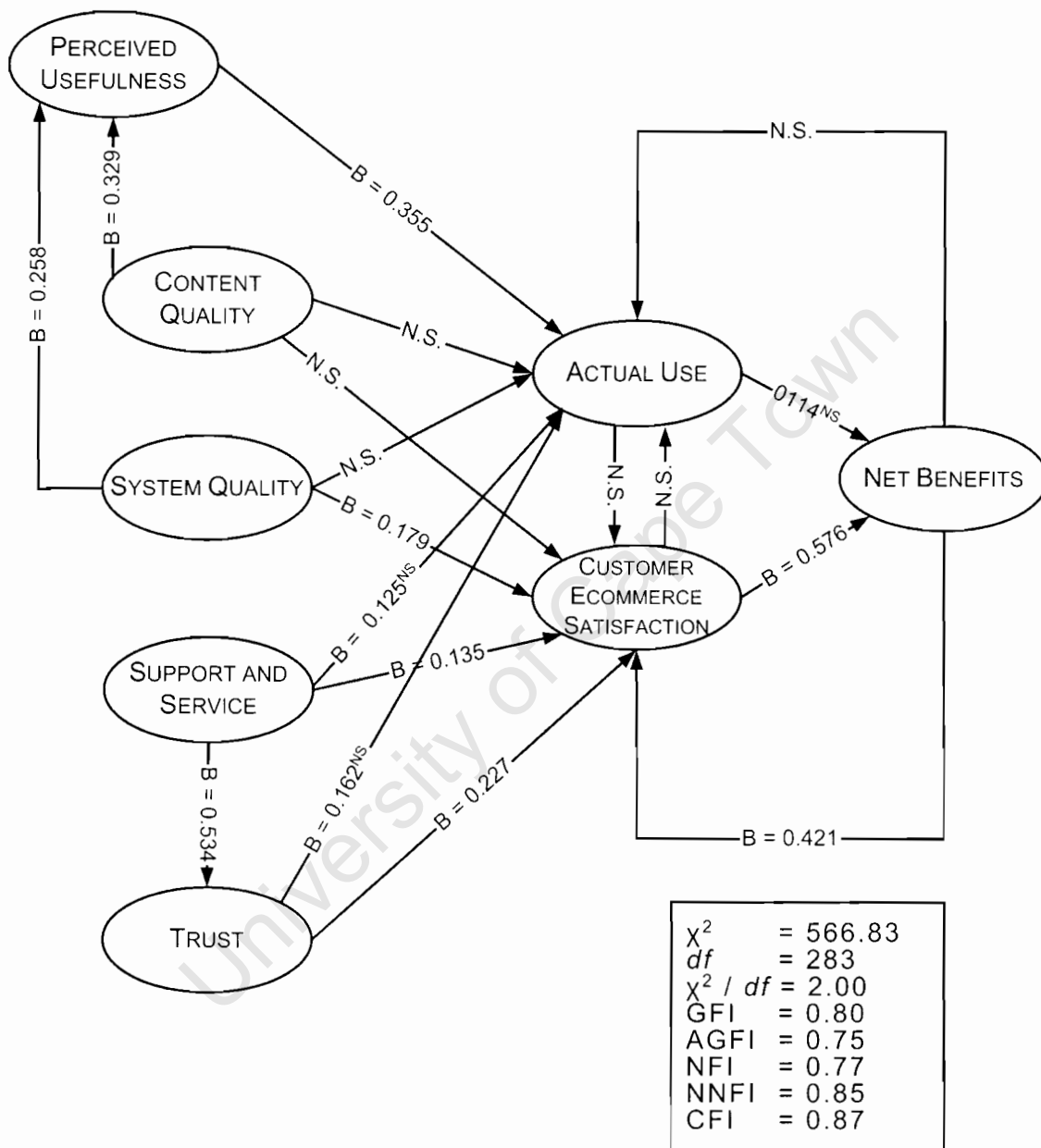


FIGURE 7.2: RESULTS OF THE SEM PERFORMED ON MODEL V2

The SEM showed that the data has reasonable fit to this model. Eliminating the factor ‘Intention to Use’ resulted in a better model fit, but was still not as high as hoped at the beginning of the research. It was agreed that even though intention to use was removed, that the limitations of the actual use data were still having an effect.

7.3 Variation 3 (V3)

A final variation, in which neither ‘Actual Use’ no ‘Intention to Use’ were considered was developed and tested. The relationship from net Benefits to Perceived Usefulness was included as identified by Seddon (1997).

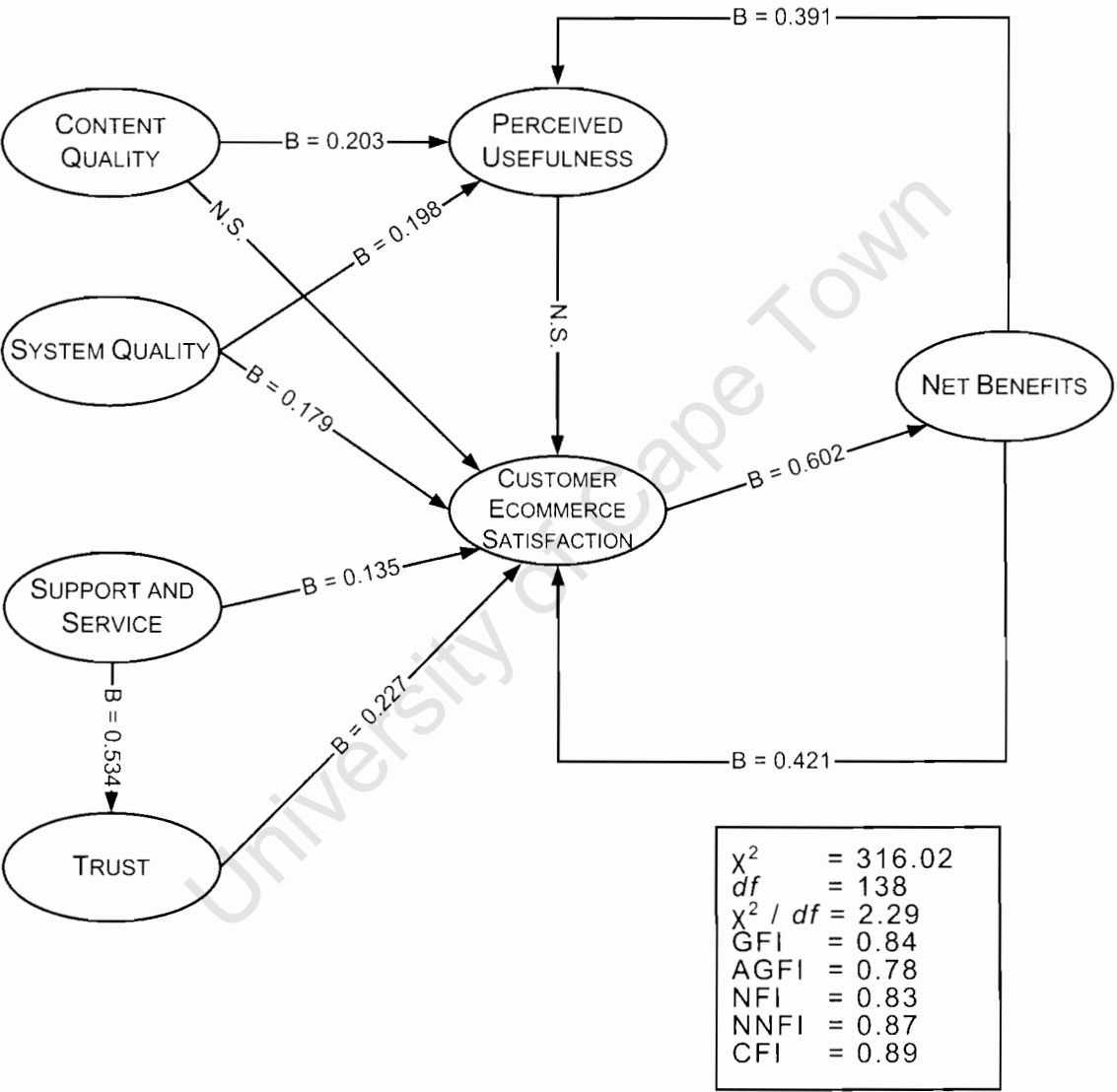


FIGURE 7.3: RESULTS OF THE SEM PERFORMED ON MODEL V3

This Model had the best fit overall. It was the only model having a GFI that exceeded 0.80 and it is the only model to have NFI, NNFI and CFI all above 0.8. This indicates that the data showed a good fit for this model. This model, V3, has many of the same relationships present in the Seddon (1997) model. The results are also very similar to those of Rai et al's (2002) empirical test of Seddon's (1997) model. This further validates the research conducted by Seddon (1997) and Rai et al (2002).

7.4 Validation of Existing Models

As a final consideration to the existing models, upon which the core of this research is based, the goodness of fit indexes and the relationships present in them were tested with the data collected.

