

**DYNAMICS OF CAPACITY CONSTRAINTS IN MANAGING  
THROUGHPUT QUALITY AT HONOURS LEVEL: UNIVERSITY  
OF KWAZULU-NATAL**

**Mbonya Nkondo**

**209523778**

**A Thesis / Dissertation submitted in partial / fulfilment of the requirements for  
the degree of**

**Master of Commerce**

**School of Management, Information Technology and Governance**

**College of Law and Management Studies**

**Supervisor: Dr. T.P mbhele**

**2015**

## **DECLARATION**

**I, Mbonya Nkondo, declare that:**

- (i) The research reported in this dissertation, except where otherwise indicated, is my original research.
- (ii) This dissertation/thesis has not been submitted for any degree or examination at any other university.
- (iii) This dissertation does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
- (iv) This dissertation does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:
  - a) Their words have been re-written, but the general information attributed to them has been referenced;
  - b) Where their exact words have been used, their writing has been placed inside quotation marks, and referenced.
- (v) Where I have reproduced a publication of which I am author, co-author or editor, I have indicated in detail which part of the publication was actually written by myself alone, and have fully referenced such publications.
- (vi) This dissertation does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the dissertation and in the References sections.

**Signed:** .....

**Year:** 2015

## **ACKNOWLEDGEMENTS**

I sincerely acknowledge the roles played by various individuals throughout this study, each of whom has contributed outstandingly towards the completion of this academic exegesis;

I am unequivocally indebted to my parents for their supportive and patient belief in me;

I further express my unflinching admiration of my brothers and sister for their patience and understanding;

My grandmother's constant prayers have propelled me throughout the most challenging moments of the study. I thank her immensely;

The University of KwaZulu-Natal (UKZN) is my alma mater from my undergraduate degree. I appreciate the conducive learning environment provided by UKZN;

Dr TP Mbhele, my supervisor has been very inspiring and supportive up to this stage of my M. Com degree. His insightful feedback on all versions of my submitted work is highly appreciated. I am very grateful for the role he has played in both the conceptualisation and development of the study;

Ms Angela Pearce, the research administrator has demonstrated optimum administrative nous throughout the review process;

Dr TJ Mkhonto, for his editorial contribution and input.

## **ABSTRACT**

The throughput quality of Honours degree students seems to be hampered by a number of factors arising from institutional capacity constraints, whose dynamics have had an impact on the throughput quality of Honours degree students at the University of KwaZulu-Natal (UKZN). The aim/purpose of this study was to identify the capacity constraints that hinder these students from achieving high levels of academic performance within their respective Honours degrees. The theory of constraints (TOC) was used as an investigative tool for identifying ways in which these constraints could be alleviated from the system at UKZN. The academic practical importance is evident in the fact that it contributes a wealth of knowledge regarding student experience in a university, which can be modelled with other respective institutions.

The results should assist UKZN in identifying and alleviating the various factors that impede Honours students from achieving high levels of academic performance. A survey of male and female Honours students (aged 15 to 33 and above) found that technological systems at UKZN do not often operate at high speeds. This study adopted a unique approach by involving the Honours students in research that has a direct impact on their institution of education. The results provide support for the conceptual framework in that Honours students face institutional resource challenges as they pursue their Honours degree. The major findings of this study were tied in the funding and budget shortfalls of the university and the lack of capacity in accommodation. This study has contributed to the University of KwaZulu-Natal and other universities because it has identified what honours students experience as resource constraints at their university. UKZN is not an isolated case because other universities around the country, as well as globally, face similar resource challenges.

## TABLE OF CONTENTS

|                                                                   |          |
|-------------------------------------------------------------------|----------|
| Title                                                             | i        |
| Declaration                                                       | ii       |
| Acknowledgement                                                   | iii      |
| Abstract                                                          | iv       |
| Table of Contents                                                 | v        |
| List of Tables                                                    | x        |
| List of Figures                                                   | xi       |
| Abbreviations                                                     | xii      |
| <br>                                                              |          |
| <b>1. CHAPTER 1: INTRODUCTION</b>                                 | <b>1</b> |
| 1.1 Introduction                                                  | 1        |
| 1.2 Background of the Study                                       | 1        |
| 1.3 Research Problem                                              | 2        |
| 1.4 Research Aim/Purpose and Objectives                           | 3        |
| 1.4.1 Research Aim/Purpose                                        | 3        |
| 1.4.2 Research Objectives                                         | 4        |
| 1.5 Research Questions                                            | 5        |
| 1.6 The Conceptual/Theoretical Framework                          | 5        |
| 1.6.1 Definition of Key Concepts                                  | 6        |
| 1.6.1.1 Capacity and Constraints                                  | 6        |
| 1.6.1.2 The Kaizen Approach and Business Process Re-engineering   | 6        |
| 1.6.1.3 The Massification Context                                 | 7        |
| 1.6.2 The Centrality of the Theory of Constraints                 | 7        |
| 1.6.2.1 Identification of the Constraint                          | 8        |
| 1.6.2.2 Exploiting the Constraint                                 | 8        |
| 1.6.2.3 Subordinating Other Activities to the Constraint          | 8        |
| 1.6.2.4 Elevating the Constraint                                  | 8        |
| 1.6.2.5 Reverting to the Constraint to Facilitate Systemic Change | 8        |
| 1.7 Significance/Relevance of the Study                           | 9        |
| 1.7.1 Disciplinary Relevance                                      | 9        |

|                                                      |           |
|------------------------------------------------------|-----------|
| 1.7.2 Institutional Relevance                        | 9         |
| 1.7.3 Socio-Economic Relevance                       | 10        |
| 1.8 Research Design and Methodology                  | 10        |
| 1.9 Data Collection                                  | 11        |
| 1.9.1 Document/Literature Review                     | 12        |
| 1.9.2 Empirical Data                                 | 13        |
| 1.9.2.1 Questionnaire Development and Administration | 13        |
| 1.9.2.2 The Research/Study Site                      | 14        |
| 1.9.3 Sampling                                       | 14        |
| 1.9.3.1 Sampling/Target Population and Sample Size   | 14        |
| 1.9.3.2 Sampling Methods/Techniques                  | 14        |
| 1.9.3.3 Sampling Criteria                            | 15        |
| Inclusion/Eligibility Criteria                       | 16        |
| ii Exclusion/Ineligibility Criteria                  | 17        |
| 1.10 Data Quality Control and Analysis               | 17        |
| 1.10.1 Data Quality Control                          | 17        |
| 1.10.2 Data Analysis                                 | 18        |
| 1.10.2.1 Validity                                    | 18        |
| i Internal Validity                                  | 19        |
| ii External Validity                                 | 19        |
| 1.10.2.2 Reliability                                 | 19        |
| 1.10.2.3 Credibility                                 | 20        |
| 1.11 Limitations of the Study                        | 20        |
| 1.11.1 The Scope of the Study                        | 20        |
| 1.11.2 Literature-Based Limitations                  | 20        |
| 1.11.3 Epistemological Limitations                   | 20        |
| 1.11.4 Empirical Limitations                         | 21        |
| 1.12 Chapter Summary                                 | 21        |
| <br>                                                 |           |
| <b>2. CHAPTER 2: LITERATURE REVIEW</b>               | <b>22</b> |
| 2.1 Introduction                                     | 22        |
| 2.2 A Brief History of the University KwaZulu-Natal  | 22        |
| 2.2.1 Disciplinary Configuration of UKZN             | 23        |

|                                                                     |                                          |
|---------------------------------------------------------------------|------------------------------------------|
| 2.2.2 Programmatic/Qualifications Configuration of UKZN             | 24                                       |
| 2.3 The Conceptual and Theoretical Focus of the Reviewed Literature | 25                                       |
| 2.3.1 The Conceptual Framework/Paradigm                             | 26                                       |
| 2.3.1.1 The Capacity Dimension                                      | 26                                       |
| 2.3.1.2 The Operations Management Dimension                         | 27                                       |
| 2.3.1.3 The Business Process Re-engineering (BPR) Dimension         | 31                                       |
| 2.3.1.4 The Quantity Management Dimension                           | 32                                       |
| a) The Intricacy of Constraints                                     | 32                                       |
| b) The Massification Approach                                       | 33                                       |
| c) Infrastructural Challenges                                       | 34                                       |
| d) The Human Capacity Challenge                                     | 35                                       |
| 2.3.2 The Theoretical Framework/ Paradigm                           | 36                                       |
| 2.3.2.1 The Centrality of the Theory of Constraints (TOC)           | 36                                       |
| 2.3.2.2 The Five Step Process of On-going Improvement               | 38                                       |
| 2.3.2.3 The Theory of Constraints in Service Organisations          | 42                                       |
| 2.3.2.4 The Drum-Buffer-Rope (DBR) Effect                           | 43                                       |
| 2.3.2.5 The Taguchi Concept                                         | 45                                       |
| 2.4 Quality Function Deployment                                     | 45                                       |
| 2.4.1 Advantages of Quality Function Deployment                     | 47                                       |
| 2.5 Capacity Management and Customer Service Quality                | 47                                       |
| 2.5.1 Capacity Management in Services                               | 48                                       |
| 2.5.2 Customer Service Quality                                      | 48                                       |
| 2.6 Chapter Summary                                                 | 51                                       |
| <b>52</b>                                                           | <b>3 CHAPTER 3: RESEARCH METHODOLOGY</b> |
| 3.1 Introduction                                                    | 52                                       |
| 3.2 Research Paradigm                                               | 52                                       |
| 3.3 Research Design                                                 | 52                                       |
| 3.4 Research Population                                             | 53                                       |
| 3.5 Sample Size                                                     | 53                                       |
| 3.6 Sampling Technique                                              | 55                                       |
| 3.7 Data Collection Methods                                         | 55                                       |
| 3.7.1 Questionnaire Development and Description                     | 56                                       |
| 3.7.2 Questionnaire Administration                                  | 56                                       |
| 3.7.3 Structure of Questionnaire                                    | 56                                       |

|           |                                                              |            |
|-----------|--------------------------------------------------------------|------------|
| 3.8       | Pilot Testing                                                | 58         |
| 3.9       | Ethical Considerations                                       | 58         |
| 3.9.1     | Research-based Ethical Considerations                        | 58         |
| 3.9.2     | Respondent-based Ethical Considerations                      | 58         |
| 3.9.2.1   | The Principle of Respect for Human Dignity                   | 59         |
| 3.9.2.2   | The Principle of Justice                                     | 59         |
| 3.9.2.3   | The Principle of Beneficence                                 | 59         |
| 3.10      | Chapter Summary                                              | 60         |
| <b>4.</b> | <b>CHAPTER 4: DATA ANALYSIS AND INTERPRETATION</b>           | <b>61</b>  |
| 4.1       | Introduction                                                 | 61         |
| 4.2       | Univariate Data Analysis                                     | 61         |
| 4.2.1     | Frequency Distribution                                       | 56         |
| 4.3       | Bivariate Data Analysis                                      | 75         |
| 4.3.1     | Cross Tabulation                                             | 82         |
| 4.3.2     | Descriptive Statistics                                       | 82         |
| 4.3.3     | Analysis of Variance                                         | 84         |
| 4.3.4     | Factor Analysis                                              | 85         |
| 4.4.      | Multivariate Analysis                                        | 90         |
| 4.4.1     | Multiple Regression                                          | 90         |
| 4.5       | Reliability and Validity                                     | 95         |
| 4.6       | Chapter Summary                                              | 108        |
| <b>5.</b> | <b>CHAPTER 5: DISCUSSIONS, FINDINGS, AND RECOMMENDATIONS</b> | <b>110</b> |
| 5.1       | Introduction                                                 | 110        |
| 5.2       | Discussion and Implications of the Results                   | 111        |
| 5.3       | Chapter Summary                                              | 116        |
| <b>6</b>  | <b>CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS</b>            | <b>104</b> |
| 6.1       | Introduction                                                 |            |
| 6.2       | Conclusions on the Major Findings                            | 104        |
| 6.2.1     | Literature-Based Conclusions                                 | 105        |
| 6.2.2     | Empirical Conclusions                                        | 106        |
| 6.3       | Recommendations                                              | 120        |



|                                                                                                      |            |
|------------------------------------------------------------------------------------------------------|------------|
| 6.3.1 Recommendations on Relevance of the Study                                                      | 121        |
| 6.4 Contribution of the Study                                                                        | 122        |
| 6.5 Limitations of the Study                                                                         | 122        |
| 6.6 Future Research                                                                                  | 123        |
| 6.7 Chapter Summary                                                                                  | 124        |
| <b>LIST OF REFERENCES</b>                                                                            | <b>125</b> |
| <b>OF APPENDICES</b>                                                                                 | <b>137</b> |
| APPENDIX A: Questionnaire                                                                            | 137        |
| APPENDIX B: Descriptive Statistics                                                                   | 141        |
| APPENDIX C: Ethical Clearance                                                                        | 146        |
| <b>List of Tables</b>                                                                                |            |
| Table 2.1: Disciplinary Configuration of UKZN According to Schools (UKZN, 2014)                      | 23         |
| Table 2.2: Higher Education Qualification Descriptors                                                | 25         |
| Table 3.1: College of Agriculture, Engineering & Science Honours Students                            | 54         |
| Table 3.2: College of Law & Management Studies Honours Students                                      | 54         |
| Table 3.3 College of Health Sciences Honours Students                                                | 54         |
| Table 3.4: College of Humanities Honours Students                                                    | 55         |
| Table 4.1: Binomial Test on General Perceptions on Capacity Constraints at UKZN                      | 82         |
| Table 4.2: Academic Activities have improved in all campuses through the integrated system design    | 84         |
| Table 4.3: Reconfiguration system design relates to the student challenges                           | 86         |
| Table 4.4: Respondents campus relates to Quality of Graduated Student                                | 87         |
| Table 4.5: Reconfiguration system design relates to Colleges at UKZN                                 | 88         |
| Table 4.6: Students challenges relates to Colleges at UKZN                                           | 90         |
| Table 4.7: Experience in the Library relates to Colleges at UKZN                                     | 91         |
| Table 4.8: Analysis of Variance                                                                      | 95         |
| Table 4.9: KMO and Barlett's Test, Communalities, Total Variance Explained, Rotated Component Matrix | 96         |
| Table 4.10: Model Summaries, ANOVA, and Coefficients                                                 | 100        |
| Table 4.11: Residual Statistics                                                                      | 103        |
| Table 4.12: One Sample Test                                                                          | 104        |
| Table 4.13: Reliability Statistics                                                                   | 107        |
| Table 4.14: Item Total Statistics                                                                    | 107        |
| Table 6.1: Conclusions on the Major Findings of this Study                                           | 117        |

|                                                                                  |     |
|----------------------------------------------------------------------------------|-----|
| Table 6.2: Recommendations                                                       | 120 |
| <b>List of Figures</b>                                                           |     |
| Figure 2.1: The Process of Converting Inputs (Students) into Outputs (Graduates) | 28  |
| Figure 2.2: The 5s Kaizen                                                        | 30  |
| Figure 2.3: The Fishbone Diagram                                                 | 40  |
| Figure 2.4: The Drum-Buffer-Rope Concept                                         | 44  |
| Figure 4.1: Gender                                                               | 61  |
| Figure 4.2: Age                                                                  | 62  |
| Figure 4.3: UKZN Campuses                                                        | 63  |
| Figure 4.4: UKZN Colleges                                                        | 64  |
| Figure 4.5: UKZN Schools                                                         | 65  |
| Figure 4.6: Disciplines in UKZN Schools (a)                                      | 66  |
| Figure 4.7: Disciplines in UKZN Schools (b)                                      | 67  |
| Figure 4.8: Disciplines in UKZN Schools (c)                                      | 68  |
| Figure 4.9: Disciplines in UKZN Schools (d)                                      | 69  |
| Figure 4.10: Year Completed Primary Degree                                       | 70  |
| Figure 4.11: Honours Class Size                                                  | 71  |
| Figure 4.12: Honours Entry Requirement                                           | 72  |
| Figure 4.13: Library Experience                                                  | 73  |
| Figure 4.14: Perceptions on Capacity Constraints                                 | 74  |
| Figure 4.15: Students Experience on Capacity Constraints                         | 76  |
| Figure 4.16: Internal Operations and Magnitude of Demand                         | 78  |
| Figure 4.17: Quality Function Deployment                                         | 79  |
| Figure 4.18: Challenges of Existing Capacity Constraints at UKZN                 | 81  |
| Figure 4.19: Eigenvalue Scree Plot                                               | 98  |
| Figure 4.20: Normal P-P Plot of Regression Standardised Residual                 | 106 |