7.4.1 Molla and Licker (2001) Model

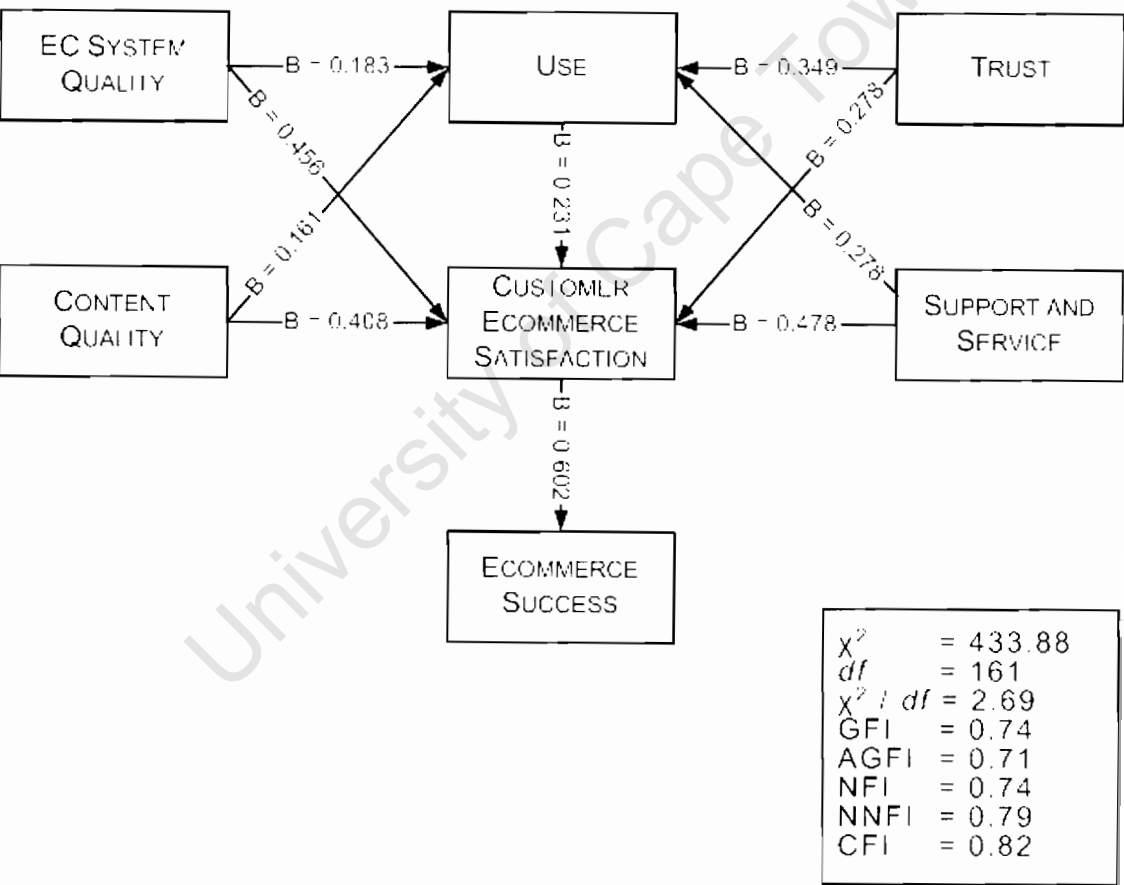


FIGURE 7.4: RELATIONSHIPS TESTED ON THE MOLLA AND LICKER (2001) MODEL

All goodness-of-fit indexes of the Molla and Licker (2001) model were lower than those of Variation 1, 2 and 3, yet show a reasonable fit to the data. Possible reasons for why the model did not exhibit a degree of fit as high as the other models include:

- 1) The Molla and Licker (2001) model does not include the factor perceived usefulness which the other models do. Perceived usefulness had a strong relationship with both content and system quality in all of the variations. A possible area for further research is determining whether this model can be refined to include perceived usefulness.
- 2) Net Benefits was used as a surrogate for Ecommerce Success, as suggested by Delone and McLean (2003). If a new instrument can be developed that specifically applies to e-commerce success and systems, it could increase the strength of the model.

7.4.2 Seddon (1997) Model

Figure 7.5 below shows the results of the examination of Seddon's (1997) model. This model exhibited a better fit to the data than Molla and Licker's (2001) model. Although not all the relationships present in the model were tested, the high degree of fit can probably be attributed to the fact that intention to use and actual use data was not used in testing this model. Seddon's (1997) model showed a stronger fit than V2 and the same level of fit as V3. This was expected as Model V3 incorporated many of the same relationships.

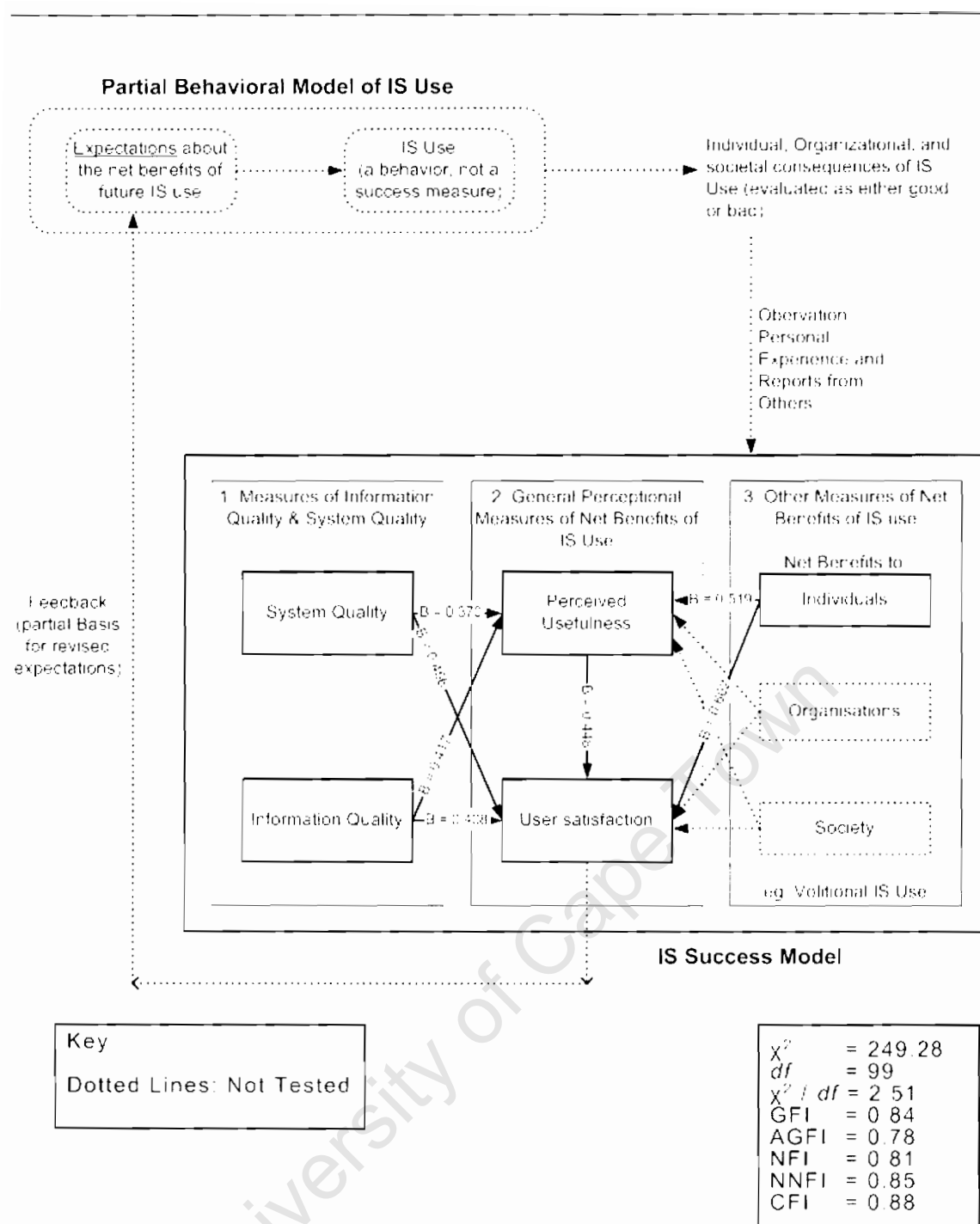


FIGURE 7.5: RELATIONSHIPS TESTED ON THE SEDDON (1997) MODEL

7.4.3 Delone and McLean (2003) Model

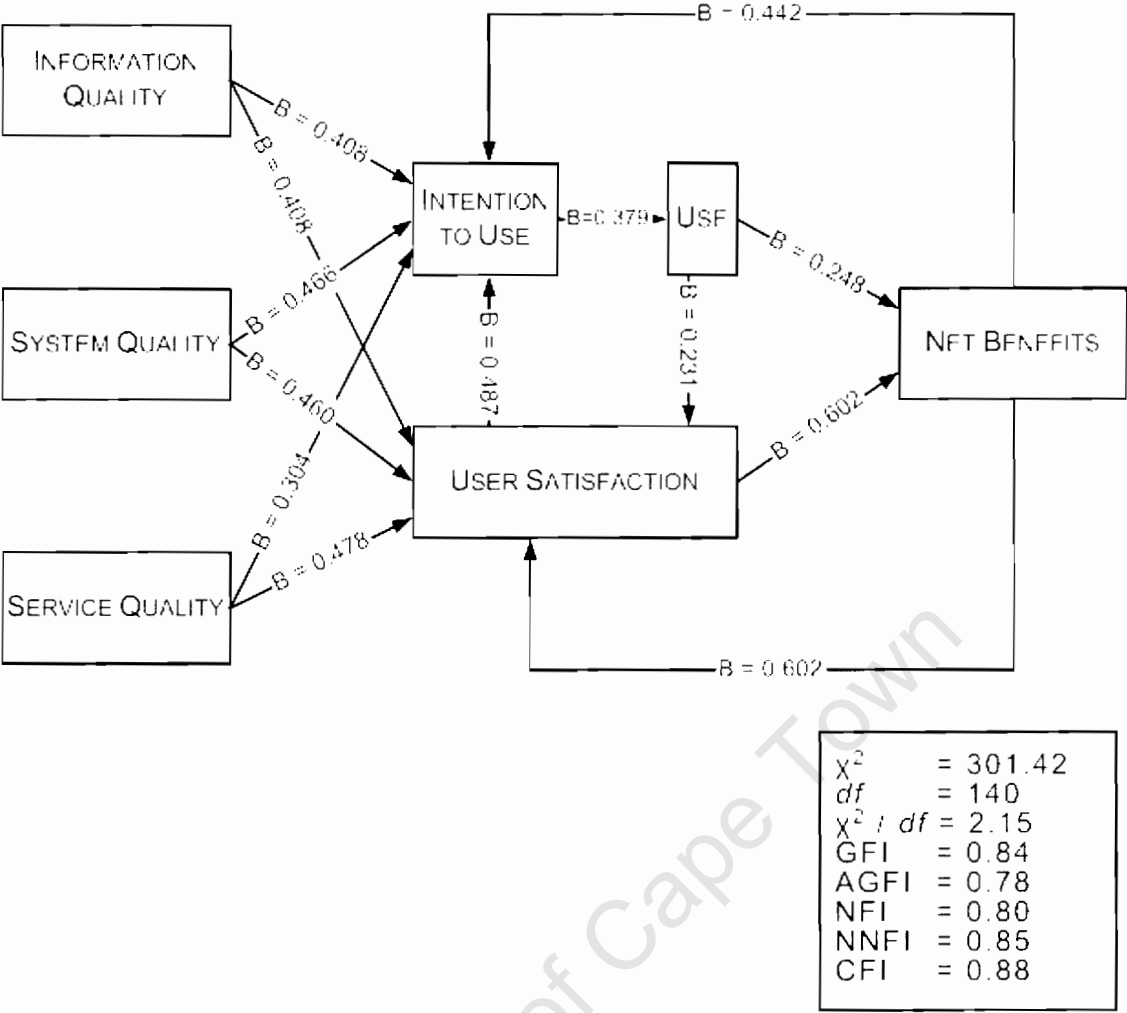


FIGURE 7.6: RELATIONSHIPS TESTED ON THE DELONE AND MCLEAN (2003) MODEL

This model showed strong relationships between the variables. What is particularly impressive is that approximately 80% of the variances for each variable were explained. This model had a better fit than Models V1 and V2, and had the same fit as V3.

Overall the Seddon (1997) had the best fit with the data collected. The Delone and McLean model (2003) also demonstrated a good fit. Molla and Licker's (2001) model exhibited a reasonable fit. In testing Molla and Licker's (2001) model, Net Benefits was

used as a surrogate measure for e-commerce success, as suggested by Delone and Mclean (2003).

The conceptual model tested in this research drew a lot from the Molla and Licker (2001) Model, which was shown to have stronger relationships with the same data. A possible explanation for this is that the Molla and Licker (2001) model contains fewer indirect relationships, and the conceptual model used more variables. It could be said that the instruments used were only adapted for use in online retail web sites and not specifically developed for them. Therefore a probable method to increase the fit of the Jayakody's Model and any subsequent e-commerce success model would be to develop and use instruments specifically for online retail.

Testing the e-commerce success models to date, including the Delone and McLean (2003) updated model, which had a good fit, lends further credibility to the original IS Success Model by Delone and McLean (1992) and tells us that current research into this field has a good base and that future research into this field should attempt to incorporate similar principles as well as develop new ones to further investigate e-commerce success.

8. CONCLUSIONS	108
8.1 BACKGROUND	108
8.2 MODEL TESTING	108
8.3 KEY FINDINGS	109
<i>Net Benefits</i>	109
<i>Customer E-commerce Satisfaction</i>	109
<i>Perceived Usefulness</i>	109
<i>Trust and Support and Service</i>	109
8.4 THE BEST MODEL FIT	110
8.5 LIMITATIONS AND FURTHER RESEARCH	111
8.6 IMPLICATIONS FOR IS PRACTITIONERS	112

University of Cape Town

8. CONCLUSIONS

8.1 Background

E-commerce success has been defined as the flourishing sharing of business information, maintaining of business relationships, and conducting business transactions by means of telecommunications networks, namely the internet. It is important that the views of all stakeholders are considered. Delone and McLean (1992) first developed a Model of IS Success, and this has been used as a platform in this research paper.

The main goals of this research were to develop a conceptual model and empirically validate it. The conceptual model was developed by carefully reviewing previous academic literature and encompassing the latest findings from various researchers including Seddon (1997) and Molla and Licker (2001) to name but a few. A research instrument was created, and the model was then empirically tested and compared with previous models.

8.2 Model testing

The most appropriate research method was first identified, a sample group was chosen and relevant data collected through questionnaires. The sample group was chosen based on previous research which identified the typical South African e-commerce user. 180 responses were received. The data was used to statistically test the conceptual model, and refinements were made to it. Three variations to the conceptual model were tested, to determine if it could be further refined given the data available. Although the expected outcome was not always achieved, it does show that there is still room for further research and refinement. Some existing models were also tested using the same data. Perhaps more important, is that 18 different hypothesizes and causal relationships that feature heavily in the literature were tested. 12 of the 18 hypotheses were accepted. The research has established that there is merit to existing IS success and e-commerce success models.

8.3 Key Findings

Net Benefits

The analysis suggests that Net Benefits is most strongly influenced by E-commerce Satisfaction. The relationship between Actual Use and Net Benefits is only significant at $p < 0.16$. ($B = 0.084$). Existing academic literature and previous research indicates that this figure is very low. This result was expected and can be attributed to the limitations in the data of Actual Use.

Customer E-commerce Satisfaction

Net Benefits is the strongest predictor of Customer E-commerce Satisfaction ($B = 0.420$), and explains 36.2% of the variance of e-commerce satisfaction. This confirms the feedback loop suggested by Delone and McLean (2003) and previous research which suggests that Satisfaction is the strongest predictor of Success (Seddon, 1997). The analysis showed that in addition to Net Benefits, System Quality, Trust and Support and Service are all significant predictors of Customer E-commerce Satisfaction.

Perceived Usefulness

The data shows that Perceived Usefulness is a significant predictor of Use ($B = 0.406$) accounting for 18.2% of its variance, validating the original TAM model by Davis. Perceived Usefulness is significantly influenced by Content Quality ($B = 0.317$) and System Quality ($B = 0.275$), explaining 17.4% and 5.9% of the variance respectively, further validating relationships identified by Lederer et al (2000).

Trust and Support and Service

Trust and Support and Service are predictors of Customer E-commerce Satisfaction. A very interesting finding of this research is that the data conclusively indicated that Support and

Service delivered by the online retailer is a strong indicator of the customers' trust in the online retailer. ($B = 0.527$), explaining approximately 28% of the variance in Trust.

8.4 The Best Model Fit

Model V3, (see Figure 7.3), had the best fit, with a GFI of 0.86. In this model Perceived Usefulness was used as a substitute for actual use and intention to use as suggested by Seddon (1997). This was done to avoid using actual use data due to the limitations in the measuring of actual use, (stated in Ch 5.11, page 84), and the fact that the intention to use factor cross loaded with perceived usefulness.

It is highly likely that this model was a good fit because only the factors with the highest minimum loading of 0.6 were used. This does not necessarily mean that Perceived Usefulness is a better or worse measure of Intention to Use. It is just more convenient and easier to measure Perceived Usefulness than either Intention to Use or Actual Use.

If Intention to Use and Actual Use can be measured as accurately as Perceived Usefulness, i.e. if a valid and reliable instrument is used, it may prove that a statistically significant relationship from Actual Use to Customer E-commerce Satisfaction exists. This research indicates that the concepts identified in Seddon's (1997) research, such as Perceived Usefulness being used as a substitute for Actual Use are accurate when attempting to measure e-commerce success, and seems the best avenue to follow for future attempts at measuring Customer E-commerce Success.

Very significant associations between Support and Service and Trust and from Customer E-commerce Satisfaction to Net Benefits have been confirmed. Also the feedback loop from Net Benefits to E-commerce Satisfaction, proposed by Delone and McLean (2003) has been proven. We have learnt that the measurement of Actual Use is not conclusive when comparing over a variety of products because different products have different turnover periods. Therefore when measuring actual use, future research should not make the mistake of trying to directly compare online retail web sites selling different products. This is further evidence for the case that

perhaps a measurement of intentions will yield a more accurate picture of the success of an e-commerce system (Seddon, 1997).