#### **ABBREVIATIONS**

|                 |                                 |
|-----------------|---------------------------------|
| <b>ANOVA</b>    | Analysis of Variance            |
| <b>AT&amp;T</b> | American Telephone & Telegraph  |
| <b>BPR</b>      | Business Process Re-engineering |
| <b>DBR</b>      | Drum Buffer Rope                |
| <b>CHE</b>      | Council on Higher Education     |
| <b>HEIs</b>     | Higher Education Institutions   |

|              |                                               |
|--------------|-----------------------------------------------|
| <b>HESA</b>  | Higher Education South Africa                 |
| <b>HEQSF</b> | Higher Education Qualifications Sub-Framework |
| <b>JIT</b>   | Just In Time                                  |
| <b>MRP</b>   | Material Requirements Planning                |
| <b>NRF</b>   | National Research Foundation                  |
| <b>NQF</b>   | National Qualifications Framework             |
| <b>NUC</b>   | Natal University College                      |
| <b>OAU</b>   | Obafemi Awolowo University                    |
| <b>OPT</b>   | Optimised Production Technology               |
| <b>PCA</b>   | Principal Component Analysis                  |
| <b>PhD</b>   | Doctor of Philosophy                          |
| <b>QFD</b>   | Quality Function Deployment                   |
| <b>ROI</b>   | Return on Investment                          |
| <b>SAQA</b>  | South African Qualifications Authority        |
| <b>SDOE</b>  | Statistical Design of Experiments             |
| <b>S/N</b>   | Signal to Noise                               |
| <b>TOC</b>   | Theory of Constraints                         |
| <b>TP</b>    | Thinking Process                              |
| <b>TQM</b>   | Total Quality Management                      |
| <b>UDW</b>   | University of Durban-Westville                |
| <b>UKZN</b>  | University of KwaZulu-Natal                   |
| <b>WIP</b>   | Work in Progress                              |

# **Chapter One Introduction**

## **1.1 Introduction**

This section of the study introduces the research topic, background of the study, statement of the problem, research questions, and research objectives. In addition, the conceptual and theoretical frameworks are discussed, focusing on some critical aspects of the study such as: Capacity, Constraints, Kaizen, Business Process Re-engineering (BPR) and Massification. The theoretical framework underpins the foundation of this study, which is the Theory of Constraints (TOC). A brief description of the research methodology (research paradigm, study site, target population, sample strategies, sample size, data collection method, data quality control, research strategies, and data analysis) opted for in this study is also outlined. The chapter then concludes with a brief explanation of the indispensable ethical considerations and the inherent limitations of the study. In this regard then, the chapter presents an integrated approach towards both the theoretical and empirical/pragmatic domains of the research topic as a whole. Such an approach is necessitated by the researcher's ultimate intention of consolidating the aspect of triangulation – which is essential for incorporating the methods of investigation with the purpose of investigation (Henning et al., 2005: 17). Cast in this mould, the research enterprise then becomes significant and practical, rather than adopting a research-for-research's sake configuration.

## **1.2 Background of the Study**

Dr Eliyahu M. Goldratt is generally credited with inventing the theory of constraints (TOC), also known in higher education as management by capacity constraints. This management philosophy was developed in the mid-1980s (Pandit and Naik, 2014:15), and has proved to be an efficient and effective system for reducing work-in-process (identified in this study as the high drop-out rate of pipeline students) and improving throughput levels. The latter is attested to by means of an excellent pass rate or throughput capability and competency levels. The theory of constraints is adequately designed to address a broad range of issues, such as the integrated design and continuous workflow (the Kaizen approach); common-sense operations process in teaching, learning and research in higher education; optimised university operations

technology; as well as synchronous manufacturing. Various TOC interpretations and definitions have since evolved from the incipient mid-1980s environment. The different interpretations of TOC emanate from the different facets of the sectorial diffusion of TOC principles. The throughput quality of an organisation could only be increased once the constraint has been identified. TOC focuses primarily on systemic limitations (bottlenecks) such as facilities, tools, machines, materials, and any other constraint that has the potential to impede on the system's ability to achieve its goals optimally (Jacobs and Chase, 2014:620). Bottlenecks are specific types of capacity constraints that limit the throughput quality of an entire process (Jacobs and Chase, 2014:624). It is important to understand the systemic bottlenecks, as well as the adverse effects they may have on the quality throughput of students at Honours level. Therefore, this study will aim to objectively identify and examine the capacity constraints that have an adverse effect on the quality throughput of students at Honours degree level. The Honours programme *per se* is at NQF level 8, and is offered as a second degree following the completion of the primary (Bachelor's) degree. The Honours programme provides an advanced teaching and learning curriculum, and a synthesised understanding of research methodology. An effective and efficient curriculum approach is therefore required to equip competent graduates with the requisite skills and knowledge base to serve society and industry.

### **1.3 Research Problem**

The research problem describes the existential purpose that necessitated the study to be undertaken in the first place. The research problem – in conjunction with the research aim/purpose and objectives, as well as the three-fold significance of the study – justifies the actual undertaking of the study. In this study, the research problem is premised within the identified shortcomings of the Honours degree to contribute to an effective and efficient throughput regime for graduates who are adequately equipped for meaningful involvement in „the world of work“ and to society in its broadest sense.

The standard at Honours level at all universities should be continuously improved in order to enhance graduates' opportunities and standing in industry. Academic programmes are configured to limit and manage capacity constraints that have an effect on the throughput quality of Honours students. The system adopted to identify and alleviate bottlenecks should not focus primarily on cost containment, but rather on enhancing the quality throughput,

especially at Honours level at the University of KwaZulu-Natal. The effects of capacity constraints on the throughput quality of Honours students are determined by existing teaching strategies and the perceived learning styles of Honours students within the supply chain quality function deployment approach. In this context then, this study intends to establish the effects of the bottlenecks in terms of staffing, institutional resources, technology, and cycle time.

The throughput quality of Honours students seems hamstrung by a number of factors arising from institutional capacity constraints. These constraints are largely reflective of a dual absorption of teaching and learning on the one hand, as well as research and higher degree divisions on the other. Institutional capacity constraints are factors that impede the capability of Honours students; as a result of which they have an adverse effect on the throughput quality at Honours level. UKZN is widely recognised as a prominent research institution, and its image manifests in different facets of university students and communities. It is in the university's best interests to produce quality throughput students at Honours level by addressing the dynamics of capacity constraints.

#### **1.4 Research Aim/Purpose and Objectives**

Some academic researchers and social scientists maintain that the aim, purpose, or goal of research is synonymous with research objectives. According to this view, the research aim/purpose or goal could be used interchangeably with research objectives (Babbie and Mouton, 2001: 407). On the other hand, another school of thought within the social sciences nomenclature maintains that the two research nuances (aim/purpose and objectives) are two distinct terms (Henning et al., 2005:7). In this study, the two terms are viewed as two separate, but mutually inter-related concepts in relation to the research problem/ the problem statement, the research questions, as well as the data collection and analysis processes.

##### **1.4.1 Research Aim/Purpose**

In the parlance of research, the aim/purpose of a study refers to the more general or broader intentions (goals) to be achieved by the researcher (Henning et al., 2000: 37). In this context, the research aim/purpose or goal broadly defines the extent to which the research process in general relates to the specific intentions of the study in the first place. In this regard, the data collection methods and the resultant findings become the catalysts by whose means the credibility and validity of the study could be established. Fouche (2002:107) illuminates that

the research aim/purpose or goal is distinguishable from the research objectives in respect of the conceptual levels of exploration, description, or explanation involved.

In accordance with Fouche's (2002:107) levels of conceptual differentiation, the general/broad intention (aim, purpose, or goal) of this study is:

- To explore the extent to which the Theory of Constraints could be referred to as a mechanism to improve the throughput of Honours degree students in relation to industry (or „the world of work“).

### 1.4.2 Research Objectives

The objectives of a study refer to the most specific and irreducible (narrower) intentions of the researcher in undertaking the study (Henning, et al., 2005: 37). Fouche, 2002:107) adds further that research objectives refer to “the more concrete, measurable and more speedily attainable conception” of the means by which the desired outcomes of the study are obtained. The latter author asserts that the following are characteristic features of research objectives:

- research objectives are more *concrete* in nature, as opposed to the more abstract nature of an aim, goal, or purpose);
- research objectives are *measurable*, as opposed to the general scope of an aim;
- as opposed to the aim, purpose, or goal of research, the research objectives are characterized by the *immediacy* of results/findings (Fouche, 2002:107).

For purposes that are in consonance with the broader intentions of the study, the following profound statements constitute the sphere of the study's objectives, due to their critical link with the study's significance, the research problem, and the research questions on the one hand; as well as the data collection and analysis processes on the other:

- i. To investigate how the TOC influences student throughput quality at Honours level at the University of KwaZulu-Natal;
- ii. To evaluate the challenges of bottlenecks affecting the throughput levels and quality of Honours students at the University of KwaZulu-Natal;
- iii. To examine the deployment and quality of the supply chain function as a mechanism to develop competitive responses to Honours student needs and demands; and
- iv. To assess the effects of internal operations processes in relation to the interface between programme capacity and the magnitude of demand.

### **1.5 Research Questions**

This study is largely based on the TOC and the extent to which this management philosophy could improve throughput quality at Honours level at UKZN. The following research questions are regarded as pertinent to the study, and have been articulated in tandem with the research aim/purpose and research objectives (Babbie and Mouton, 2001:563):

- i. What are the capacity constraints influencing the quality of Honours students' throughput levels at the University of KwaZulu-Natal?
- ii. What are the throughput bottlenecks challenges experienced by Honours level students at the University of KwaZulu-Natal?
- iii. What is the supply chain quality function deployment of Honours students at the University of KwaZulu-Natal?
- iv. What are the effects of internal operations processes in assessing the interface between program capacity and the magnitude of demand on Honours students at the University of KwaZulu-Natal?

### **1.6. Conceptual/Theoretical Framework**

The conceptual/ theoretical framework of the study refers to the foundational premises on which abstractions, concepts, or theories are assembled on the basis of their relevance to a common theme being interrogated or discussed (Polit and Hungler, 2004:109). It is in this context that it could be argued that conceptual frameworks precede theoretical models, assumptions, or principles.

The latter perspective is supported by Stommel and Willis (2004:4), who argue that a theory is fundamentally an organised, symbolic representation of reality that specifies relationships among key concepts, ideas or phenomena of interest. Accordingly, a theory provides the framework for understanding and explaining data patterns. The data patterns, concepts drawn development and articulation of recommendations of this study.

This study uses the elements and principles of TOC in its development of the conceptual/ theoretical framework. For purposes that are congruent with both the study's objectives and its attendant conceptual/theoretical perspective, a two-fold paradigmatic orientation has been



opted for, in order to establish the building blocks for TOC as a significant and valid mechanism for resolving the research problem. Accordingly, the definition of key concepts and the centrality of TOC are thematically placed within the conceptual and theoretical domains of the study.

### **1.6.1 Definition of Key Concepts**

The definition of key concepts is considered in this study as the foundational sphere within which abstract ideas or phenomena are thematically and centripetally linked to TOC as the core/pivotal aspect of the research topic and its attendant research processes.

#### **1.6.1.1 Capacity and Constraints**

Ricket (2010) states that „capacity“ is the propensity to accommodate, or contain something. The latter author contends that every organisation should prioritise what it plans to accommodate. This is because balancing demand and capacity has always been a major constraint for service practitioners (Klassen and Rohleder, 2002:527). Constraints occur in the event that an imbalance exists between an organisation’s capacity and the demand for services or commodities. It should be noted that constraints could also be found in an organisation’s external environment. An example of an external constraint is the market. Timilsina (2012:5) postulates that a bottleneck is any activity that hinders or limits the performance of a system or decreases efficiency. Bottlenecks are the main reason for slowdowns in an organisation. There are different types of bottlenecks, and they could take various forms in a system. According to Woepel (2001:12) constraints are categorised into three aspects, namely: policy constraints, resource constraints, and material constraints. These various forms of constraints straddle both the operational and managerial functioning of an organisation. They include people, materials, equipment, processes, management, policy, and the environment.

#### **1.6.1.2 The Kaizen Approach and Business Process Re-engineering (BPR)**

Kaizen, also known as the process of continuous improvement, states that there will always be room for improvement, and that it is important to be persistent in developing more efficient systems (Al Smadi, 2009:203). According to Hesson (2007:707), BPR has played a major role in private and public organisations to enhance existing software applications and information. In order for current organisations to be more efficient, they need to reorganise their processes continuously and dynamically.

### **1.6.1.3 The Massification Approach**

McDonald (2009) enlightens that massification is the result of a product or service that was initially reserved for a particular stratum of society (the rich and wealthy), but is now available to a broader population as part of transforming and establishing an egalitarian postapartheid society. Huang (2012:237) on the other hand, argues that institutions of higher education have evolved into a stage of mass customisation as a result of growth in the economy quickly rising and the considerable increase in the number of students enrolling at universities. In the South African higher education context, massification of universities has been directly influenced by the reconfiguration of higher education institutions (HEIs) after decades of the geo-political arrangements institutionalised by racist apartheid education. One of the observable features of massification has been the de-mystification of the „gold standard“ of university admissions. Consequently, heterogeneous student populations were visible and recorded across the South African higher education ecology, in order to broaden access and lifelong learning opportunities (Henry et al., 2001: 161-163). Scholars such as Scholte (2000:8) have argued that massification should not only be confined to the numerical increase of previously disadvantaged students in the lecture halls of previously advantaged HEIs. Curriculum transformation and epistemological diversity should also be reflective of the broader changes taking place in the larger society to be served by all HEIs.

### **1.6.2 The Centrality of the Theory of Constraints**

The TOC, also known as management by constraints, is a management philosophy developed by Dr EM. Goldratt in 1979. It originally came into being with the introduction of Optimized Production Timetables (OPT) scheduling software. Over time, TOC has progressed from basic production scheduling software to a set of integrated management tools, which include three interrelated areas: performance measurement, problem solving/thinking tools, and logistics/production. The TOC is central to the argumentation based on the unlocking of factors that deter or constrain UKZN Honours degree students“ capacity and throughput insofar as the requisite industry skills repertoire is concerned. To this effect, TOC is viewed in this study as centripetal to abstractions, concepts, and ideas (phenomena) dynamically associated with both the identification and resolution of inhibitive factors relating to the acceptable levels of Honours students“ academic performance and acquisition of socioeconomically relevant and

productive skills. According to Blom (2011), and David and Graeme (2013:1362), the following five focus steps are congenial to the process of on-going improvement inherent to TOC's resolution of constraints:

#### **1.6.2.1 Identification of the Constraint**

Organisations need to determine factors that limit the performance of the system from achieving its intended goals. A load analysis examines capacity utilisation in order to identify a particular bottleneck. Another way of identifying a constraint is by asking the question: "If the system had more of a particular resource, would this resource allow the system to expand itself and reach its goals?" (Groop, 2012:38). The bottleneck is then identifiable by inspecting the work-in-progress (WIP) in the system – large amounts of inventory pending to be processed.

#### **1.6.2.2 Exploiting the Constraint**

Exploiting the bottleneck or constraint is a process by which current capacity is expanded by minimising waste. Current capacity is equivalent to work plus waste (Honiball, 2012:11). Firstly, the organisation needs to identify whether or not the product should be processed through the bottleneck. If this is not necessary, other resources could be used to process this task. Quality assurance is an efficient way to reduce the amount of work processed through the bottleneck. This means that items are rejected from the system before they have the chance to waste process time at the bottleneck. This reduces waste and increases capacity.

#### **1.6.2.3 Subordinating Other Activities to the Constraint**

When subordinating the bottleneck, non-bottlenecks should either stand still and protect the current throughput, or production should be at full capacity in order to create throughput. If a non-bottleneck is producing at a reduced rate when it shouldn't be producing at all, this could be counter-productive to the process as a whole. Such a measure of counter-productivity is known as throughput obliteration (Honiball, 2012:11).

#### **1.6.2.4 Elevating the Constraint**

The elevation of a constraint implies that additional capacity should be installed at the bottleneck point. However, if output is still inadequate, it is necessary to acquire more resources in order to attenuate the bottleneck's effects. Elevating the constraint could also take the form of outsourcing (Honiball, 2012:12).

#### **1.6.2.5 Reverting to the Constraint to Facilitate Systemic Change**

It is important to repeat the entire process from the identification of the constraint, since the exploitation and elevation of the bottleneck may have caused it to shift within the system (Honiball, 2012:12). Repeating the process ensures that there is continuous improvement, justifying TOC's stature as a method of continuous improvement (Sutherland & Canwell, 2004:232).

### **1.7 Significance/Relevance of the Study**

In the broader scheme of the scientific enterprise (and a non-commercial venture), the purpose of undertaking this study is premised on:

- making a contribution to the body of knowledge on the research topic;
- contributing to institutional/organisational policy-making; and □ contributing to socio-economic development.

#### **1.7.1 Disciplinary Relevance**

On the basis of its evidence-based findings and recommendations, the study has made a discipline related (epistemological) contribution to the body of knowledge on TOC as a viable mechanism to resolve throughput constraints (bottlenecks) engendered by identifiable systemic deficiencies in complex organisations such as institutions of higher learning. The questionnaires were drawn from the literature review and the students themselves answered the questionnaires, therefore, this study also contributes primary data to the body of knowledge.

#### **1.7.2 Institutional Relevance**

For complex environments in the process of transformation such as UKZN, this study explored the identified capacity constraints experienced by students at Honours degree level.

This exploratory approach will be significant in enhancing the UKZN's future strategic planning to minimise these constraints. The University will benefit as a whole by providing throughput quality students, and thus become more competitive in the higher education sector. This study will add value to policy transformation in the higher education system. It will contribute to knowledge creation in that the University will be able to identify constraints hindering quality throughput rates. The study will further benefit both the University and Honours students in view of the research questions becoming a catalyst leading to the University taking action to alleviate the constraints faced by Honours degree students.

Undergraduate students planning to pursue a post-graduate qualification, specifically at Honours degree, will benefit from the envisaged improvements in the throughput and industry skills domains.

### **1.7.3 Socio-Economic Relevance**

Since scientific research is not only undertaken for commercial value or viability, it should necessarily be of practical relevance to the socio-economic development. Such a perspective is in tandem with HEIs (especially those that are publicly funded) being institutions *of* society, and rooted *in* society. For this reason, in particular, the study's primary focus on improving UKZN Honours degree students' throughput credentials and their industry-specific skills repertoires, would have contributed to the improvement in standards of graduate employment and employability.

## **1.8 Research Design and Methodology**

Mouton (2001:55) asserts that there are two fundamentally varied perspectives on the understanding of research design and research methodology on the one hand, as well as research methods and research methodology on the other. Some researchers prefer to use research design and research methodology as synonymous terms, while others regard the two as separate, but inter-related concepts. Furthermore, some researchers regard research methods and research methodology as synonymous and inter-related concepts; while some view the two as distinct but inter-related nuances. In this study, a perspective has been adopted according to which research design and research methodology/methods are viewed as separate but inter-related research prescripts. Research design relates to the general action or management plan according to which the researcher conducted and managed the particular study and all its attendant variables. Such a management plan is necessarily conjoined to the research problem, the research aim/purpose and objectives, the research question(s), the research hypothesis, the significance of the study, as well as the identifiable difficulties experienced by the researcher and/or research participants during the entire research process (Burns & Groove, 2009:218; Mouton, 2001:55).

A descriptive and exploratory quantitative research design was opted for in this study. Quantitative research focuses primarily on collecting numerical data and generalising it across the research population (UKaid, 2013:4). One of the advantages of a quantitative approach is

that it is independent of the researcher. The results remain the same, irrespective of the persona of the researcher. Additionally, quantitative data is an appropriate mechanism for measuring trends, and is considered more objective than other data collection approaches. This study will therefore employ a quantitative approach in order to measure statistical variables and their relationship (Creswell, 2014:4) by means of a survey. Survey research provides a quantitative or numeric description of opinions, attitudes, or trends in a population by measuring a pattern based on the frequency of occurrences elicited by a sample of the population. Survey research includes longitudinal or cross-sectional studies using questionnaires for data collection – with the intention of generalising the sample to the entire population.

Research methods and research methodology are construed differently by different academic researchers and social scientists (Mouton, 2001:65). One school of thought upholds the view of the two terms as synonymous and mutually inclusive; while another school of thought maintains the two as separate, but mutually inclusive concepts. According to the latter orientation, research methodology would refer to a conceptually motivated paradigm or influence according to which the research *process* is conducted; whereas the research method(s) would specifically relate to the particular *tools or instruments* opted for in the data collection process – such as questionnaires, document review, participant observation, focus group interviews, and so on. In this study, the questionnaire was utilised as the primary data collection instrument.

## **1.9 Data Collection**

According to Mouton (2001:56) and Burns and Grove (2006:40), data collection is concerned with the precise and systemic gathering of theoretically and empirically generated information in relation to the research problem, the research aim/purpose and objectives, the study's significance, as well as the pertinent research questions. The above-cited authors cite further that the data collection process conforms to the research methodology of the study. Accordingly, the research methodology then incorporates both the research process and the tools and procedures used (Mouton, 2001:56). For purposes of this study, data collection involved theoretically (qualitatively) generated data (e.g. document review); as well as empirically (quantitatively) obtained information.

Data collection will involve gathering information from the target population. To gain access to volunteer respondents, the researcher will inform the University about the nature of study. Once approved, the researcher will distribute the questionnaires to the relevant Honours degree students. The study will be conducted at all five UKZN campuses, focusing primarily on Honours degree students in the schools/faculties that offer an Honours degree programme. The data collection instrument in this study will be self-administered questionnaires, as they are a widely accepted tool for gathering information (Bird, 2009:1307). According to Spark, Pharm and Willis (2013:469) questionnaires are a time- and cost-effective method of collecting data from respondents. A questionnaire is a form of written communication in which the researcher communicates with the respondents. However, it should be noted that if the questionnaire is not structured properly, the value of a study's results could be reduced immensely. The self-administered questionnaires are completed by the respondents without the help of the interviewer, and are collected after their completion (Bless, Higson-Smith and Kagee, 2006:117).

### **1.9.1 Document/Literature Review**

Literature review was conducted in order "to present results of similar studies, to relate the present study to the on-going dialogue in the literature, as well as to provide a framework for comparing results of this study with those of other studies" (Creswell 2003:46). Furthermore, the review of relevant literature pertaining to this study enhanced the quality and integrity of the study by incorporating research ethics in order to prevent scientific misconduct and malpractices such as plagiarism. Accordingly, the researcher duly acknowledged authors and other sources of information whose original contributions were consulted (Babbie and Mouton, 2004:117). Most importantly, the review of literature provided the most relevant context for the development of the theoretical/conceptual premises of the study on one hand, as well as the analytic framework for the research problem, research aim/purpose and objectives, research hypothesis, as well as the data collection and interpretation processes on the other (Burns & Grove, 2006: 44).

The review of documents focused mainly on a brief historical background of UKZN and its metamorphosis into the post-apartheid higher education transformation space. The literature review further facilitated the compilation of the research topic's theoretical perspectives, as well as the acquisition of multiple perspectives of data collection – thus obtaining different

epistemological paradigms in the field of TOC (Muller, 2004:5; Babbie & Mouton, 2004: 117). The document/literature review process was conducted by means of obtaining information from sources such as peer reviewed and accredited journals; academic books on the theory of constraints; completed doctoral studies between 2010 and 2015; databases such as Google Scholar, Science Direct, and PubMed; relevant higher education discussion and policy documents from the South African Government Website; as well as authoritative higher education organisations such as HESA, the NRF, and CHE. In the latter context, the literature review process afforded the researcher the opportunity to focus and reflect on the canonical contributions of other scholars, academics, intellectuals, social scientists, and academic institutions/organisations in the corpus of knowledge in the field explored and described by the research topic” (Mouton, 2001:6).

### **1.9.2 Empirical Data**

While the literature review process enhanced the theoretical premises of the study, the empirically generated data was sourced during the experiential/observation phase designed to obtain first-hand information (or the social reality) from the sampled respondents (De Vos, 2002:42). In this study, the questionnaire facilitated both the empirical and quantitative aspects of the data collection process – while also enhancing the researcher’s participant observation capacity (Leedy and Ormrod, 2005:28). Logically, the empirical phase entailed some degree of fieldwork on the part of the researcher.

#### **1.9.2.1 Questionnaire Development and Administration**

In this study, the questionnaire was utilised as the primary and empirical data collection tool and a form of self-reporting mechanism, intended to elicit relevant and valuable quantitative (numerical/statistical) data obtained by means of the written responses of selected respondents (Burns and Grove, 2011:353).

During the questionnaire development and administration process, the researcher took cognisance of the following:

- there were no correct or incorrect answers;
- the identity of the respondents was not revealed, in order to protect their privacy, anonymity, and confidentiality;



- permission was sought from the respective academic lecturers to administer the questionnaires during their classes;
- questionnaire items excluded race, gender, ethnicity, and cultural practices;
- close- and open-ended questions were included;
- questionnaires were administered to the respondents during the selected Honours degree students' lecture periods;
- all the critical questionnaire items were thematically linked to the respondents' throughput repertoire;
- since some students were not present at the lectures, the researcher administered some of the questionnaires on a personal basis (for example going to postgraduate residences and asking respondents to complete the questionnaires); and
- the researcher personally collected the completed questionnaires for further statistical analysis.

#### **1.9.2.2 The Research/Study Site**

This study will be conducted at all the five UKZN campuses in order for the researcher to gain multiple perspectives of understanding the constraints experienced by Honours degree students.

### **1.9.3 Sampling**

Sampling refers to the process of selecting a representative group of respondents in accordance with objectively constructed sampling criteria, which the researcher has established. The objective sampling criteria (population parameters) refer to the degree to which the research participants have been selected on the basis of the similarities (homogeneity) or dissimilarities (heterogeneity) of pre-determined characteristics which enhance both the purpose and objectives of the study. Homogeneity or heterogeneity could influence either inclusion or exclusion of research participants in the study, depending on the extent to which they are representative (or unrepresentative) of the larger group's (population's) observable universal characteristics (De Vos et al., 2002:203; Strydom and Delport, 2002:334).

#### **1.9.3.1 Sampling/Target Population and Sample Size**

The sampling or target population refers to the total group of people, events, or objects that the researcher is investigating in order to draw possible conclusions regarding the general characteristics or attributes of that particular group (Sekaran & Bougie, 2009:262); Babbie & Mouton, 2001:100).

The target population of this study is the group of **1 380** students currently enrolled in any Honours degree at the University of KwaZulu-Natal.

In order to establish a modicum of representativity, only a limited number of research participants could be selected, based on the selection criteria. In this context, the selected respondents (sample) become the sample of the population. The sample size, therefore, refers to the numerical representativity of the research participants; that is, the actual number of those selected for participation and involvement in the study (Babbie and Mouton, 2001:100). According to Sekaran and Bougie (2009:295), a population of 1 300 will have a sample size of 297, and a population of 1 400 will have a sample size of 302. In order to gain the most from this study, the researcher will utilise the larger of the two. Therefore, the sample size will be **302** students.

#### **1.9.3.2 Sampling Methods/Techniques**

Sekaran and Bougie (2009:295), emphasises that sampling methods or techniques are generally grouped into either probability or non-probability categories. Probability sampling is propounding that each respondent's probability of selection is known. On the other hand, non-probability sampling postulates that the probability of selecting a particular research participant is unknown.

Examples of probability sampling techniques are: simple random, systematic sampling, stratified sampling, and cluster sampling; while the non-probability sampling techniques are exemplified by: convenience sampling, quota sampling, snowball sampling, and judgment/purposive sampling (Neuman, 2011). Probability sampling has the advantage of the calculation of the sampling error, which is based on the degree to which the variables of a sample could either be similar (homogeneous) or dissimilar (heterogeneous) to those of the target population. In the case of non-probability sampling, the degree of difference between the sample and the population remains unknown (Neuman, 2011). Sample frames assist in the establishment and development of sources from or contexts from which sample variables are determined.

A sampling frame is a group of source materials from which the sample is selected. It is designed to choose the members of the target population. An important aspect is whether or not the sampling frame will correspond with the population that the researcher intends to describe (Fowler, 2009:19). Students currently enrolled for an Honours degree at UKZN will be used as the sample frame from which the sample will be drawn.

In this study, convenient probability stratified sampling was used. Blair, Czaja and Blair (2014:140) state that stratified sampling breaks the population into sub-groups. These subgroups are called „strata“. A random selection is then made from each sub-group to obtain a sample (Fink, 2013:82). However, it should be noted that splitting the samples is complicated and creates more work and additional costs (Olsen, 2012:27). Stratified sampling is an efficient sampling technique when different types of information are required regarding the University colleges in the population (Sekaran and Bougie, 2009:282). Stratified sampling is considered the most efficient of the probability designs. Its advantage lies in the fact that all the groups are sufficiently sampled, and it is possible to compare the groups. However, it should be noted that stratification must be meaningful; and that it is more time consuming than systematic or random sampling. The sampling frame for each station is vital. Convenience sampling incorporates participants who are readily available and willingly agree to take part in a study (Latham, 2007). It relies on the availability of certain subjects and is often referred to as accidental sampling. This sampling technique will be used as the researcher could not determine whether all the participants will be readily available during data collection.

### **1.9.3.3 Sampling Criteria**

The sampling criteria are measures which justify participants' inclusion or exclusion in a study (Polit and Beck, 2010:306; Strydom and Delpont, 2002:334). It is in this context that Strydom and Delpont (2002: 334) emphasise that The sampling criteria of a study also determines the research participants' eligibility or otherwise in fulfilling the pre-selected traits in relation to the research objectives (Strydom and Delpont 2002: 334). In this study, the sampling criteria were developed in tandem with all the relevant variables of the research topic.