The original relationships between perceived usefulness and intentions to use proposed by Davis (1989) in the TAM were strongly significant, indicating that the TAM can be still valid when applied in an online retail context, and that TAM is still important when considering the success of e-commerce systems. It is likely that this is because it contains fundamental direct relationships with few indirect relations.

The study also revealed that communication, such as email and chat, is still the most widely performed task on the Internet. Amazon.com is still the most popular online bookstore and still one of the most popular sites to make purchases online. These findings were identical to those of De Villiers and Van Der Merwe's (2001) study.

8.5 Limitations and Further Research

A possible shortcoming of the conceptual model is that there were too many indirect relationships present in the model, which could have statistically weakened the model. A possible variation for further research may be to also test small parts of the model individually and observe the differences. Another topic for further research is how system quality affects the success of online retail sites that sell only digital products and physical goods delivered, MP3's, for example.

A specific limitation to this research was the use of single item measures. Although this has been used by past researchers in this field, it is recommended that new instruments be developed specifically for the use of online retail web sites to conduct further research. A further recommendation for future studies on e-commerce success is that they focus on only one e-commerce site when gathering data. The respondents in this survey were asked to give feedback on the *last* online retail site they used. It was felt that this limited the data as different products and services sold on the internet have varying cycle times and hence usage data could not be directly compared. The classic example is airline tickets and groceries.

Another limitation identified was that previously validated instruments were not statistically compared to determine which yielded the most valid and reliable data. Also the respondents in this research were all from the same institution. A larger, more geographically diverse sample would have been more representative. For subsequent research, it is highly recommended that the instruments are statistically validated through more rigorous pilot testing and wherever possible, new instruments specific to online retail sites be developed.

8.6 Implications for IS practitioners

E-commerce is developing at an increasing pace, more people gaining access to the internet and e-commerce becoming more prominent everyday, further research on the accurate measurement of success, satisfaction and net benefits will provide greater understanding and consensus on truly achieving e-commerce success.

The significant role that various factors play in the success has been confirmed by the multi-dimensional nature of e-commerce success. Priorities for online retailers should include a high level of support and service, which was shown to build trust, a factor crucial to the customer feeling satisfied with the transaction. Online retailers and e-commerce systems in general should strive to have high levels of content and system quality. This will increase the customers' perceptions of the *usefulness* of the e-commerce system, in turn increasing its usage. This point is particularly applicable to South African online retailers as the bulk of South African online shoppers are still using overseas sites.

Bibliography

- Bailey, J. and Pearson, S. (1983) Development of a tool for measuring and analyzing computer user satisfaction, *Management Science*, 29(5), pp530-546.
- Bhattacharjee, A. (2001) An empirical analysis of the antecedents of electronic commerce service continuance, *Decisions Support Systems*, 32(2), pp201–214.
- Briggs, R., De Vreede, G., Nunamaker, J. and Sprague, R. (2003) Special issue: Information systems success, *Journal of Management Information Systems*, 19(4), pp5-8.
- Chen, L., Gillenson, M. and Sherrell, D. (2002) Enticing online customers: An extended technology acceptance perspective, *Information and management*, 39(8), pp705-719.
- Davis, F. (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, 13(3), pp319-339.
- Delone, W. and McLean, E. (1992) The quest for the dependent variable, *Information Systems Research*, 3(1), pp60-65.
- Delone, W. and McLean, E. (2003) The Delone and McLean model of information systems success – A 10 year update, *Journal of Management Information Systems*, 19(4), pp9-30.
- De Villiers, C. and Van Der Merwe, J. (2001) *An investigation into the adoption of electronic commerce by South African consumers – Who they are and what they think*. Unpublished PhD Thesis, University of Pretoria.
- Dishaw, M. and Strong, D. (1999) Extending the technology acceptance model with task-technology fit constructs, *Information & Management*, 36, pp9-21

-
- Doll, W. and Torkzadeh, G. (1988) The measurement of end user computing satisfaction, *MIS Quarterly*, 12(2), pp259-274.
- Gefen, D., Karahanna, E. and Straub, D. (2003) Trust and TAM in online shopping: An integrated model, *MIS-Quarterly*, 27(1), pp51-90.
- Gefen, D. and Straub, D. (2000) The relative importance of perceived ease of use in IS adoption: A study of e-commerce adoption, *Journal of the Association for Information Systems*, 1(8), pp1-30.
- Hair, J., Anderson, R., Tatham, R. and Black, W. (1995) *Multivariate Data Analysis with Readings*, 4th edition, Englewoods Cliffs, NJ: Prentice Hall.
- Harris, L. and Goode, M. (2004) The four levels of loyalty and the pivotal role of trust: A study of online service dynamics, *Journal of Retailing* 80, pp139–158.
- Hennig-Thurau, T. and Klee, A. (1997) The Impact of customer satisfaction and relationship quality on customer retention: A critical reassessment and model development, *Psychology and Marketing*, 14(8), pp737–764.
- Klein, H. and Myers, M. (1999) A set of principles for conducting and evaluating interpretive field studies in information systems, *MIS Quarterly*, 27(1), pp571-586.
- Lederer, A., Maupin, D., Sena, M. and Zhuang, Y. (2000) The technology acceptance model and the world wide web, *Decision Support Systems*, 29(3), pp269–282.
- McKnight, D., Choudhury, V. and Kacmar, C. (2002) Developing and validating trust measures for e-commerce: An integrative typology, *Information Systems Research*, 13(3), pp334–359.

-
- Molla (2002) *E-readiness and e-commerce success: Developing and exploring an antecedent model in developing countries context*. Unpublished PhD Thesis, University of Cape Town.
- Molla, A. and Licker, P. (2001) E-commerce systems success: An attempt to extend and respectify the Delone and McLean model of information systems success, *Journal of Electronic Commerce Research*, 2(4), pp1-11.
- Nunnally, J. (1978) *Psychometric Theory*, New York: McGraw-Hill.
- Palvia P., Mao, A., Salam, A. and Soliman, K. (2003) Management Information Systems Research: What's there in a methodology, *Communication of the Association for Information Systems*, Vol. 11, pp289-309.
- Pindyck, R., and Rubinfeld, D. (1998) *Econometrics Model and Economic Forecasts*, 4th Edition, McGraw-Hill, Singapore.
- Rai, A., Lang, S., and Welker, R. (2002) Assessing the validity of IS success models: An empirical test and theoretical analysis, *Information Systems Research*, 13(1), pp50-69.
- Reichheld, F. and Schefter, P. (2000) E-loyalty: Your secret weapon on the web. *Harvard Business Review*, 78(4), pp105-113.
- Seddon, P. (1997) A Respecification and extension of the Delone and McLean model of IS success, *Information Systems Research*, 8(3), pp240-253.
- Seddon, P. and Kiew, M. (1996) A Partial Test and Development of Delone and McLean's Model of IS Success, *Australian Journal of Information Systems*, (4)3, pp66-88.

-
- Shankar, V., Smith, A. and Rangaswamy, A. (2003) Customer satisfaction and loyalty in online and offline environments, *International Journal of Research in Marketing*, 20(2), pp153–175
- Straub, D. (1989) Validating instruments in MIS research, *MIS Quarterly*, 13(2), pp147-169.
- Suh, B. and Han, I. (2002) Effect of trust on customer acceptance of internet banking, *Electronic Commerce Research and Applications*, 1, pp247–263.
- Tan, M. and Teo, T. (2000) Factors Influencing the Adoption of Internet Banking, *Journal for the Association of Information Systems*, 1(5), pp1-42.
- Teo, T. and Lim, V. (1999) Usage and perceptions of the internet: What has age got to do with It?, *CyberPsychology and Behavior*, 1(4), pp371-381.
- Van der Heijden, H. (2003) Factors influencing the usage of websites: the case of a generic portal in The Netherlands, *Information and Management*, 40(6), pp541-549.
- Wang, T. and Tang, J. (2001) An Instrument for measuring Customer Satisfaction Toward Web Sites That Market Digital Products and Services, *Journal of Electronic Commerce Research*, 2(3), pp20-48.
- Whyte, G., Bytheway, A. and Edwards, C. (1997) Understanding user perceptions of information systems success, *Journal of Strategic Information Systems*, Vol. 6, pp35-68.
- Yang, Y and Yoo, Y (2003) It's all about attitude: revisiting the technology acceptance model, *Decision Support Systems*, 38(1), pp19-31
- Zeithaml, V., Parasuraman, A. and Berry, L. (1990) *Delivering Quality Service: Balancing Customer Perceptions and Expectations*. New York: The Free Press.

Zwass, V. (1996) Electronic commerce: structures and issues, *International Journal of Electronic Commerce* 1(1), pp3-23.