#### **i. Inclusion/Eligibility Criteria**

Inclusion criteria refers to the specific characteristics or qualities that research participants should possess in relation to the sampled respondents or research population/universe. The

following measures (criteria) were applied in the determinant of respondents' eligibility or participation in the study:

- full-time male or female UKZN Honours degree students of all races in any field of study offered by the University; and
- resident and non-resident UKZN Honours degree students familiar with the throughput constraints at the University;

The above-cited criteria imply that the 302 (sample size) students of the 1 380 (target population) were obligated to fulfil **all** aspects of the inclusion criteria.

## **ii. Exclusion/Ineligibility Criteria**

The exclusion or ineligibility criteria applies to those research participants whose profiles disqualified them from any involvement in the study. Accordingly, the following factors provided a context from exclusion in the study;

- male or female, resident or non-resident UKZN students who are not in any Honours degree programme.
- Any male or female who does not possess in-depth, above average knowledge in public participation theory and practice; and

## **1.10 Data Quality Control and Analysis**

In order to legitimate and validate the research process, the researcher is obliged to subject the theoretically and empirically generated data to a quality control process. Such validation and legitimisation accords scientific integrity and worth to the study and its intended (epistemological, institutional, and socio-economic) usefulness. The latter orientation obviates the notion of research-for-research's-sake.

### **1.10.1 Data Quality Control**

Once the (empirical) data has been collected from the fieldwork, an analytic process is conducted in order to make sense of the information obtained. Since the study is fundamentally quantitative in its construction, statistical measures – such as univariate, bivariate, and multivariate means and procedures – were applied in order that the objective reality of the research participants and truth value) of the research topic (that is, acceptance of the research hypothesis) could be established (Babbie and Mouton, 2001:9; De Laine, 2000:11-12).

Univariate data analysis could be used in the event the researcher wishes to really understand a data set by examining each variable, one at a time (Sage Pub, 2005:50). Univariate data analysis examines one variable at a time even if the intention is to explore all the sets of data further, such as central tendency discovers the mean, median, and mode of the observation.

The second scientific component will be bivariate data analysis, which is used when two measurements are performed on each observation (University of Michigan, 2004). Analysis of variance (ANOVA) will be used to discern the association between two variables or more (Sekaran and Bougie, 2009:435).

The final data analysis technique will be multivariate data analysis, as it investigates many variables at the same time in order to make sense of the relationships which may be present among those variables (Swarbrick, 2012:6). Factor analysis will be used to minimise a large set of variables and create indexes with variables that measure indistinguishable characteristics or occurrences (Torres-Reyna, 2010). Multivariate analysis is easy to use and could be used to measure from two to thousands of variables simultaneously.

### **1.10.2 Data Analysis**

Data analysis is primarily concerned with the examination and interpretation of observations in order to discovering underlying meanings and patterns of relations among different research variables and creation of order and structure to data and its findings (Babbie 2007:378). Data analysis involves reading through the data repeatedly, and breaking it data down into themes and categories, as well as reconstructing it by means of elaboration and interpretation (Ulin et al., 2005:323). In the process of reconstruction, elaboration, and interpretation, three important data analysis factors inform on the extent to which meaningfulness and the truth-value are established; these factors are validity, reliability, and credibility.

#### **1.10.2.1 Validity**

Validity refers to the accuracy and trustworthiness of instruments, data, and findings in research. Nothing in research is more important than validity (Bernard, 2013:45). Creswell (2014:160) postulates that establishing validity is important for a study as it determines whether or not an instrument will be useful for the study. Babbie and Mouton (2001:122) concur that

the whole point of validity is to determine whether or not the empirical measures reflect the efforts expended to generate the study's usefulness. The usefulness of the study is also determined by the extent of its comparability with other studies conducted in the particular field of knowledge, in order to contribute to the existing body of knowledge and establishing grounds for the particular study's generalizability. The current study's validity is established by incorporating the core aspects and principles of TOC with the actual throughput constraints experienced by UKZN Honours degree students.

### **i. Internal Validity**

The internal validity of a study is established by means of the extent to which the accuracy of the research instrument and its findings have been correlated in terms of contributing to the quality of the study. Internal validity also generates confidence with which the independent variables of research is concluded (Saunders et al., 2007; Creswell, 2007). The latter authors concur that internal validity is enhanced by the consistent measurability of the same variables in the research instrument. In this study, internal validity was maintained by means of the questionnaire items' thematic adherence to the centrality of TOC as a point of reference.

### **ii. External Validity**

Whereas internal validity focuses on the accuracy of the research instrument, external validity highlights the repeatability, generalizability, or transferability of the same study in a different research milieu without compromising the initial intentions that necessitated the study being undertaken in the first place. In this study, external validity was established by constructing a clearly defined inclusion and exclusion criteria framework, as well as adhering to the TOC and Honours degree students' throughput constraints as the central points of reference. Such an orientation ensures that the study's original intentions are not derailed in the event of the study being undertaken in other contexts outside of the UKZN's jurisdiction.

#### **1.10.2.2 Reliability**

According to Bless et al. (2006:150), reliability is a research process or activity (derived from a numerical index) that indicates consistency when measuring an unchanging value. Bell (2010:119) states that when a test is able to manufacture almost identical results on all occasions, it shows reliability. If it is reliable and provides a correct measurement, this instrument is considered to have a high value of reliability. Creswell (2014:160) elaborates that

the test measures have to show internal consistency in test administration and scoring. Cronbach's Alpha will be used to test reliability of the questionnaire in this study. Sekaran and Bougie (2009: 324) observe that a reliability coefficient (numerical index) shows how well the units are confidently correlated to each other.

#### **1.10.2.3 Credibility**

Credibility refers to the degree to which researcher's confidence is generated by the truth value of data and its interpretation (Sekaran and Bougie, 2009:324). Credibility is mostly evidenced by the cogent means expended by the researcher in convincing the external readers of the truthfulness of the study's findings. In this study, credibility was achieved by means of incorporating literature review and the questionnaire, as well as participant observation during the empirical phase of the study.

#### **1.11 Limitations of the Study**

The limitations associated with this study do not in any manner constitute a diminished value of the study and its findings. On the contrary, the identified limitations are on the periphery, and do not compromise the core aspects of the study.

##### **1.11.1 The Scope of the Study**

The study focuses only on Honours degree students. Other students in their PhD, Master's, Post-graduate Diploma, and fourth-year Business Science and Engineering programmes will not take part in this study. This study is also limited to UKZN, but is also transferable to other South African HEIs. Furthermore, programmatic (curriculum) constraints and implications were not thoroughly explored.

##### **1.11.2 Literature-based Limitations**

The theoreticity of the study was largely derived from academic sources on the TOC. Documents and other sources with a more philosophical and theory-driven persuasion could have afforded the researcher with an opportunity to identify shortcomings in the initial construction of TOC.

##### **1.11.3 Epistemological Limitations**

While the centrality of the TOC is pivotal to the study and its stated objectives, the scope of investigation could have extended to programmatic (curriculum) offerings in some limited

manner. An incorporation of the TOC and higher education curriculum would broaden the epistemological base, especially that curriculum transformation (in the same vein as throughputs) are contentious issues in the sphere of *standards* in the reconfiguration and diversification of knowledge production and dissemination in the country.

#### **1.11.4 Empirical Limitations**

The study is fundamentally quantitative (statistically driven), which means that the results will be limited to numerical results. Notwithstanding that the statistical data is described, explained, and interpreted narratively, the study would have benefited immensely from other qualitative approaches than literature review only.

#### **1.12 Chapter Summary**

This chapter provided a brief introduction of the research topic and the direction the researcher used in order to complete this study. Key aspects were covered in this chapter such as background of this study in relation to the University of KwaZulu-Natal and the research population. A brief outline on the research methodology and data collection methods were also highlighted. The chapter ended with a discussion on the limitations that were experienced during this study.



## **Chapter Two Literature Review**

### **2.1 Introduction**

This section of the study discusses a brief history and the reconfiguration system of the University of KwaZulu-Natal (UKZN). It describes the Honours programme at the University and its relevant descriptors. The conceptual framework focuses on such variables as Capacity, Constraints, Quality, and Quantity. The theoretical framework encompasses the centrality of the theory of constraints (TOC). The final part of the chapter discusses capacity management and customer service quality.

### **2.2 A Brief History of the University of KwaZulu-Natal**

As a result of the merger between the University of Durban-Westville (UDW) and the University of Natal, the University of KwaZulu-Natal was formed on the 1<sup>st</sup> of January, 2004. The tapestry of the diversity histories of both universities was combined when the new university was established (UKZN, 2014). The University of Durban-Westville was established in the 1960s as the University College for Indians on Salisbury Island in Durban. Throughout the 1960s, the numbers of students enrolled in the University were low because of the Congress Alliances' policy of rejecting the structures that the apartheid government had aligned (UKZN, 2014). This policy made way for a strategy in the 1980s of "education under protest", which sought to transfigure apartheid institutions into sites of political struggle. In 1971, the College was granted University status as the student numbers grew quickly. The following year, the newly named University of Durban-Westville moved into its modern campus in Westville and was a site of major anti-apartheid struggles. In 1984, UDW became an autonomous institution, accepting students of all races (UKZN, 2014).

Founded in 1910 as the Natal University College (NUC) in Pietermaritzburg, the University of Natal was accorded independent University status in 1949, owing to the rapid growth in numbers, its vast array of courses and its achievements in and opportunities for research. By that time, the NUC was already a multi-campus institution, having been expanded to Durban after World War 1 (UKZN, 2014). The Howard College Building was opened in 1931, as a result of a donation by Mr. T.B. Davis. His son, Howard Davis, was killed during the Battle of Somme (France) in World War 1. The Faculty of Agriculture in Pietermaritzburg was approved

by government in 1946, and the following year a, Medical School for African, Indian and Coloured students in Durban was established. Both universities were part of the first group of South African institutions to conform to the government's higher educational restructuring plans that eventually saw a decrease in institutions of higher education in South Africa (minimised from 36 to 21) in 2004 (UKZN, 2014). The coalitions are the pinnacle of a wide-ranging consultative process on the restructuring of the higher education sector which began in the early 1990s, confirmed by a Cabinet decision in December 2002. The UKZN Vision is to be the premier university of African scholarship. The UKZN Mission reflects "a truly South African university that is academically excellent, innovative in research, critically engaged with society and demographically representative, redressing the disadvantages, inequities and imbalances of the past" (UKZN, 2014). Following its post-merger reconfiguration in 2004, the UKZN was eventually constituted with five campuses, namely:

- Edgewood Campus;
- Howard College Campus;
- Medical School Campus; □ Pietermaritzburg Campus; and □ Westville Campus.

### 2.2.1 Disciplinary Configuration of UKZN

There are four Colleges at the University of KwaZulu-Natal. The four Colleges consist of 19 (nineteen) schools in total, all of which are headed by a Deputy Vice Chancellor and Head of College (UKZN, 2014). Below is a tabular description of the configuration of the University according to the various disciplines located in each School.

**Table 2.1: Disciplinary Configuration of UKZN According to Schools (UKZN, 2014)**

| College                                       |  |  | School                                                   | Disciplines |
|-----------------------------------------------|--|--|----------------------------------------------------------|-------------|
| College of Agriculture, Engineering & Science |  |  | School of Engineering                                    | 34          |
|                                               |  |  | School of Agricultural, Earth and Environmental Sciences |             |
|                                               |  |  | School of Chemistry and Physics                          |             |
|                                               |  |  | School of Life Sciences                                  |             |
|                                               |  |  | School Mathematics, Statistics and Computer Science      |             |
|                                               |  |  |                                                          |             |
| College of Health Sciences                    |  |  | School of Clinical Medicine                              | 34          |
| College                                       |  |  | School                                                   | Disciplines |

|                                                |                                                                                                                                                                                                              |                   |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|                                                | School of Laboratory Medicine & Medical Sciences<br>School of Health Sciences<br>School of Nursing & Public Health                                                                                           |                   |
| <b>College of Humanities</b>                   | School of Religion, Philosophy and Classics<br>School of Arts<br>School of Social Sciences<br>School of Applied Human Sciences<br>School of Built Environment and Development Studies<br>School of Education | 30                |
| <b>College of Law &amp; Management Studies</b> | Graduate School of Business and Leadership<br>School of Accounting, Economics and Finance<br>School of Law<br>School of Management, IT and Governance                                                        | 22                |
| <b>Total: 4</b>                                | <b>Total: 19</b>                                                                                                                                                                                             | <b>Total: 120</b> |

**Source:** Compiled by the researcher from the UKZN database, ([www.ukzn.ac.za](http://www.ukzn.ac.za))

### 2.2.2 Programmatic/Qualifications Configuration of UKZN

The Higher Education Qualifications Sub-Framework (HEQSF) (2013:27) highlights the programmatic/qualifications descriptors below. The table below describes the qualification types, the national qualifications framework (NQF), and the purpose and characteristics of the particular qualification(s). The tabular presentation facilitates a comparative basis for UKZN and the rest of the country's universities.

## 2.2: Higher Education Qualification Descriptors (HEQSF, 2013).

| Qualification Type                    | NQF Level | Purpose and Characteristics                                                                 |
|---------------------------------------|-----------|---------------------------------------------------------------------------------------------|
| <b>Higher Certificate</b>             | 5         | Entry level higher education qualification                                                  |
| <b>Advanced Certificate</b>           | 6         | Vocational or industry-oriented                                                             |
| <b>Diploma</b>                        | 6         | Vocational orientation                                                                      |
| <b>Advanced Diploma</b>               | 7         | Different purposes depending on the nature of the programme                                 |
| <b>Bachelor's Degree</b>              | 7         | Professionally oriented                                                                     |
| <b>Bachelor Honours Degree</b>        | 8         | Postgraduate specialisation qualification                                                   |
| <b>Postgraduate Diploma</b>           | 8         | Designed for working professionals to strengthen knowledge                                  |
| <b>Master's Degree</b>                | 9         | Training individuals to contribute to the development of new knowledge at an advanced level |
| <b>Master's Degree (Professional)</b> | 9         | Training individuals to contribute to the development of new knowledge at an advanced level |
| <b>Doctoral Degree</b>                | 10        | Research at the most advanced academic level                                                |
| <b>Doctoral Degree (Professional)</b> | 10        | Development of high performance levels and innovation in a professional context             |

## 2.3 The Conceptual and Theoretical Focus of the Reviewed Literature

Section 6.1 of Chapter 1 outlined both the conceptual and theoretical perspectives of the study, the purpose of which is to integrate the literature-based information to the entire research process. Accordingly, the process of defining of key terms and identifying the centrality of TOC, allocates a holistic perspective of the research topic in its mission to contribute towards the resolution of the research problem – with UKZN as the pivotal research milieu.

### **2.3.1 The Conceptual Framework/Paradigm**

As opposed to the mere definition of key concepts presented in sub-section 1.6.1 of Chapter 1, the conceptual framework/paradigm presented in this chapter transcend lexical and semantic boundaries. Additionally, paradigmatic perspectives of the very key concepts are presented in order to accentuate these terms to conceptual levels of definition.

#### **2.3.1.1 The Capacity Dimension**

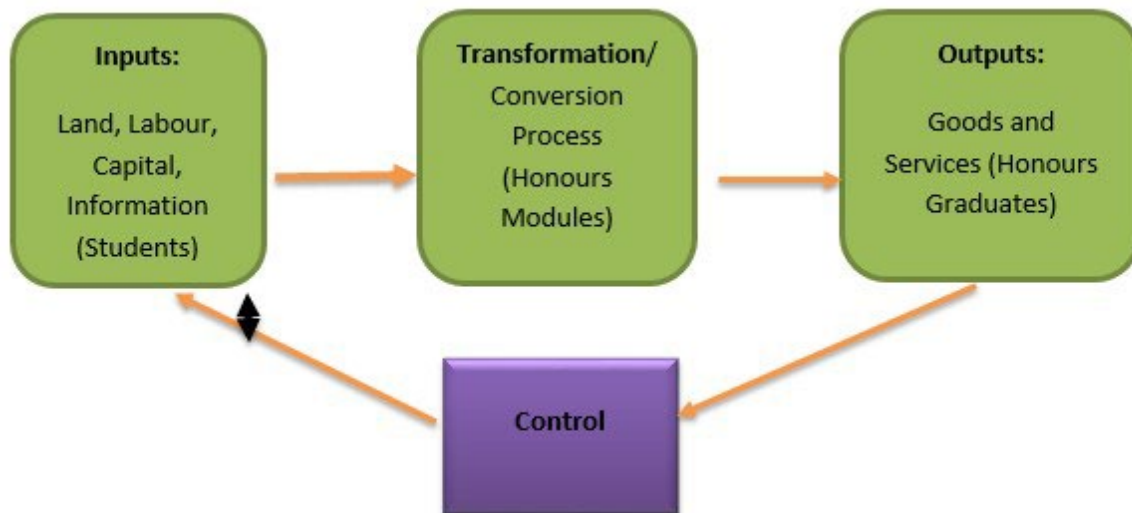
Capacity is concerned with the units an operation could produce, receive, store, or hold at a given point in time (Heizer and Render, 2011:314). Ricket (2010) states that „capacity“ is the propensity to accommodate, or contain something, while Marlies, Matthias, and Dirk (2011:1) also provide a similar definition of capacity by stating that capacity is premised on the potential of an organisation (type, size, and structure) within a given period of time. In addition, Olhager and Johansson (2012:23) mention that capacity is the maximum possible output within a specified period. Capacity may differ depending on the type of setting and/or context. In a service setting for instance, capacity may be determined as the number of customers a business is able to accommodate between 12:00 and 13:00 (Jacobs and Chase, 2014:110). In a manufacturing context, capacity may be the number of laptops that could be produced within a single shift. In an operations context, capacity is determined by the availability of resource inputs to the output required over a given time period. To a large extent, the organisation’s capital requirements are determined by the capacity decisions. The dilemma of whether demand will be satisfied, or whether facilities will be inactive is dependent on capacity (Heizer and Render, 2011:314).

Capacity planning is important because a small facility could cause the organisation to lose customers and inevitably lose its market share. If a facility is too large, then excess capacity will remain unused. It is critical to determine the size of a facility with the aim to achieve high resource utilisation and return on investment (ROI) (Heizer and Render, 2011:314). Although various organisations measure their capacity in terms of the output achieved over a specified period, capacity could also be expressed in terms of inputs. This is evident in organisations where the product mix is uncertain. For instance, the number of beds in a hospital could be viewed as a hospital’s capacity because the number of patients served and the service that will be provided depend on the needs of the patient. Jacobs and Chase (2014:110) emphasise a time dimension of capacity in operations and supply chain management. The authors identify three

distinct time ranges: short, intermediate, and long range. The Honours degree has a duration of 12 (twelve) months. Therefore, intermediate range capacity planning will be isolated. Intermediate range capacity planning has monthly or quarterly arrangements, which range from 6 (six) to 18 (eighteen) months. In this case, capacity may vary, considering the sub-contracting, minor equipment purchases, new tools, layoffs, and hiring. Ricket (2010) postulates that every organisation should ask what it plans to accommodate. Balancing demand and capacity has always been a major challenge for service practitioners (Klassen and Rohleder, 2002:527).

### **2.3.1.2 The Operations Management Dimension**

Operations exist in manufacturing, assembly plants, goods orientated, and service orientated organisations. Operations include all those activities that directly relate to the production and delivery of products and services (Kruger, De Wit, and Ramdass, 2005:13). For the purpose of discussion in this chapter, operations include all those activities directly related to the production and delivery of Honours students. Operations is one of the core activities of an organisation that is responsible for the production of goods and services offered by the organisation (Stevenson, 2007:4). Creating goods and services involves converting or transforming inputs into outputs (transforming Honours degree students into competent graduates). Inputs include information, labour, and capital – all of which are used to create products and services using a transformation process. In order to ensure that the organisation obtains the desired output, measurements could be taken at numerous points during the transformation process (feedback) and comparisons could be made with established standards. The figure below depicts the conversion process (Stevenson, 2005; Stevenson, 2007; CIPS, 2011). The arrows around the control function represent feedback.



**Figure 2.1: The Process of Converting Inputs (Students) into Outputs (Graduates)** Source: Stevenson (2005)

From the conversion process depicted above, it is evident that inputs, transformation, and outputs are all integral to the centripetal role of the control function, without which the organisation's systems may be constrained.

### **Kaizen and Workflow**

The Japanese are believed to have developed the process of continuous improvement (known as Kaizen) (Karkoszka and Honorowicz,, 2009:198). However, Yokozawa and Steenhuis (2013:1053) assert that the original idea of the kaizen approach was founded in the USA and later transferred to Japan after World War II. The authors postulate that the kaizen approach was further developed and improved by manufacturers in Japan and consequently was given a Japanese name. In the Japanese language „kaizen“ means continuous improvement involving everyone regarded as a staff member in an organisation (Singh and Singh, 2009; Magnier-Watanabe, 2011).

Kaizen, also known as the process of continuous improvement in the workflow process, states that there will always be room for improvement, and that it is important to be persistent in developing more efficient systems (Al Smadi, 2009:203). It is therefore implied that kaizen and quality of work and services are symbiotically related. More efficient systems will allow for higher quality at a lower cost. Kerfoot and Rohe (1989:228) define continuous improvement as the constant pursuit of improvement in delivering value to the customer. The kaizen concept

states that engineering, production, and marketing excellence call for ongoing learning and attention.

There is a cultural belief among the Japanese that the aspects of an individual's personal, home, and social life must be continuously improved by means of examination and analysis (Suárez-Barraza and Miguel-Dávila, 2014:394). Kaizen is distinguished from traditional management objectives because it aims to continually improve quality by utilising a process that sets moderately difficult, but achievable steps (Kerfoot and Rohe, 1989:228). Goals are never met, nor are they forgotten because there will always be room for improvement. Improvement has no finish line, the process will go on and on. Prashar (2014:478) reinforces this statement by indicating that kaizen is an instrument used to search for waste, and implement lean principles. Opportunities for improvement will always arise, irrespective of their size.

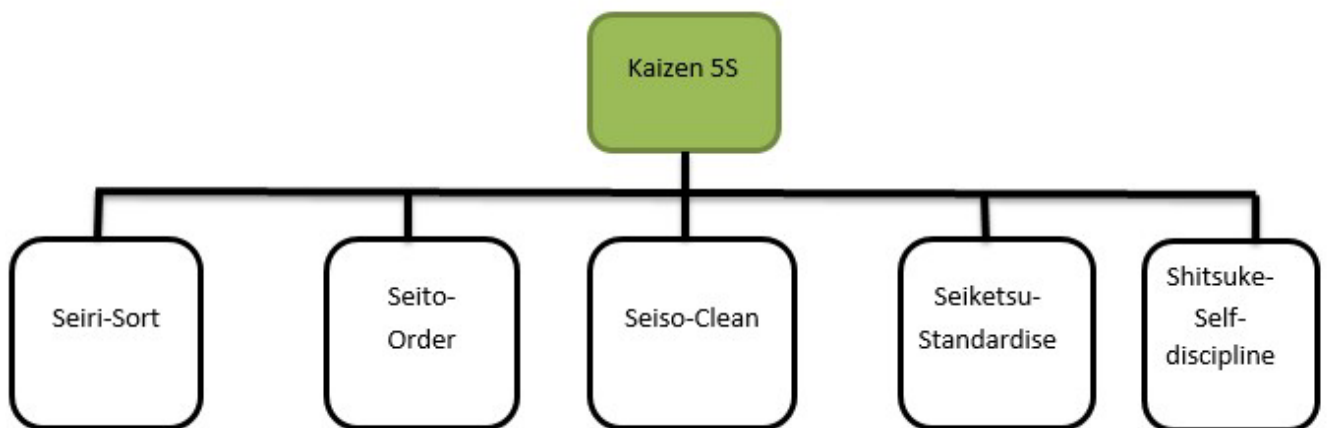
There are three levels of improvement. Firstly, in *gemba kaizen*: this is where small, and low-cost improvements are introduced by the frontline workers (Shang & Pheng, 2013:20). This ensures a platform for relentless change and will evolve the Honours degree continuously. Secondly, in *jishuken*: this is the introduction of a new perspective. In most cases, personnel from other functions of the university come together and identify opportunities for improvement (Shang & Pheng, 2013:20). Familiarity and proximity may hide certain things from the frontline team of a certain department. Lastly, in *kaikaku* (also known as radical design): is adopted when old processes and procedures are discarded and a new concept is introduced (Shang & Pheng, 2013:20). This is similar to the experiences of the University of KwaZulu-Natal during the merger between the University of Durban-Westville and the University of Natal (UKZN, 2014).

The kaizen approach is based on constant never-ending quality improvement. Kaizen is more a mind-set than anything else, and it should be integrated into the daily operations of the Honours degree. The belief is that not a single day must pass without having some type of improvement. Some of the most successful organisations in the world have a workforce that is devoted to improvement (Kerfoot & Rohe 1989:228). The kaizen approach is based on a 5s concept which, as defined by Japanese specialists, is grounded on good manners and customs



(Karkoszka & Honorowicz, 2009:198; Titu et al., 2010). The 5s model depicts Seiri, Seito, Seiso, Seiketsu, and Shitsuke, as described below and represented in figure 2.2. For logical purposes, the 5s model is translated into relevance according to aspects of the study

- i. **Seiri** (selection): proper preparation for the Honours degree includes selecting the right instruments of work and eliminating everything that is deemed useless. The Honours degree needs to be structured in such a way that only eligible students are selected for the degree. Selecting the appropriate functions will ensure that operations are efficient.
- ii. **Seito**-order (systemic): ensuring that Honours students are in a suitable environment. Preparing the required resources in such a manner that it enables quick and simple utilisation by the Honours students.
- iii. **Seiso**-cleanliness (cleaning): when the Honours degree is supported by a conducive environment, it allows an increase in the control of facilities, and responsibility regarding the management of Honours students at the UKZN.
- iv. **Seiketsu**-consolidation (standardisation): it is important for the postgraduate staff members to be reminded about their duties regarding equipment, resources, and ensuring that the Honours students are properly attended to.
- v. **Shitsuke**-discipline (self-discipline): staff members and Honours students need to adapt to the organisation's principles, and independently eliminate any bad custom or training.



**Figure 2.2: The 5s Kaizen Model**

**Source:** (Titu, Oprean, and Grecu, 2010)

Figure 2.2 above is a representation of the kaizen 5s model, regarded as the seminal Japanese concept credited with improvements in the quality of workflow.

### **2.3.1.3 The Business Process Re-engineering (BPR) Dimension**

Business Process Re-engineering (BPR) has played a major role in private and public organisations (Hesson, 2007:707). BPR is primarily focused on designing techniques that will simulate and check various sets of processes that could ameliorate its own organisation. Over the years, BPR has played a huge role in the management of organisational policies. It offers opportunities such as redefining an organisation at a fundamental level; the rethinking and transformation has an enormous effect (Shin and Jemella, 2002:352). Dramatic change means a complete remodelling of the organisational structures, incentive schemes, the use of information technology, skills development, performance measurements and employee responsibilities, and management systems (Hesson, 2007:708). BPR has the potential to affect every aspect of the organisation's operations.

BPR enhances the internal and external communications and capabilities (Chin-Tsei, ChieBein and Ying-Chan, 2011:175). BPR is popular in the business environment as it serves as a tool for dealing with rapidly changing technology. It also serves as a tool that could yield a significant competitive advantage if implemented correctly. BPR has assisted a number of organisations in reaching breakthrough performance levels in various aspects such as quality, customer service, and delivery times (Hesson, Al-Ameed and Samaka, 2007:349; Hesson, 2007:708). This is in accordance with Ozcelik (2010:7); the author states that "business process reengineering (BPR) is defined as a radical design of processes in order to gain significant improvements in cost, quality, and service". BPR programs have been employed by major organisations such as AT&T, Cigna RE, Pacific Bell, and IBM Credit Corporation. However, although BPR could yield significant cost benefits, it is high risk. BPR causes so much change within an organisation that it could either have enviable success to completely failure. BPR could significantly improve the performance of an organisation, but it should be noted that as many as 70 per cent of BPR projects fail (Kamhawi, 2008:167; Ozcelik, 2010:7). Kamhawi (2008:168) identifies three forms of BPR:

- Process improvement;
- Evolutionary BPR; and □ Revolutionary BPR.

Process improvement employs a conservative approach to making additional changes to an existing system. Evolutionary BPR involves radical change, but still adopts augmented steps like process improvement. On the other hand, revolutionary BPR is an approach that requires

a clean slate (Kamhawi, 2008:168). It employs a single process of innovation aimed at reaching radical business improvement. Process improvement and revolutionary BPR are an alternative to TQM (total quality management), while the revolutionary BPR is the original model of BPR. Numerous institutions of higher education have reengineered their academic and internal administrative processes. Abdous (2011:427) states that a study conducted by Educause, institutions of higher education have invested heavily in BPR by taking advantage of information technology. The author postulates that this has been done to enhance services and to lower costs in specific areas such as human resources, finances, advancement, teaching and learning, and student services. Factors such as the aging of infrastructure, external pressures, information technology infusion, and budget shortfalls have sparked an interest in the rethinking of existing processes (Abdous, 2011:427).

#### **2.3.1.4 The Quantity Management Dimension**

The quantity management dimension reinforces the notion that quantities could be managed by means of eliminating or reducing constraints. Four critical variables are integral to the concept of quality management, namely: massification, constraint complexity, infrastructural challenges, and human capacity.

##### **a) The Intricacy of Constraints**

The following factors are dimensions of capacity constraints in universities: human resources shortage, digital divide, brain drain, political unrest, funding/ budget, university governance, poor infrastructure, and high population explosion (Ekundayo and Ekundayo, 2009:247). Constraints consist of anything that limit throughput within a system (Couldnon et al., 2013:629). Every organisation faces scarce resources which must be used optimally so that operations could run efficiently. Scarcities in resources cause constraints (also known as limitations) which place restrictions on the organisations operations (Black and Gallagher, 1999:144). There are three identifiable types of constraints, namely: policy, resource, and material constraints. Policy relates to systems and processes that dictate organisational behaviour – such as rules, conditions, or measurements (Woepfel, 2001:12). Resource constraints are less common than policy constraints, constituting only eight per cent of most constraints. Material constraints are less frequent than policy and resource constraints. These (material) constraints usually involve issues such as scarce materials, but could also constitute available materials in short supply due to problems along the supply chain. Making a distinction

between policy, resource, and material constraints is mostly academic. The main concern for managers should be the best utilisation of available resources in order the achievement of strategic organisational goals (Fapohunda, 2014:349).