Zwass V. (1999) *Structure and Macro-Level Impacts of Electronic Commerce: From Technological Infrastructure to Electronic Marketplaces*, available: <http://www.mhhe.com/business/mis/zwass/ecpaper.html>, [Accessed: 12th November 2003]

University of Cape Town

APPENDICES

Appendix A: The Research Instrument (Questionnaire)

E-commerce Questionnaire
Please think back to your most recent online shopping experience and answer the following questions by circling the appropriate number, (with regards to your most recent online shopping experience)

1. Perceived Usefulness	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Using this online shopping site enhances the productivity of my shopping activities.	1	2	3	4	5
Using this online shopping site has a critical role in supporting my shopping activities.	1	2	3	4	5
Using this online shopping site makes it easier to do my shopping activities.	1	2	3	4	5
Using this online shopping site enables me to accomplish shopping activities more quickly.	1	2	3	4	5
Using this online shopping site improves my performance (eg. saving time or money) of shopping activities.	1	2	3	4	5
I find this online shopping site useful for my shopping activities.	1	2	3	4	5

2. Content Quality	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This online retail site provides the precise information I need.	1	2	3	4	5
This online retail site provides responses to questions and queries that are exactly what I need.	1	2	3	4	5
This online retail site provides sufficient information to enable me to do my tasks.	1	2	3	4	5

This online retail site has errors that I must work around.	1	2	3	4	5
I am satisfied with the accuracy of information provided by this online retail site.	1	2	3	4	5
The output options (printer-friendly options, page sizes allowed for, etc.) are sufficient for my use.	1	2	3	4	5
The information provided by this online retail site is helpful regarding my questions or problems.	1	2	3	4	5

3. System Quality	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This online retail site is user friendly.	1	2	3	4	5
Compared to other sites, this online retail site is easy to become familiarized with.	1	2	3	4	5
I find it easy to get this online retail site to do what I want it to do.	1	2	3	4	5
I find it easy to become skilful at using this online retail site.	1	2	3	4	5
I believe that this online retail site is cumbersome to use.	1	2	3	4	5
To use this online retail site requires a lot of mental effort.	1	2	3	4	5
I get frustrated when I use this online retail site.	1	2	3	4	5

4. Intention to use	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I want to continue using this online retail site rather than discontinue its use.	1	2	3	4	5
My intentions are to continue using this online retail site rather than use any other alternative means of shopping.	1	2	3	4	5
I would like to discontinue the use of this online retail site.	1	2	3	4	5

5. Actual Use	Almost Never	Less than once a month	Few Times a month	Once a week	Once a day or more
How often do you use this online retail site to make online purchases or for information seeking?	1	2	3	4	5
How many times have you used this online retail site for purchases or information seeking in the last six months?	1	2	3	4	5

6. Trust	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This online retail site is trustworthy.	1	2	3	4	5
I trust in the benefits of the decisions made by this online retail site. ie: I trust the specials offered and recommendations made by the site.	1	2	3	4	5
This online retail site keeps its promises and commitments.	1	2	3	4	5
This online retail site keeps customers' best interests in mind.	1	2	3	4	5
This online retail site would do the job right even if not monitored.	1	2	3	4	5
I trust this online retail site.	1	2	3	4	5

7. Loyalty Incentives	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This online retail site offers incentives for its continued use, such as frequent flier miles or bonus points.	1	2	3	4	5
I get rewarded for my continued patronage of this online retail site.	1	2	3	4	5
This online retail site generally does not give me any loyalty incentives for my continued use of its service.	1	2	3	4	5

8. Support and Service	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am satisfied with the customer support provided by this online retail site.	1	2	3	4	5
I am satisfied with the after-sales service provided by this online retail site.	1	2	3	4	5

This online retail site understands my problems and requests.	1	2	3	4	5
This online retail site responds to my requests fast enough.	1	2	3	4	5

9. Customer E-commerce Satisfaction	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am satisfied with making purchases online from this online retail site.	1	2	3	4	5

10. Net Benefits	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The total benefits of using this online retail site to make purchases outweighs the total costs.	1	2	3	4	5

11. Demographics																																																							
<table border="1"> <tr> <td>Gender</td> <td colspan="3">Male</td> <td colspan="3">Female</td> </tr> </table>							Gender	Male			Female																																												
Gender	Male			Female																																																			
Highest Education Level	Primary School	High School	College Diploma	Technikon Diploma	Under-graduate University Degree	Post - graduate Degree																																																	
Monthly Taxable Income	R 0 - R 1999	R 2000 - R 4999	R 5000 - R 9999	R 10 000 - R 19 000	R20 000+																																																		
Age Group	Under 18	18 - 24	25 - 34	35 - 44	45 - 54	55+																																																	
<table border="1"> <tr> <td colspan="3">Occupation</td> <td colspan="4"></td> </tr> <tr> <td>Full time Student</td> <td></td> <td></td> <td>Manager</td> <td colspan="3"></td> </tr> <tr> <td>Professional</td> <td></td> <td></td> <td>Retired</td> <td colspan="3"></td> </tr> <tr> <td>Technician</td> <td></td> <td></td> <td>Housewife</td> <td colspan="3"></td> </tr> <tr> <td>Artisan</td> <td></td> <td></td> <td>Unemployed</td> <td colspan="3"></td> </tr> <tr> <td>Academic</td> <td></td> <td></td> <td>Other (Please State)</td> <td colspan="3"></td> </tr> <tr> <td>Clerk</td> <td></td> <td></td> <td></td> <td colspan="3"></td> </tr> </table>							Occupation							Full time Student			Manager				Professional			Retired				Technician			Housewife				Artisan			Unemployed				Academic			Other (Please State)				Clerk						
Occupation																																																							
Full time Student			Manager																																																				
Professional			Retired																																																				
Technician			Housewife																																																				
Artisan			Unemployed																																																				
Academic			Other (Please State)																																																				
Clerk																																																							

12. Internet Access		
Do you have a PC at home?		
Yes		No

Do you have Internet Access at home?	Yes		No	
What sort of access?	Dial up modem	DSL	ISDN	Satellite

13. Internet Experience					
For how many years have you been using the internet?	Less than 1 year	1 - 3 years	3 - 4 years	4 - 5 years	More than 5 years
For how many years have you been using the internet for online retail specifically?	Less than 1 year	1 - 3 years	3 - 4 years	4 - 5 years	More than 5 years
On average how frequently do you use the internet?	Never	Less than once a month	Few Times a month	Once a week	Once a day or more

On the average day how much time do you spend on the internet?	None	Less than 1/2 hour	1/2 - 1 hours	1 - 3 hours	More than 3 hours
--	------	--------------------	---------------	-------------	-------------------

14. I use the Internet:	Never	Less than once a month	Few Times a month	Once a week	Once a day or more
To get information and product support	1	2	3	4	5
To communicate with people (eg: Email and chat)	1	2	3	4	5
To download free resources	1	2	3	4	5
For entertainment (eg: online games)	1	2	3	4	5
For purchasing/shopping through online retail sites	1	2	3	4	5
For banking transactions	1	2	3	4	5

15. What do you purchase through Online retail sites (please tick). You may select more than one	
Alcoholic beverages	
Apparel, Accessories and Shoes	
Arts, Collectables and Jewellery	
Books Magazines and Stationary	
DVD's, Movies and Videos	
Music	
Electronics and Photography	
Flowers, Gifts and Cards	
Food, Beverages (excl. alcohol) and other groceries	
Health Beauty and Baby Care	

Home & Garden		
Other: Please State *Optional		

Please List the Online retail site that you were referring to in this questionnaire: (Optional), and any other online retails sites that you use (Optional); and any other comments

Online Retail Site Referred to Questionnaire:

When did you actually use the site? Eg: a week ago, a month ago, 2 months ago etc:

Other Online Retail Sites used:

Please State you email address if you would like a summary of the results:

Thank you for your participation

Appendix B: CFA at 0.6 minimum loading

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.600000)								
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
PU1	0.172	0.045	0.056	0.145	0.140	0.052	-0.002	-0.257	
PU2	0.083	0.110	0.129	-0.038	0.365	0.052	0.114	-0.016	
PU3	0.153	-0.065	0.157	0.078	0.026	0.140	0.109	-0.010	
PU4	0.058	-0.085	0.015	0.116	0.148	0.130	0.068	0.020	
PU5	-0.100	0.056	0.147	0.126	0.038	0.220	-0.008	0.217	
PU6	0.122	-0.064	0.279	0.097	-0.037	0.175	0.032	0.017	
CQ1	0.087	0.308	0.059	0.185	0.083	0.071	0.077	-0.022	
CQ2	-0.065	0.079	-0.009	0.188	0.009	0.065	0.172	-0.029	
CQ3	0.248	0.220	0.016	0.171	0.152	-0.046	0.215	0.006	
CQ4	0.579	-0.111	-0.079	0.360	0.206	0.183	-0.038	-0.323	
CQ5	0.197	0.048	-0.011	0.111	0.022	0.114	0.282	-0.140	
CQ6	0.222	0.112	0.035	0.476	-0.038	0.022	0.289	-0.235	
CQ7	0.070	0.169	0.055	0.111	0.215	-0.069	-0.012	0.005	
SQ1	0.430	0.180	0.006	0.426	0.129	0.082	0.202	0.356	
SQ2	0.256	0.163	-0.100	0.184	0.163	0.282	0.097	0.051	
SQ3	0.482	-0.045	0.107	0.442	0.257	0.162	0.126	0.172	
SQ4	0.568	0.070	-0.010	0.215	0.177	0.105	0.119	0.129	
SQ5	0.147	0.287	0.092	0.097	0.161	-0.244	0.255	0.015	
SQ6	0.187	0.060	-0.141	0.061	-0.076	0.176	0.160	0.141	
SQ7	0.128	0.062	0.144	0.124	0.142	0.131	-0.060	0.088	
IU1	0.297	0.477	-0.034	0.255	0.189	0.350	0.142	-0.237	
IU2	-0.044	0.259	0.024	0.031	0.279	0.421	-0.028	-0.227	
IU3	0.360	0.555	-0.096	0.149	-0.005	0.237	0.084	-0.333	
AU1	0.087	0.336	0.139	0.004	0.027	0.208	0.111	0.105	
AU2	0.044	0.187	0.085	0.016	0.049	0.135	0.097	0.063	
TR1	0.327	0.253	-0.043	0.208	0.153	0.077	0.004	0.078	
TR2	0.087	0.242	0.018	0.062	0.212	0.082	0.085	0.047	
TR3	0.298	0.222	-0.024	0.168	0.345	0.171	0.035	-0.104	
TR4	0.065	0.142	0.126	0.274	0.368	0.260	0.439	0.148	
TR5	0.228	-0.112	0.063	0.036	0.115	0.168	0.125	0.111	
TR6	0.198	0.119	0.068	0.265	0.216	0.117	0.114	-0.028	
LI1	0.075	0.025	0.003	0.136	0.076	0.079	-0.064	-0.051	
LI2	0.075	-0.061	0.031	0.160	0.089	0.048	-0.077	0.002	
LI3	-0.018	-0.047	0.058	-0.044	0.023	-0.059	0.083	0.115	
SS1	0.346	0.089	0.038	0.129	0.128	0.172	-0.009	-0.033	
SS2	0.290	0.162	0.117	0.170	0.073	0.220	0.030	0.153	
SS3	0.033	0.141	0.130	0.271	0.091	0.235	0.069	0.193	
SS4	0.122	0.112	0.051	0.224	0.034	0.180	0.054	-0.015	
Expl.Var	3.542	4.769	2.495	3.929	3.188	2.171	2.931	1.242	1.359
Prp.Totl	0.093	0.125	0.066	0.103	0.084	0.057	0.077	0.033	0.036

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.600000)						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	0.103	0.051	0.093	0.149	0.061	0.066	
PU2	-0.080	0.102	0.172	0.137	0.378	0.034	
PU3	0.110	-0.089	0.173	0.188	0.085	0.125	
PU4	0.149	-0.096	0.010	0.069	0.175	0.101	
PU5	0.154	0.059	0.125	-0.160	0.105	0.284	
PU6	0.105	-0.093	0.301	0.126	0.005	0.203	
CQ1	0.151	0.260	0.057	0.204	0.093	0.107	
CQ2	0.178	0.046	-0.022	0.785	-0.034	0.064	
CQ3	0.184	0.190	0.006	0.111	0.186	0.020	
CQ5	0.007	0.071	0.012	0.659	0.140	0.017	
CQ7	0.260	0.143	0.059	0.171	0.000	-0.020	
SQ2	0.264	0.145	-0.166	0.204	0.260	0.464	
SQ5	0.237	0.261	0.072	0.130	0.244	-0.157	
SQ6	0.119	0.115	0.025	-0.032	0.107	0.082	
SQ7	0.135	0.071	0.067	0.234	0.111	0.193	
AU1	0.046	0.326	0.138	0.006	0.038	0.184	
AU2	0.048	0.219	0.104	0.028	-0.032	0.130	
TR1	0.167	0.243	-0.032	0.215	0.258	0.074	
TR2	0.207	0.248	0.009	0.089	0.106	0.115	
TR3	0.350	0.258	-0.017	0.175	0.217	0.136	
TR5	0.172	-0.257	0.056	-0.000	0.177	0.354	
TR6	0.237	0.099	0.077	0.275	0.135	0.169	
LI1	0.121	0.041	0.023	0.023	0.070	0.022	
LI2	0.162	-0.039	0.028	0.043	0.047	0.057	
LI3	-0.024	-0.060	0.028	0.005	0.078	-0.073	
SS1	0.111	0.089	0.048	0.137	0.258	0.139	
SS2	0.247	0.146	0.120	0.156	0.198	0.133	
SS3	0.205	0.132	0.128	0.271	-0.007	-0.022	
SS4	0.211	0.116	0.054	0.248	0.086	0.080	
Expl.Var	3.048	4.044	2.470	3.244	2.163	2.026	2.731
Prp.Totl	0.105	0.139	0.085	0.112	0.075	0.070	0.094

	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.600000)						
Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	0.092	0.754	0.047	0.089	0.152	0.100	0.085
PU2	-0.061	0.582	0.101	0.168	0.142	0.399	0.044
PU3	0.104	0.793	-0.089	0.169	0.189	0.095	0.125
PU4	0.145	0.775	-0.095	0.006	0.072	0.184	0.100
PU5	0.157	0.595	0.066	0.120	-0.161	0.076	0.258
PU6	0.101	0.781	-0.091	0.296	0.127	0.008	0.199
CQ1	0.151	0.265	0.057	0.762	0.094	0.107	0.091
CQ2	0.180	0.041	-0.023	0.761	-0.031	0.073	0.044
CQ3	0.187	0.199	0.008	0.623	0.187	0.011	0.232
CQ5	0.007	0.049	0.009	0.615	0.144	0.043	0.320
CQ7	0.262	0.170	0.063	0.751	-0.001	-0.043	0.031
SQ2	0.272	0.131	-0.186	0.201	0.266	0.465	0.020
SQ5	0.236	0.267	0.074	0.124	0.546	-0.164	0.272
SQ6	0.121	0.115	0.027	-0.035	0.623	0.070	0.165
SQ7	0.138	0.067	0.068	0.231	0.737	0.183	0.155
AU1	0.058	0.300	0.138	0.001	0.046	0.791	0.195
AU2	0.061	0.175	0.101	0.023	-0.021	0.844	0.154
TR1	0.172	0.235	-0.031	0.207	0.259	0.074	0.741
TR2	0.212	0.232	0.010	0.080	0.108	0.123	0.711
TR3	0.352	0.231	-0.019	0.187	0.221	0.159	0.614
TR6	0.248	0.094	0.080	0.266	0.138	0.158	0.716
LI1	0.119	0.024	0.413	0.021	0.072	0.040	0.091
LI2	0.161	-0.048	0.432	0.027	0.044	0.053	0.062
LI3	-0.020	-0.035	0.734	0.030	0.003	0.047	-0.094
SS1	0.761	0.073	0.046	0.132	0.263	0.148	0.181
SS2	0.751	0.155	0.122	0.152	0.199	0.114	0.247
SS3	0.751	0.153	0.131	0.268	-0.009	-0.048	0.235
SS4	0.741	0.108	0.052	0.244	0.089	0.065	0.165
Expl.Var	3.042	3.964	2.468	3.200	2.152	1.987	2.697
Prp.Totl	0.109	0.142	0.088	0.114	0.077	0.071	0.096

	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.600000)						
Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	0.092	0.755	0.047	0.090	0.151	0.089	0.087
PU2	-0.054	0.687	0.093	0.173	0.148	0.390	0.045
PU3	0.087	0.799	-0.081	0.167	0.178	0.081	0.140
PU4	0.143	0.780	-0.092	0.006	0.068	0.163	0.108
PU5	0.161	0.690	0.063	0.123	-0.157	0.086	0.247
PU6	0.101	0.779	-0.090	0.296	0.125	-0.003	0.197
CQ1	0.148	0.271	0.061	0.751	0.088	0.078	0.097
CQ2	0.175	0.047	-0.019	0.787	-0.039	0.044	0.053
CQ3	0.195	0.196	-0.001	0.634	0.196	0.015	0.213
CQ5	0.018	0.043	-0.003	0.612	0.157	0.059	0.294
CQ7	0.256	0.174	0.069	0.747	-0.010	-0.071	0.036
SQ5	0.234	0.267	0.078	0.124	0.640	-0.184	0.271
SQ6	0.126	0.119	0.020	-0.030	0.824	0.054	0.164
SQ7	0.152	0.069	0.052	0.241	0.740	0.180	0.140
AU1	0.085	0.303	0.109	0.019	0.076	0.818	0.171
AU2	0.095	0.176	0.064	0.044	0.018	0.877	0.120
TR1	0.162	0.239	-0.021	0.208	0.247	0.047	0.757
TR2	0.200	0.237	0.022	0.080	0.094	0.097	0.743
TR3	0.349	0.234	-0.017	0.171	0.217	0.139	0.640
TR6	0.250	0.093	0.079	0.272	0.140	0.155	0.717
LI1	0.121	0.020	0.936	0.021	0.076	0.059	0.085
LI2	0.166	-0.053	0.926	0.029	0.052	0.080	0.052
LI3	-0.033	-0.029	0.936	0.022	-0.013	0.029	-0.068
SS1	0.770	0.076	0.037	0.138	0.268	0.131	0.176
SS2	0.754	0.158	0.118	0.156	0.200	0.094	0.247
SS3	0.760	0.153	0.132	0.269	-0.011	-0.062	0.234
SS4	0.758	0.108	0.042	0.249	0.096	0.059	0.156
Expl.Var	2.998	3.977	2.436	3.188	2.102	1.820	2.697
Prp.Totl	0.111	0.147	0.090	0.118	0.078	0.067	0.100