#### **b) The Massification Approach**

Massification could be defined as a product or service that was initially reserved for the rich and wealthy, but now available to a broader population (McDonald, 2009). With growth in the economy quickly rising and the considerable increase in the number of students enrolling at universities, higher education institutions have evolved into a stage of mass customisation of higher education. According to Huang (2012:237), countries such as Singapore, China, and Malaysia have made efforts to boost universal-access higher education systems by increasing their enrolment over 50 per cent of the university age category. Ngok (2008:548) reiterates that rapid expansion in higher education has fostered remarkable changes for countries like China. The expansion of higher education aims to nurture advanced human resources for national development, fulfil the potential capacity of an individual, and realise the achievement of equal educational opportunities (Prudence and Li-Tien, 2012:18). Some of the problems which arise are due to the expansion of higher education in numerous countries.

Fabiyi and Uzoka (2007:4) elaborate on the fact that most universities enrol more students than available qualified lecturers, facilities (classrooms, desks, reading material, equipment, and laboratories). Carrying capacity, as defined by Fabiyi and Uzoka (2007:4), is the maximum number of students that an institution could sustain for quality education. The latter authors state that based on the availability of human and material resources, massification has grown rapidly and exponentially. This has shown unexpected consequences that have been side tracked from the original objectives. Prudence and Li-Tien (2012:18) indicate some of the problems arising from these unexpected consequences, such as: inconsistencies in tuition between private and public higher education institutions; resources being allocated unequally; and acute competition in the face of decreasing student enrolments. As a result, constraints have developed within the higher education system. The next section provides a discussion on the capacity constraints faced by universities.

### **c) Infrastructural Challenges**

It has been established that there was a significant relationship between the adequacy of infrastructure in higher education institutions (HEIs) and the quality of teaching (Fabiya and Uzoka, 2007:12). For instance, the computer and Internet facilities at universities are functionally and numerically inadequate (Mohamedbhai, 2007). At times, students have to wait for long periods before they are able to make use of a computer. This is usually the case at Honours level, because it is a research-based degree and requires concerted use of the Internet for information sources such as journals, articles, and e-books (Kanyengo, 2009:380). There are cases where institutions have a total of twenty computers that are used by a student population of over 95 00 on campus. In addition, Internet access is hampered by inadequate computers with limited bandwidth. This is tedious because accessing documents electronically becomes an effort. There was a survey done on 62 educational institutions in Africa. The survey found out that the institutions were heavily dependent on external support for information services, and Internet connectivity was minimal and very slow (Kanyengo, 2009:380). Student numbers are on the increase and space requirements remain the same over a long period of time (Calderon, 2012:2). During operating hours, large groups of students wait in the LANs (local area networks) for an opportunity to use a computer. With the student populations on the increase, there is an urgent need for expansion. Maringe and Sing (2014:768) assert that university lecturers are facing the dilemma of having to teach large classes, compounded by inadequate infrastructure (limited room for group work or movement). In addition, materials and resources for teaching and learning support are insufficient. Furthermore, lecturers have found that students have been underprepared in meeting the demands of university learning (Maringe and Sing, 2014:768).

Due to shortages in public funding, the expansion of physical infrastructure has not increased at the same rate as the enrolment of students into universities (Mohamedbhai, 2014:72). Higher education institutions need to increase the available capacity so that the enrolment demand could be accommodated (Gumport et al., 1998:3). The available capacity of lecture rooms, administrative offices, laboratories and academic staff, as well as sanitary facilities does not meet the needs of a large student and staff population. This has also had a negative effect on libraries. In most cases, institutions have a shortage of periodicals and books (Mohamedbhai, 2014:72). The challenges for educational institutions continue to intensify due to the mass

influx of students (Kanyengo, 2009:376). The lecturer and student ratios are generally high, with lecturers and students reporting that they do not have sufficient contact hours with each other (Bailey et al., 2011:130).

#### **d) The Human Capacity Challenge**

An increased enrolment of students over the years has left higher education institutions understaffed and unable to recruit more academic staff (Fisher and Scott, 2011; Bailey, 2014). Some of the reasons include unavailability of qualified candidates and lack of funding. Mohamedbhai (2014:72) states that the staff/student ratio has increased to 1:40 (1 lecturer per 40 students). In some specific departments with more students, the ratio is as high as 1:100 (1 lecturer per 100 students). This has also been the case in colleges and universities in Taiwan, where gross enrolment rates are more than eighty per cent (Dian-Fu and Yeh, 2012:33). These institutions have had to employ part-time staff who do not always have the required credentials, (qualifications or experience) in teaching at tertiary institutions. Time meant for research has decreased because of the increase in administrative responsibilities, coupled with the extensive teaching load required of full-time staff. The number of staff members who have PhD (Doctor of Philosophy) qualifications is low, which means that the members of staff are not able to further encourage post-graduate programmes or supervise research projects (Mohamedbhai, 2014:72).

It is important to develop the human resource capacity in universities because the delivery of high quality education is dependent on it. Ekundayo and Ekundayo (2009:247) state that there are high levels of deficiency of teachers in Education, Medicine, Science, Engineering, Agriculture, Pharmacy, and Administration. The authors emphasise the importance of taking the challenge of capacity limitations seriously. This could be achieved by developing institutional, infrastructural, as well as human capital capabilities. ICT in education needs to be buffered by the availability of trained teaching staff (Ekundayo and Ekundayo, 2009:247). Most universities in South Africa, including those with relatively viable ICT infrastructure, still remain at the bottom level of ICT integration into research, teaching, learning, library, as well as managerial and information services due to lack of human resources (Ekundayo and Ekundayo, 2009:247).

The Nigerian example of Obafemi Awolowo University (OAU) demonstrates the extant nature of higher education human capital deficiencies, which is not only confined to South African universities. Between 1988 and 1998, the Obafemi Awolowo University experienced a 1% increase of staff members, from 962 to 973. However, student enrolments increased by 56% during the same time-frame. One of the reasons for the low level of human resources in the institutions was due to issues such as brain drain, the departure of an institutions best scholars and scientists (Ekundayo and Ekundayo, 2009:247).

### **2.3.2 The Theoretical Framework/Paradigm**

The theoretical framework or paradigm outlines a specific theory that provides the foundation for the abstraction of ideas, concepts, assumptions, or principles relating to the central or specific matter or issue of argumentation. In this study, the Theory of Constraints presents an opportunity to entrench the ground for the central or specific matter or issue of argumentation, namely, throughput constraints associated with Honours degree students' competence in the context of academic performance and requisite work-related skills.

#### **2.3.2.1 The Centrality of the Theory of Constraints**

The theory of constraints (TOC) is symbiotically linked to optimised production technology (OPT). OPT is a production tool for the control and planning of a system. Creative Output Inc. owns the proprietary rights of this software product. The purpose of the software was to identify and manage the bottlenecks in manufacturing processes (Panizzolo and Garengo, 2013:1). TOC could be used in administrative, service, manufacturing, and supply chain processes. The concept was popularised in a book called "The Goal: A Process of Ongoing Improvement," by Dr. EM Goldratt and Jeff Cox. Anything that keeps an organisation from achieving its goals is a constraint. Constraints could be physical, such as insufficient labour capacity, or material bottlenecks along the manufacturing floor or supply chain. Constraints appear in various forms, such as behavioural cultural norms within an organisation, poor labour attitudes, or an absence of effective training programmes. A bottleneck is a constraint that restricts the flow of materials, reduces product output capability, decreases overall capacity, increases the cycle of processes. By its nature, a bottleneck has a negative impact on an organisation's customer service base and fellow supply chain partners. Wisner and Stanley (2008:233) stress the importance of understanding that one or more bottlenecks will always exist in an organisation. As soon as one bottleneck is identified and exploited, a new bottleneck will appear at the

surface (which becomes the new primary constraint). Therefore, organisations need to understand that identifying and treating bottlenecks is an extant process. It requires continuous concern and could assist the organisation by keeping it up-to-date (Wisner and Stanley, 2008:233).

During the 1980s, Dr EM. Goldratt began to apply mind-sets and methods to improve the management of organisations (Barnard, 2011). Dr Goldratt asserted that manufacturers were not productive enough in scheduling and controlling resources and inventories (Jacobs and Chase, 2014:620). Dr Goldratt and his associates from Creative Output Inc. further took the initiative by developing software that could schedule work by means of manufacturing processes, taking into consideration limited materials, personnel, tools, facilities, machines and any other constraints which had the ability to limit a firm from following a planned schedule. The schedules were capable of running on a computer much faster than the time required of a material requirements planning (MRP) system. The software was precise and viable. The scheduling logic was distinct because it separated the non-bottleneck from bottleneck operations. In explaining the principles that formed the foundation of OPT scheduling logic, Dr Goldratt described nine fundamental scheduling rules (Jacobs and Chase, 2014:620). Subsequent to approximately 100 firms installing this software, Dr. Eliyahu M. Goldratt promoted the logic behind OPT rather than the software itself. Below are the rules governing production scheduling:

1. Balance the flow – do not balance capacity;
2. The level at which a non-bottleneck resource is used is determined by the potential of another constraint in the system;
3. „Utilising a resource“ and „activating a resource“ are not the same;
4. Time lost at a bottleneck means time lost for the entire system;
5. Time saved at a non-bottleneck is an illusion;
6. Both throughput and inventory are governed by bottlenecks;
7. The transfer batch and process batch should not be equal to each other;
8. The process batch should be volatile along its route and in time; and
9. Examining system constraints allows for prioritisation to take effect (Jacobs and Chase, 2014:620).

The TOC focuses primarily on the operation that constrains an important process or on the weakest link that restricts the performance of the whole system (Barnard, 2011). The latter



author further attests that system performance is limited by constraints. If these components (system performance and constraints) are managed in an effective manner, the better overall performance of the system will lead to goal attainment. Underlying the work of Dr Goldratt is the notion of synchronous manufacturing (Jacobs and Chase, 2014:621). This means that the entire production process needs to work in harmony in order to achieve its goal. Synchronous manufacturing emphasises total system performance, and not confined measures such as machine utilisation and labour.

Within every system, there is a constraint (Pandit and Naik, 2013:15). If this were not true, then all profit-making organisations would make unlimited profits. Anything which limits an organisation from achieving high performance against its goal, is a constraint. Constraints within a system represent opportunities for continuous improvement (Pandit and Naik, 2013:15). It is the opposite of most thinking, as the TOC views bottlenecks as positive, rather than negative. Since the bottlenecks determine the overall performance of a system, a moderate advancement of the system's bottlenecks will enhance the system's performance. Such an orientation enables an organisation to distinguish between what it must „start“ doing to improve the entire organisation, but most importantly, what the organisation must „stop“ doing that is not of any contribution to its goals. Dr Goldratt noticed that a focus oriented process of this nature (from „start“ to „stop“) would need to be supplemented with the relevant decision support systems and thinking tools in order to develop and take advantage of the cause-effect relationships between the bottlenecks and non-bottlenecks which preside over the performance of a system.

#### **2.3.2.2 The Five Step Process of On-going Improvement**

The TOC encompasses two paramount components. The first is a philosophy which justifies the working concept of TOC as formed by the five focus oriented steps of continuous improvement, the drum-buffer-rope (DBR) scheduling methodology, and the buffer management information system. The following five ideas are referred to as the TOC's "logistics paradigm" (Pandit and Naik, 2013:16). The TOC's second component is concerned with an inclusive approach to investigate, analyse, and solve compounded problems. This aspect is known as the thinking process (TP). Authors such as Ronen and Starr (1990:597; Siha (1999:256); Mabin, Forgeson and Green (2001:172; Barnard (2011; Blom (2011); Groop

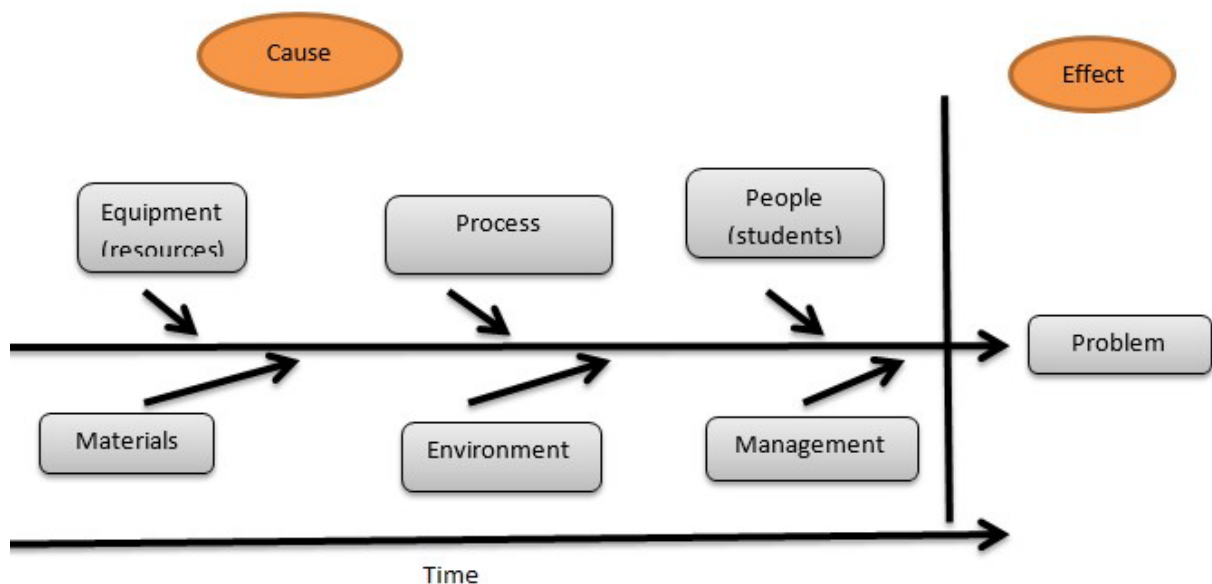
(2012:36); Honiball (2012:10); Sale and Sale (2013:109); Jacobs and Chase (2014), attest to the critical significance of the following five focus oriented steps of the TOC:

1. Identifying the constraint;
2. Exploiting the constraint;
3. Subordinating other activities to the constraint;
4. Elevating the constraint: and
5. Restarting the entire process to avoid inertia and ensuring continuous improvement.

### **Step 1: Identify the Constraint**

ACCA (2011:4) supports the view that the identification of the system's constraint is the first. Wisner and Stanley (2008:234) state that an effective way of identifying a bottleneck within a system is by creating reports so that comparisons could be made, or simply investigating the tell-tale signs of a bottleneck within a process. Timilsina (2012:8) agrees with Wisner and Stanley (2008:234), and reinforces the argument that bottlenecks are the main reasons for slow-downs in production. These bottlenecks need to be identified, analysed, and resolved. The bottlenecks are usually visible because they are distinguished by unfinished work (also known as work-in-process). This means that whatever seems to be limiting the system from achieving high performance levels in relation to its goals, must be isolated (Sadat et al., 2013:62). As a means of identifying a possible bottleneck, a load analysis could be utilised to examine the quantity of capacity being used. Groop (2012:38) contends that in establishing the efficacy or otherwise of a system's capacity, it is essential to answer a question such as: "If the system had more of this, would it enable the organisation to achieve its goal at the desired rate?"

The efficient and appropriate identification of a bottleneck helps to reduce production costs and enhances the efficiency of a system as a whole. It is important to understand that there are short-term and long-term bottlenecks within a system, which could be identified by means of the fishbone diagram. A fishbone diagram is an efficient and effective method for identifying the root causes of a problem (Timilsina, 2012:8). It is systematic and graphic, and uses categories to structure and focus thinking. This happens in order that the root causes could be determined. The cause-effect fishbone diagram is also known as the Ishikadiagram, pioneered by Dr Kaoru Ishikawa. The fishbone concept propounds that in order for an effect to arise, there has to be a cause (Timilsina, 2012:8). Once the data is collected, it is analysed with precision in order to determine the core issue(s) of a particular problem. Below is the researcher's diagrammatic representation of the fishbone effect derived from Timilsina, 2012).



**Figure 2.3: The Fishbone Diagram Source: Designed by the Researcher**

### **Step 2: Exploit the Constraint**

In order to maximise the performance of a constraint, an organisation should make use of its current resources, which requires the elimination of policy constraints, dummy constraints, and ensuring that the resource constraints which govern throughput are maximised. A twofold approach could be used to exploit the constraint: effectiveness and efficiency (Groop, 2012:39). Effectiveness suggests that, since demand could not be met because of a resource constraint, it should rather place effort on preferred items. These items should be the ones that make the greatest contribution to the goal of the organisation. For example, in a profitdriven business, the bottlenecks should lean toward the products and services that generate the most money per constraint minute. Efficiency means that the organisation needs to ensure that the resource should never fall short of items to process; this could be achieved by maximising the resource constraint utilisation (Groop, 2012:39).

### **Step 3: Subordinate Other Activities to the Constraint**

Groop (2012:40) suggests that as soon as the bottleneck has been identified, a policy needs to be established that will ensure the management of non-constraints and non-critical resources. Subordinating other activities to the constraint entails moulding the non-bottlenecks around the bottleneck. The non-bottlenecks should submit to the bottleneck, ensuring that the bottleneck capacity is kept busy at all times. Therefore, rather than maximising the productivity of each resource, the aim should be to maximise the efficiency of the constraint (Rajesh, 2014:7). It is important to manage the protective capacity in the non-bottlenecks so that they are always available to buffer the constraint with additional work. In addition, to reduce the level of inventory, the non-bottlenecks should be wary of supplying more than the bottleneck could accommodate. The drum-buffer-rope (DBR) approach is the scheduling technique used for the TOC, and is explained further as the chapter progresses.

### **Step 4: Elevate the Constraint**

For the throughput of the entire system to be improved, it is important to increase capacity by elevating the constraint (Groop, 2012:40). Elevating the constraint is different from the previous steps, as it involves making investments regarding capacity needs; whereas the other steps are more focused on using current resources (Chou, Lu, and Tang, 2012:4687). If the constraint is internal, elevating it would mean procuring or outsourcing additional manpower or equipment.

### **Step 5: Restart the Entire Process to Avoid Inertia and Ensure Continuous Improvement**

Chou et al. (2012:4687) postulates that ensuring that the new system configuration is examined is an efficient way to fortify changes that have been made prior to the constraint. Applying these five focusing steps will improve the planning, execution, and management of operations (Barnard, 2011). These five focusing steps are able to reduce the primary causes of high operating expenses, mediocre due-date performance, and low throughput due to internal bottlenecks. These causes comprise of unfocused improvement initiatives, inefficient/ineffective buffering, variable demand and supply, unsynchronised priorities, and overproduction.

Notwithstanding its merits, Denisa (2012:162) indicates some TOC aspects are fraught with deficiencies in the real world. The author postulates that having to deal with a number of

constraint resources is problematic. The TOC is suitable for uncomplicated bottleneck problems, but fails to provide the most favourable solutions when applied to extensive problems that have numerous bottlenecks. However, Denisa (2012:162) agrees that the TOC is currently the only problem-solving method that could produce the best results, but is not sufficient for all problems

### **2.3.2.3 The Theory of Constraints in Service Organisations**

There have been numerous management methods, techniques, and philosophies that have been used in manufacturing organisations (Librelato et al., 2014:922). Different types of organisations have made use of these techniques and philosophies in an attempt to improve performance in an increasingly competitive environment. Although the industrial management philosophies have been guided towards manufacturing firms, there has been an increase in the number of service organisations applying them (Motwani et al., 1996:53). For instance, Groop (2012:71) reports that the theory of constraints has been applied to service organisations such as banks, engineering/product design, court systems, food services, education, government sector services (utilities, publishing of statistics, military organisations, administrative processes, preventive maintenance, information systems, insurance, personal productivity, and employee retention in police departments and fire departments).

Service organisations face the same kind of market pressures that private sector organisations experience. Motwani et al. (1996:53) suggest that it is possible and beneficial to apply management techniques and philosophies such as the TOC to service organisations, since all industries require continuous improvement, citing that: “The theory of constraints (TOC), TQM (total quality management) philosophy and JIT (just-in-time) could be used effectively to assist managers of service organisations in identifying their organisational goals, constraints, and the most effective solutions”. The TOC technique could also be applied to organisations that do not necessarily operate for a profit, but strive to achieve non-financial goals and financial survival. This method was able to improve throughput levels of profit and non-profit organisations. For example, utilising a shop-specific control technique (such as the DBR approach) was beneficial to the Red Cross organisation. The notion of continuous improvement needs to be examined. The theory of constraints (TOC) positions itself, in that, only by attending to the weakest link in a chain will it ensure a desired effect for the organisations bottom line.

It is important to first determine what the organisation's goal is, in order to measure the effect the constraints may have. Groop (2012:167) suggests that the TOC as a whole would not fit into the context of a service environment. However, the author does state that the thinking processes of TOC could be applied in a service organisation. The thinking processes are an effective tool to determine the factors that cause poor productivity. Moss (2007:4) elaborates further that the use of TOC thinking processes could be used in services just as effectively as in manufacturing. Services need a management philosophy that will act as a guide for process improvement. The TOC thinking processes and problem-solving techniques could attain the most benefit for service organisations.

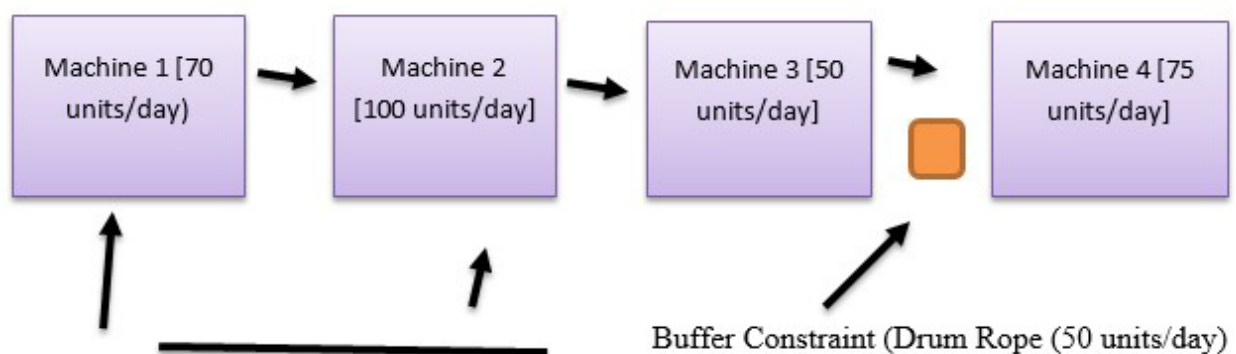
#### **2.3.2.4 The Drum-Buffer-Rope (DBR) Effect**

It has been demonstrated writ large that service organisations could apply the basic philosophy of the theory of constraints (TOC). The five-step process of ongoing improvement has been used in procedures and processes within the service environment. This process has been used to improve re-engineering, administrative functions, information flows, and service times. The focus steps have also been used in sales and logistics functions within the military (Moss, 2007:4). The Drum-Buffer-Rope (DBR) scheduling tool could be utilised in a service environment. Manufacturing organisations use the DBR tool to schedule machinery. On the other hand, services could use the DBR tool to schedule human resources within the organisation, to administer appointments for customers, or envisage lead-times for customers. Buffer management could also be used to identify any weaknesses or problems that may cause disruptions in a system (Moss, 2007:4).

The DBR technique has been highly recommended for managing supply chains effectively (Bhardwaj et al., 2010:103). Goals need to be explicitly identified, accurate measurements should be made, and the bottlenecks, whether physical or policy need to be managed correctly or altered to ensure that there is on-going improvement. It is fascinating to note that the practical methodologies of TOC in a manufacturing context could be adopted for use in the context of a service organisation. The DBR technique has been widely used across a number of manufacturing organisations, purely because it allows for better decision-making and scheduling. As described by Bhardwaj et al. (2010:103) the drum is the constraint that commands the overall velocity of the system; it is the exploitation of the constraint in the

system. The constraints may be factors such as management policy, market demand, scarce raw materials or a resource. Of particular importance is the fact that in order for the drum to be exploited, it needs to include a detailed schedule that will be executed by the system.

A buffer could also be referred to as „protection time“, needed to protect critical areas. For instance, protecting the operation by ensuring that the constraint does not occur (Costas et al., 2015:2050). Some of the reasons accounting for disruptions include unreliable supplies, breakdowns, unavailable resources, or fluctuating set-up times. The rope of the system acts as a link. The rope of the system is specifically designed to ensure that all the links within the system are commanded by the beat of the drum. In a manufacturing context, this is executed by creating a detailed scheduling process for releasing raw materials onto a shop floor. The DBR technique is rooted in the TOC’s five-step process of on-going improvement (Costas et al., 2015:2054). Figure 2.4 below is a representation of the DBR concept:



**Figure 2.4: The Drum-Buffer-Rope Concept**

**Source:** Wisner and Stanley (2008)

### 2.3.2.5 The Taguchi Concept

Dr Genichi Taguchi, a Japanese consultant who specialised in quality management, is regarded as the father of the Taguchi concept (hence the term „Taguchi concept“). He was. Dr Taguchi is responsible for developing and promoting a philosophy and methodology for continuous/on-going improvement (Antony and Antony, 2001:141). The Taguchi philosophy illustrates how statistical design of experiments (SDOE or DOE) could assist in designing and manufacturing high quality products. The core focus of the Taguchi concept is eliminating anything that has the potential to cause an inferior quality and ensuring the products are insensitive to variation (Antony and Antony, 2011:141). The DOE technique is a powerful tool for determining the

most favourable settings of a process and thereby attaining improvements in process performance, reductions in process variability, and improvements in the manufacturability of process and products. In this study, the Taguchi concept will assist in designing an Honours degree that will produce high quality graduates.

According to the Taguchi concept, the quality of a product is defined in terms of the „loss“ imparted by the product to the society from the time it is shipped to the customer (Lofthouse, 1999; Khan and Al-Darrab, 2010). In addition, Lofthouse (1999:218) postulates that this loss entails customer dissatisfaction which, will eventually have a negative effect of the organisation’s reputation. Taguchi is distinguished by the fact that it puts the customer at the forefront of the issue. The future return of customers is primarily dependent on quality services and products, hence improved reputation and greater market share. When a product’s functional characteristics deviate from its desired target value, this contributes to some of the losses (also known as loss because of functional variation). The uncontrollable factors, also known noise factors, cause a product’s functional characteristics to deviate from the initial target values. Uncontrollable factors could be classified as external factors (such as human error), manufacturing imperfections and the deterioration of a product. Quality engineering aims at making robust products with respect to all the uncontrollable factors (Khan and AlDarrab, 2010:65). In the same way, the university is focused on producing quality students despite all the existing constraints. These ideas are founded on the basis that quality could be attained by choosing the design parameters that will allow the quality throughput at a lower cost under several noise factors. When the highest quality is attained, the loss to society, for instance, the costs incurred by the producer, and the customer, are decreased (Taner & Antony, 2000:300). A signal to noise ratio (S/N) is used to measure quality in a product. It combines the desired outcome with any undesirable noise that causes variation in the outcome. This index has been used to calculate several systems, including continuous inputcontinuous output systems (Taner and Antony, 2000:300). This aspect of Taguchi identifies with the system applied at the university whereby the system is continuously receiving students.

## **2.4 Quality Function Deployment**

Quality Function Deployment (QFD) came into existence in 1972. Its development and implementation was carried out in Japan at the Mitsubishi Heavy Industries (Yilmaz, 2009:6). From 1977 to 1984, Toyota was able to decrease its pre-production costs by sixty per cent, and



the amount of time for its development by one-third, due to the use of the QFD process. Some of the early users of QFD include Toyota, Procter, Ford Motor Company, Gamble, AT&T (American Telephone and Telegraph), Digital Equipment Corporation, Hewlett Packard, and 3M Corporation. Originally, QFD was proposed through the collection and analysing of customer voices to develop products and services of higher quality to meet and exceed the needs of customers (Buyukozkan and Berkol, 2011:13733). Therefore, the core functions of QFD are customer needs analysis, quality management, and product development, design, engineering, decision-making, teamwork, management, costing and timing. QFD is an efficient tool to use when products are developed, and the benefits of this tool are well documented (Yilmaz, 2009:6). Furthermore, QFD is customer-driven and is important in designing products. Yilmaz (2009:6) and Raharjo, Xie and Brombacher (2011:3653) agree that QFD collects and translates customer requirements into the suitable technical requirements at each phase of development and production (for instance, product design, planning, production, process development).

When a product has been conceived, the main focus is on who the customer is, since the customer determines the work to be accomplished (Raharjo et al., 2011:3653). The needs and wants of the customer will determine whether simple improvements are possible, whether technologies are needed, or whether a totally new concept is insisted on. The critical point of the QFD process involves understanding that success in the marketplace is solely dependent on the success of determining customer requirements (Wang, 2010:908). Customer requirements are the cornerstone of QFD projects. It is also important to analyse the customer requirements and receive them unapologetically. According to Wang and Xiong (2011:14428) today's global market place is highly competitive, and in order for an organisation to thrive, it needs to have customer satisfaction at the forefront and as a permanent goal. The latter state of affairs accrues due to customer satisfaction increasing and having a positive effect on business performance, cash flow, and consumer spending.

QFD is a highly recognised customer driven approach used for making new products and services, developing them to attain specific customer requirements and ensuring that customer satisfaction is maximised. At the core of QFD is the aim to translate collected customer requirements into engineering features, and eventually into part attributes, process frameworks

and requirements for production. According to Wang and Xiong (2011:14428) there are four phases that govern the QFD process. These four phases are:

- Product planning;
- Parts deployment; □ Process planning; and □ Production planning.

The four phase cited above outline the critical functions of QFD in relation to the delivery of quality customer services, thus adding value to the core functions and goals of an organisation.

#### **2.4.1 Advantages of Quality Function Deployment**

There are several advantages that accrue from utilising the quality function deployment approach. The first advantage is that it is totally focused on the customer. There is a high probability of achieving customer satisfaction, as it concentrates primarily on the customer requirements and the ratings of customer importance (Maewell & Dumas, 2012:6). The QFD allows for higher levels of communication and customer satisfaction within an organisation. The QFD could be implemented by more than one department within an organisation's horizontal communication systems. The results include a higher level of understanding of the customer's needs throughout the organisation, which leads to agreement in terms of strategy and decision-making. However, Wang (2010:908) argues that due to uncertainties in the information loop, the QFD is inconsistent in presenting information such as the relationships between customer needs and proposed solution schemes, and whether or not the solution schemes are relevant.

#### **2.5 Capacity Management**

This section covers the importance of decisions regarding capacity in organisations. Capacity could be described as the maximum amount of units that an operating unit could handle at a specified period of time. Organisations need to plan for capacity and the many basic questions that come with long-term consequences. According to Stevenson (2002:174), capacity management is important for all levels within an organisation. Examples of operation units include departments, plants, machines, workers, or a store. The amount of capacity that an operating unit could handle is an important piece of information for planning, since it allows managers to quantify the production capacity of an organisation in terms of its throughput, and

thereby make plans or decisions in line with those quantities. The following three questions need to be answered by an organisation regarding capacity:

1. What type of capacity will be needed for this?
2. How much of capacity will be needed for this?
3. When will the capacity be needed?