Appendix C: CFA at 0.4 minimum loading

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.400000)								
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
PU1	0.172	0.732	0.045	0.056	0.145	0.140	0.052	-0.002	-0.257
PU2	0.083	0.694	0.110	0.129	-0.038	0.365	0.052	0.114	-0.016
PU3	0.153	0.793	-0.065	0.157	0.078	0.026	0.140	0.109	-0.010
PU4	0.058	0.767	-0.085	0.015	0.116	0.148	0.130	0.068	0.020
PU5	-0.100	0.684	0.056	0.147	0.126	0.038	0.220	-0.008	0.217
PU6	0.122	0.787	-0.084	0.279	0.097	-0.037	0.175	0.032	0.017
CQ1	0.087	0.308	0.059	0.704	0.185	0.083	0.071	0.077	-0.022
CQ2	-0.065	0.079	-0.009	0.731	0.186	0.009	0.065	0.172	-0.029
CQ3	0.248	0.220	0.016	0.674	0.152	-0.046	0.215	0.015	0.006
CQ4	0.579	-0.111	-0.079	0.360	0.206	0.183	-0.038	-0.323	-0.221
CQ5	0.197	0.048	-0.011	0.663	0.022	0.114	0.282	-0.140	-0.108
CQ6	0.222	0.112	0.035	0.476	-0.038	0.022	0.289	-0.235	0.296
CQ7	0.070	0.169	0.055	0.771	0.215	-0.069	-0.012	0.005	0.152
SQ1	0.430	0.180	0.006	0.426	0.129	0.082	0.202	0.356	0.067
SQ2	0.256	0.163	-0.100	0.184	0.163	0.282	0.097	0.694	0.051
SQ3	0.482	-0.045	0.107	0.442	0.257	0.162	0.126	0.172	0.047
SQ4	0.568	0.070	-0.010	0.215	0.177	0.105	0.119	0.129	0.033
SQ5	0.647	0.287	0.092	0.097	0.161	-0.244	0.255	0.015	0.050
SQ6	0.709	0.187	0.060	-0.141	0.061	-0.076	0.176	0.160	0.141
SQ7	0.684	0.128	0.062	0.144	0.124	0.142	0.131	-0.060	0.088
IU1	0.297	0.477	-0.034	0.255	0.189	0.350	0.142	-0.237	0.117
IU2	-0.044	0.259	0.024	0.031	0.279	0.421	-0.028	-0.227	0.500
IU3	0.380	0.555	-0.096	0.149	-0.005	0.237	0.084	-0.333	0.090
AU1	0.087	0.336	0.139	0.004	0.027	0.720	0.208	0.111	0.105
AU2	0.044	0.187	0.085	0.018	0.049	0.817	0.135	0.097	0.063
TR1	0.327	0.253	-0.043	0.208	0.153	0.077	0.678	0.004	0.078
TR2	0.087	0.242	0.018	0.062	0.212	0.082	0.767	0.085	0.047
TR3	0.298	0.222	-0.024	0.168	0.345	0.171	0.626	0.035	-0.104
TR4	0.065	0.142	0.126	0.274	0.368	0.260	0.438	0.148	0.157
TR5	0.228	-0.112	0.063	0.036	0.115	0.115	0.188	0.125	0.774
TR6	0.198	0.119	0.068	0.265	0.216	0.117	0.684	-0.028	0.157
LI1	0.075	0.025	0.905	0.003	0.136	0.076	0.079	-0.064	-0.051
LI2	0.075	-0.061	0.922	0.031	0.160	0.089	0.048	-0.077	0.002
LI3	-0.018	-0.047	0.799	0.058	-0.044	0.023	-0.059	0.083	0.115
SS1	0.346	0.089	0.038	0.129	0.737	0.128	0.172	-0.009	-0.033
SS2	0.290	0.162	0.117	0.170	0.701	0.073	0.220	0.030	0.153
SS3	0.033	0.141	0.130	0.271	0.746	-0.091	0.235	0.069	0.193
SS4	0.122	0.112	0.051	0.224	0.786	0.034	0.180	0.054	-0.015
Expl.Var	3.542	4.769	2.495	3.929	3.188	2.171	2.931	1.242	1.359
Prp.Totl	0.093	0.125	0.066	0.103	0.084	0.057	0.077	0.033	0.036

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are >.400000)							
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
PU1	0.159	0.763	0.042	0.072	0.192	0.080	-0.090	-0.001
PU2	-0.053	0.691	0.110	0.166	0.129	0.362	0.025	-0.124
PU3	0.088	0.795	-0.070	0.166	0.149	0.028	0.121	-0.060
PU4	0.138	0.772	-0.087	0.006	0.026	0.165	0.112	-0.001
PU5	0.135	0.676	0.060	0.117	-0.162	0.080	0.286	0.056
PU6	0.105	0.785	-0.084	0.284	0.115	-0.034	0.155	0.008
CQ1	0.169	0.288	0.063	0.747	0.133	0.079	0.053	-0.043
CQ2	0.158	0.055	-0.013	0.794	0.008	0.030	0.054	-0.182
CQ3	0.175	0.219	0.009	0.614	0.231	-0.032	0.206	0.103
CQ4	0.272	-0.072	-0.070	0.288	0.469	0.114	-0.131	0.535
CQ5	0.064	0.090	-0.015	0.822	0.149	0.057	0.216	0.290
CQ6	0.007	0.117	0.042	0.384	0.079	0.042	0.415	0.453
CQ7	0.218	0.140	0.061	0.751	0.008	-0.030	0.087	0.146
SQ2	0.198	0.143	-0.133	0.245	0.310	0.367	0.146	-0.478
SQ4	0.213	0.069	-0.018	0.218	0.547	0.122	0.149	0.054
SQ5	0.211	0.284	0.083	0.088	0.610	-0.213	0.265	0.129
SQ6	0.059	0.154	0.056	-0.080	0.775	-0.032	0.228	-0.141
SQ7	0.124	0.105	0.071	0.181	0.715	0.161	0.152	0.102
IU1	0.215	0.494	-0.013	0.193	0.195	0.320	0.167	0.369
IU3	-0.014	0.557	-0.069	0.125	0.323	0.193	0.091	0.342
AU1	0.060	0.346	0.130	-0.004	0.063	0.756	0.216	0.017
AU2	0.082	0.202	0.077	0.006	0.015	0.841	0.133	0.043
TR1	0.207	0.305	-0.052	0.175	0.298	0.027	0.635	0.115
TR2	0.235	0.287	0.002	0.084	0.140	0.042	0.680	-0.117
TR3	0.416	0.287	-0.042	0.143	0.270	0.120	0.497	0.094
TR4	0.364	0.156	0.122	0.294	0.084	0.255	0.462	-0.128
TR5	0.077	-0.181	0.088	0.020	0.172	0.227	0.532	-0.044
TR6	0.262	0.155	0.058	0.235	0.161	0.110	0.674	0.126
LI1	0.141	0.040	0.904	-0.001	0.075	0.043	0.046	0.035
LI2	0.168	-0.052	0.924	0.015	0.053	0.068	0.045	0.075
LI3	-0.052	-0.066	0.798	0.061	-0.019	0.055	0.018	-0.077
SS1	0.777	0.100	0.038	0.115	0.287	0.134	0.123	0.118
SS2	0.726	0.164	0.121	0.144	0.213	0.089	0.264	0.085
SS3	0.732	0.132	0.137	0.272	-0.002	-0.075	0.296	-0.069
SS4	0.790	0.118	0.053	0.236	0.104	0.036	0.138	-0.048
Expl.Var	3.319	4.819	2.490	3.478	2.852	2.028	2.982	1.309
Prp.Totl	0.095	0.138	0.071	0.099	0.081	0.058	0.085	0.037

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are > .400000)						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	0.082	0.767	0.051	0.162	0.072	0.128	-0.066
PU2	0.138	0.695	0.106	0.075	0.369	-0.043	0.034
PU3	0.144	0.792	-0.088	0.153	0.059	0.136	0.072
PU4	-0.004	0.772	-0.092	0.042	0.172	0.153	0.087
PU5	0.113	0.676	0.055	-0.124	0.066	0.136	0.310
PU6	0.279	0.782	-0.093	0.116	-0.024	0.119	0.148
CQ1	0.753	0.282	0.061	0.097	0.095	0.157	0.066
CQ2	0.779	0.040	-0.028	-0.038	0.068	0.181	0.054
CQ3	0.626	0.217	0.007	0.243	-0.011	0.181	0.167
CQ5	0.675	0.096	0.008	0.187	0.030	-0.005	0.226
CQ7	0.747	0.143	0.055	0.031	-0.016	0.245	0.049
SQ2	0.185	0.122	-0.165	0.218	0.466	0.285	0.070
SQ4	0.245	0.061	-0.019	0.555	0.150	0.197	0.118
SQ5	0.104	0.275	0.069	0.652	-0.184	0.232	0.208
SQ6	-0.079	0.126	0.024	0.785	0.041	0.115	0.133
SQ7	0.200	0.103	0.068	0.712	0.172	0.102	0.153
IU1	0.256	0.506	0.018	0.267	0.267	0.114	0.213
IU3	0.181	0.564	-0.047	0.384	0.143	-0.098	0.134
AU1	-0.007	0.354	0.141	0.075	0.758	0.047	0.182
AU2	0.012	0.216	0.100	0.014	0.828	0.039	0.131
TR1	0.204	0.304	-0.043	0.325	0.020	0.158	0.662
TR2	0.074	0.282	0.001	0.126	0.062	0.228	0.690
TR4	0.289	0.153	0.125	0.049	0.264	0.333	0.518
TR5	0.000	-0.192	0.066	0.209	0.265	0.125	0.480
TR6	0.254	0.159	0.068	0.189	0.096	0.217	0.719
LI1	0.027	0.033	0.909	0.105	0.034	0.119	0.031
LI2	0.028	-0.050	0.930	0.077	0.054	0.155	0.036
LI3	0.020	-0.057	0.790	-0.068	0.046	-0.020	0.044
SS1	0.138	0.108	0.050	0.312	0.144	0.743	0.126
SS2	0.151	0.167	0.120	0.251	0.111	0.728	0.240
SS3	0.261	0.123	0.123	0.024	-0.037	0.759	0.279
SS4	0.237	0.119	0.054	0.096	0.058	0.777	0.161
Expl. Var	3.329	4.721	2.496	2.716	2.049	3.018	2.553
Prp. Totl	0.104	0.148	0.078	0.085	0.064	0.094	0.080

Variable	Factor Loadings (Varimax normalized) (Clean Data1.1) Extraction: Principal components (Marked loadings are > .400000)						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
PU1	0.082	0.767	0.051	0.162	0.072	0.128	-0.066
PU2	0.138	0.695	0.106	0.075	0.369	-0.043	0.034
PU3	0.144	0.792	-0.088	0.153	0.059	0.136	0.072
PU4	-0.004	0.772	-0.092	0.042	0.172	0.153	0.087
PU5	0.113	0.676	0.055	-0.124	0.066	0.136	0.310
PU6	0.279	0.782	-0.093	0.116	-0.024	0.119	0.148
CQ1	0.753	0.282	0.061	0.097	0.095	0.157	0.066
CQ2	0.779	0.040	-0.028	-0.038	0.068	0.181	0.054
CQ3	0.626	0.217	0.007	0.243	-0.011	0.181	0.167
CQ5	0.675	0.096	0.008	0.187	0.030	-0.005	0.226
CQ7	0.747	0.143	0.055	0.031	-0.016	0.245	0.049
SQ4	0.245	0.061	-0.019	0.555	0.150	0.197	0.118
SQ5	0.104	0.275	0.069	0.652	-0.184	0.232	0.208
SQ6	-0.079	0.126	0.024	0.785	0.041	0.115	0.133
SQ7	0.200	0.103	0.068	0.712	0.172	0.102	0.153
IU1	0.256	0.506	0.018	0.267	0.267	0.114	0.213
IU3	0.181	0.564	-0.047	0.384	0.143	-0.098	0.134
AU1	-0.007	0.354	0.141	0.075	0.758	0.047	0.182
AU2	0.012	0.216	0.100	0.014	0.828	0.039	0.131
TR1	0.204	0.304	-0.043	0.325	0.020	0.158	0.662
TR2	0.074	0.282	0.001	0.126	0.062	0.228	0.690
TR4	0.289	0.153	0.125	0.049	0.264	0.333	0.518
TR5	0.000	-0.192	0.066	0.209	0.265	0.125	0.480
TR6	0.254	0.159	0.068	0.189	0.096	0.217	0.719
LI1	0.027	0.033	0.909	0.105	0.034	0.119	0.031
LI2	0.028	-0.050	0.930	0.077	0.054	0.155	0.036
LI3	0.020	-0.057	0.790	-0.068	0.046	-0.020	0.044
SS1	0.138	0.108	0.050	0.312	0.144	0.743	0.126
SS2	0.151	0.167	0.120	0.251	0.111	0.728	0.240
SS3	0.261	0.123	0.123	0.024	-0.037	0.759	0.279
SS4	0.237	0.119	0.054	0.096	0.058	0.777	0.161
Expl. Var	3.329	4.721	2.496	2.716	2.049	3.018	2.553
Prp. Totl	0.104	0.148	0.078	0.085	0.064	0.094	0.080

Appendix D: Reliability Analysis of Both Instruments

Summary for scale: Mean=93.1747 Std.Dv.=13.6186 Valid N:166 (Clean Data1.1) Cronbach alpha: .904765 Standardized alpha: .910187 Average inter-item corr.: .283718					
variable	Mean if deleted	Var. if deleted	Stdv. if deleted	Item-Totl Correl.	Alpha if deleted
PU1	89.398	170.456	13.056	0.522	0.901
PU2	89.970	167.692	12.950	0.527	0.901
PU3	89.247	169.114	13.004	0.577	0.900
PU4	89.277	170.405	13.054	0.490	0.901
PU5	89.422	170.087	13.042	0.510	0.901
PU6	89.307	170.526	13.059	0.616	0.899
CQ1	89.699	169.078	13.003	0.578	0.900
CQ2	90.060	172.936	13.151	0.403	0.903
CQ3	89.602	171.167	13.083	0.553	0.900
CQ5	89.572	173.787	13.183	0.448	0.902
CQ7	89.771	172.177	13.122	0.462	0.902
SQ5	89.518	171.683	13.103	0.514	0.901
SQ6	89.416	174.725	13.218	0.381	0.903
SQ7	89.386	172.791	13.145	0.486	0.902
AU1	90.886	172.981	13.152	0.463	0.902
AU2	90.675	173.448	13.170	0.374	0.904
TR1	89.259	171.047	13.079	0.623	0.899
TR2	89.464	170.755	13.067	0.554	0.900
TR3	89.355	170.145	13.044	0.649	0.899
TR6	89.482	171.310	13.089	0.614	0.900
LI1	90.145	174.401	13.206	0.305	0.906
LI2	90.277	175.273	13.239	0.283	0.906
LI3	90.193	179.939	13.414	0.099	0.911
SS1	89.663	170.609	13.062	0.572	0.900
SS2	89.825	167.482	12.941	0.635	0.898
SS3	89.970	169.764	13.029	0.581	0.900
SS4	89.705	168.678	12.988	0.570	0.900

Summary for scale: Mean=107.527 Std.Dv.=14.8560 Valid N:165 (Clean Data1.1) Cronbach alpha: .910553 Standardized alpha: .915960 Average inter-item corr.: .269141					
variable	Mean if deleted	Var. if deleted	Stdv. if deleted	Item-Totl Correl.	Alpha if deleted
PU1	103.758	204.668	14.306	0.507	0.907
PU2	104.333	201.519	14.196	0.521	0.907
PU3	103.606	203.039	14.249	0.567	0.906
PU4	103.636	204.171	14.289	0.492	0.908
PU5	103.782	203.722	14.273	0.516	0.907
PU6	103.667	204.562	14.303	0.606	0.906
CQ1	104.055	202.755	14.239	0.576	0.906
CQ2	104.424	207.493	14.405	0.388	0.909
CQ3	103.958	204.998	14.318	0.552	0.907
CQ5	103.933	208.111	14.426	0.441	0.908
CQ7	104.133	206.346	14.365	0.477	0.908
SQ4	103.642	209.599	14.478	0.440	0.908
SQ5	103.879	205.694	14.342	0.511	0.907
SQ6	103.776	208.877	14.453	0.384	0.909
SQ7	103.746	206.408	14.367	0.503	0.907
IU1	103.582	206.522	14.371	0.624	0.906
IU3	103.588	206.909	14.384	0.498	0.908
AU1	105.236	206.447	14.368	0.484	0.908
AU2	105.036	207.490	14.405	0.377	0.910
TR1	103.618	204.891	14.314	0.623	0.906
TR2	103.824	204.884	14.314	0.542	0.907
TR4	104.067	205.735	14.343	0.600	0.906
TR5	104.418	211.868	14.556	0.252	0.911
TR6	103.842	205.333	14.329	0.610	0.906
LI1	104.503	209.099	14.460	0.288	0.911
LI2	104.636	210.013	14.492	0.267	0.912
LI3	104.539	214.309	14.639	0.109	0.915
SS1	104.018	204.394	14.297	0.571	0.906
SS2	104.182	200.937	14.175	0.636	0.905
SS3	104.333	203.956	14.281	0.568	0.906
SS4	104.067	202.587	14.244	0.551	0.907

Appendix E: Normality Histograms