The first question is dependent on the type of products and services that an organisation produces or provides, since capacity planning is governed by these choices. The kinds of products and services that an organisation intends to sell are the most important decisions that the organisation will make. All decisions regarding capacity, location, facilities, and so on, are governed by the choice of product or service. In some cases, capacity choices are made on a regular basis; in others, they are made infrequently as part of a continuous process. In most cases, the capacity choices are influenced by factors such as competition, the rate at which product design and equipment change technologically, and how stable demand is (Stevenson, 2002:174). Other important factors include whether or not „change“ in a product or service is important (for example, clothing and automobiles). As a rule of thumb, organisations need to ensure that they review the choices of products and services periodically so that if capacity changes need to be made, they could be for reasons such as cost, competitive effectiveness, and numerous other reasons.

### **2.5.1. Capacity Management in Services**

The service sector is growing at a rapid rate in many countries. The increase in the number of services means that organisations have the responsibility to increase their productivity, competition, and efficiency, which requires the organisation to manage the available capacity it has productively. This is not a simple task. The aim of capacity management is to avoid idle capacity and minimise the amount of time customers have to wait. The primary objective for the organisation is to attend to demand in a timeous manner and with as much efficiency as possible. Adenso-Diaz et al., (2002:287) define the capacity of a service as the highest possible amount of output that may be obtained within a specific period of time with a predefined level of staff, installations, and equipment.

### **2.5.2 Customer Service Quality**

Quality education is concerned with meeting or exceeding customer/student needs and expectations. Institutions have shifted toward focusing more on how students perceive high premiums and the level of service quality (De Jager and Gbadamosi, 2013:110). The expectations of traditional students have changed and continue to change. In today's higher education institutions, student populations do not only comprise of young and mature people. They comprise of a heterogeneous population that includes working professionals, more women, and an increasing number of part-time students. These groups of students are more demanding of service delivery (De Jager and Gbadamosi, 2013:110).

Largely due to factors such as globalisation, democratisation of societies, massification, and the advent of ICT, tertiary education institutions have evolved into a global enterprise, and universities have the responsibility to consistently explore further options for the dissemination of quality tertiary education services (Yousapronpaiboon, 2014:1088). Aggressive competition among higher education institutions (HEIs) through high service quality and competitive advantages is increasingly apparent in today's global environment (Cardona and Bravo, 2013:23). In addition, the tertiary education sectors – where no tangible products are involved – the type of service that is provided acts as a demarcation between the various institutions in terms of which one is able to create a unique experience of superior quality. Acquiring new customers and maintaining current customers, have been the main two approaches adopted by service organisations. Given their highly competitive environment, higher education institutions are expected to deliver high levels of service quality. However, Yousapronpaiboon (2014:1088), states that there is no competition regarding outcomes such as research and innovation. Assessing service quality in higher education could contribute immensely for management and staff to continue enhancing the quality of higher education institutions' services to their multiple stakeholders.

A service is intangible, and could only be assessed when merged with other tangible productive processes (Umamaheswari, 2014:712). The intangible nature of a service is associated with the process, which is physically not palpable. In other words, the provision of a service and its consumption occur simultaneously. Lupo (2013:7096) identifies the following characteristics of a service: perishable, heterogeneous, sharing product, inseparable, and intangible. Production occurs once the service has been ordered and culminates when the demand is met

(Umamaheswari, 2014:712). Service quality measures if the service delivered is in synchrony with actual customer expectations (Thaichon et al., 2014:1047). Mert, Waltemode, and Aurich (2014:254) suggest that quality criteria such as sovereignty, empathy, obligingness, reliability, and physical environment could be used to assess service quality. However, evaluating service quality is more difficult than evaluating product quality, but it plays a significant role in enhancing customer loyalty and satisfaction of a firm (Liu et al., 2014:1). The level of service quality is a driver of service-based firms and acts as a significant differentiator in highly competitive business environments. Customers' value, trust, and commitment could be positively influenced by enhancing a firm's service quality. Long-term business success and customer loyalty are highly dependent on these factors (Thaichon et al., 2014:1047).

Abari, Yarmohammadian, and Esteki (2011:2300) isolate 10 dimensions in identifying service quality: facilities, reliability, responsibility, communication, credit, security, qualification, politeness, understand the client, and availability. However, these dimensions could be summarised into the following five dimensions:

1. **Facilities:** staff appearances, student accommodation, and physical facilities
2. **Reliability:** the staff members at the university need to be able to perform services in a precise and reliable manner;
3. **Responsibility:** staff members need to have built-in character to serve students in time;
4. **Guarantee:** knowledgeable and polite staff who possess the ability to produce assurance and reliability for the students;
5. **Sympathy:** ensuring that each student receives personal attention.

Higher education institutions have been seeking ways in which to improve service quality (Foropon et al., 2013:1). The SERVQUAL model, as described by Faganel (2010:214), provides five dimensions in determining service quality:

- **Reliability:** this means that the service provider delivers a service in a timely and accurate manner without any errors and delivers exactly what was agreed upon by both parties (Faganel, 2010:214).
- **Responsiveness:** this entails the service provider fulfilling tasks such as service efficiency, going beyond the call of duty, and timely response, and monitoring the service process until completion (Liu et al., 2014:2).

- **Assurance:** employees in the organisation need to be knowledgeable, courteous, and able to inspire trust and confidence within the customers (Purcarea, Gheorghe, and Petrescu, 2013:575).
- **Empathy:** the service provider ensures that each customer receives individual attention and is cared for (Akhlaghi, Amini, and Akhlaghi, 2012:5286).
- **Tangibles:** this includes the physical facilities of the organisation, the equipment, and the appearance of the personnel conducting the service. The tangibles create an environment conducive to the service experience (Udo, Bagchi, and Kirs, 2011:1274).

Higher education institutions have the responsibility to provide high quality services to students in order to provide the community, government, and future employers with quality graduates. Assessing the quality of services and receiving feedback on the dimensions of quality is vital for HEIs' capacity to solidify a competitive advantage within the knowledge market (Faganel, 2010:213).

It is a growing culture around the world to receive feedback from students regarding their perception of the quality of their educational experiences (Cardona and Bravo, 2012:24). In order for higher education institutions to prioritise resource allocation and strengthen promotion plans and marketing, they need information on the quality of their academic activities and administrative processes. Since students are the primary consumers of educational services, it is only proper to engage them on their own experiences regarding academic activities and administrative processes (Cardona and Bravo, 2012:24). Quality is a term that is commonly considered to indicate a high level of customers' satisfaction which refers to factors that characterise a considered product or service (Lupo, 2013:7096).

## 2.6 Chapter Summary

The thematic focus of this chapter was on the discussion of Dr Goldratt's theory of constraints, which advances an approach for the continuous improvement of an organisation through its practical use of the five step on-going process. Spector (2011:3393) highlights the importance of the TOC and its potential to enable managers examine and control the most important factors in the organisation – its constraints – in innovative ways.

The flexibility of the TOC is one of the important factors that were highlighted. The TOC was created for manufacturing organisations, but it could also be applied to enhance the

performance of service oriented organisations, including those that do not operate for profit. The TOC concept allows organisations to successfully identify their goals, detect the constraints which inhibit the organisation's maximum performance, and proceed to develop practical measurements to guarantee on-going improvement in tandem with the goal of the organisation. The next chapter discusses the research design and methodology used in the study.

## **Chapter Three Research Methodology**

### **3.1 Introduction**

The research design and research methodology employed in this study were succinctly outlined from sub-sections 1.9 to 1.11.2.3. Meanwhile, the previous chapter presented a review of relevant literature from different theoretical perspectives. The main headings included the conceptual and theoretical frameworks of this study. In chapter 3, the aim is to provide an overview of the research methodology used, the data collection method, and the data analysis processes that were used to achieve the objectives of the study. The current chapter incorporates the research paradigm, study site, target population, sampling strategies, sample size, data collection method, administration of data collected, and pilot testing.

### **3.2 Research Paradigm**

The researcher used quantitative research for this study. This type of research paradigm focuses on collecting numerical/quantitative data that is statistically analysed (Bless, HigsonSmith, and Sithole (2013:16). The numerical data could take on different types of forms, such as scores, durations, ratings, or counts of incidents (frequencies of occurrence). The collection of quantitative data could be administered in both naturalistic and controlled environments, field studies or laboratories, from specific populations or samples from a general population (Jupp, 2006:250). Quantitative research has its pros and cons, but most importantly, it provides objective facts about the behaviour of the world and its citizens.

### **3.3 Research Design**

There are basically six types of identifiable research designs. These include exploration, description, explanation, prediction, evaluation and historical research design (van Wyk, 2012:8). The researcher adopted the descriptive exploratory approach. A descriptive

exploratory study is considered to be the most useful and suitable research design for research projects that address a subject of high uncertainty, and in which paucity of knowledge is prevalent (van Wyk, 2012:8). Exploratory studies are focused on identifying boundaries of the environment in which the problems, situations or opportunities of interest are likely to be found. Furthermore, an exploratory study identifies the variables that could possibly be found which may be relevant to the study (van Wyk, 2012:8).

The deductive approach reinforced the descriptive exploratory research design, in that the researcher found the social theory (TOC) and its test implications compelling (Bellamy, 2012:76). A deductive approach is typically associated with scientific investigation. The researcher begins with studying the works of others, reads the theory of the phenomenon, and then tests the hypotheses that emerged from those theories. The exploratory nature of the study obviated the inductive approach, since theory development was not *sine qua non* to the broader and more specific intentions of the study. An inductive approach begins with observing data and then moving onto the theory, or from a specified level to a general level (Bellamy, 2012:76).

### **3.4 Research Population**

A population is the universe of units pertaining to the *place* where the sample will be drawn (Bryman and Bell, 2007:182). As defined by Sekaran and Bougie (2009:262), a population is the whole group of people, events, or things that the researcher is interested in investigating. Sarantakos (2013:167) concurs, and states that the target population is a representative group from which information is required. The population for this study were the registered Honours students at the five campuses for the 2014 academic year at the University of KwaZulu-Natal, in the KwaZulu-Natal Province, South Africa.

### **3.5 Sample Size**

Estimating sample sizes varies significantly. Some emphasize an interest in quantity, others in quality, and some both. The sample needs to be as large as possible, and as compact as possible. There are 1 380 students currently enrolled in the Honours degree at the UKZN. For purposes of this study, the researcher decided to opt for quantity. The researcher made use of the table for sample sizes of given population sizes in Sekaran and Bougie (2009:295). The table indicated that a population size of 1 300 would merit a sample size of 297. On the other hand,



a population size of 1 400 would merit a sample size of 302. In order for the study to have greater weight, the researcher opted for a sample size of 302 respondents. Below are stratified samples of the different Colleges at UKZN represented in tabular form.

**Table 3.1: College of Agriculture, Engineering & Science Honours Students**

| Qualification Description                                | Current Enrolled Honours Students |
|----------------------------------------------------------|-----------------------------------|
| School of Engineering                                    | N/A                               |
| School of Agriculture, Earth, and Environmental Sciences | 161                               |
| School of Chemistry & Physics                            | 76                                |
| School of Life Sciences                                  | 109                               |
| School of Mathematics, Statistics and Computer Science   | 17                                |
|                                                          | <b>Total: 363</b>                 |

**Source: UKZN administration staff members**

From the data above, it is evident that Honours students in the School of Agriculture, Earth, and Environmental Sciences are in the majority (N=161).

**Table 3.2: College of Law & Management Studies Honours Students**

| Qualification Description                                 | Current Enrolled Honours Students |
|-----------------------------------------------------------|-----------------------------------|
| School of Management, Information Technology & Governance | 642                               |
| School of Finance, Economics & Accounting                 | 141                               |
| School of Law                                             | N/A                               |
| Graduate School of Business & Leadership                  | N/A                               |
|                                                           | <b>Total: 783</b>                 |

**Source: UKZN administration staff members**

Table 3.2 indicates that Honours degree students from the School of Management, Information Technology and Governance are in the majority (N=642).

**Table 3.3 College of Health Sciences Honours Students**

| Qualification Description | Campus | Current Enrolled Honours Students |
|---------------------------|--------|-----------------------------------|
|---------------------------|--------|-----------------------------------|

|                                     |           |                   |
|-------------------------------------|-----------|-------------------|
| Bachelor of Medical Science Honours | Mandela   | 34                |
| Bachelor of Medical Science Honours | Westville | 38                |
| Bachelor of Nursing Honours         | Howard    | 23                |
| Bachelor of Sport Science Honours   | Westville | 39                |
|                                     |           | <b>Total: 139</b> |

**Source: UKZN administration staff members**

The majority of Honours students in the College of Health Sciences (n=39) were enrolled in the Bachelor of Science Honours programme.

**Table 3.4: College of Humanities Honours Students**

| Qualification Description       | Current Enrolled Honours Students |
|---------------------------------|-----------------------------------|
| Applied Human Sciences          | 3                                 |
| Arts                            | 81                                |
| Religion, Philosophy & Classics | 6                                 |
| Social Sciences                 | 2                                 |
| Arts                            | 3                                 |
|                                 | <b>Total: 95</b>                  |

**Source: UKZN administration staff members**

The table above indicates that the majority of Honours students (N=81) were from the Arts. From the collective information from the tables above, it is evident that the majority of students (N=642) were from the School of Management, Information Technology and Governance.

### **3.6 Sampling Technique**

A sample is a group of subjects chosen from a sizeable group with the hope that conducting a study on the smaller group (the sample) will bring important information about the larger group (target population) (Vogt, 1993:200). A sample frame is the list of all the members of a target population who will be used as a basis for survey design (Puszczak et al., 2013:3).

In this study, the researcher made use of the stratified random sampling technique. This type of sampling technique is a probability sampling procedure according to which the target population is categorised into different strata, and a sample is then drawn from each stratum.

Sarantakos (2013:172) avers that this procedure yields an advantage, since it allows for all the population groups to be represented within the final sample. For this study, the division of the population was based on the different academic schools on all five campuses.

### **3.7 Data Collection Methods**

The researcher views data collection and research methodology as symbiotically related processes. Whereas data collection succinctly reflects on the systematic process of obtaining relevant evidence-based information from primary and secondary sources and facts pertaining to the subject matter under investigation, the research methods enhance the systematic utilisation of tools to obtain the required information. The purpose of a study, the type of skills the researcher has, and the available resources, determine the methods of collecting data for the researcher (Kumar, 2011:140).

#### **3.7.1 Questionnaire Development and Description**

A questionnaire is a list of written questions that are answered and recorded by the respondents. The researcher made use of questionnaires as the primary data collection instrument. During questionnaire administration, respondents read the questions in the questionnaire and write their answers. Kumar (2005:126) elaborates on the importance of constructing easy-to-understand questions because respondents usually do not have any one to explain the questions properly. Two prime advantages of a questionnaire are that it is relatively affordable to develop, and the respondents have the option of remaining anonymous in order to enhance anonymity. On the other hand, Kumar (2005:130) states that the disadvantages of using a questionnaire include limited application, a low response rate, a bias towards how the respondents are selected, a lack of opportunity to clarify issues, and there is hardly any allowance for spontaneous responses.

#### **3.7.2 Questionnaire Administration**

The most efficient way to have the questionnaires completed was to hand them out during the Honours degree students' classes. The researcher received permission from the respective academic lecturers before proceeding to hand out the questionnaires during class. After receiving permission from the lecturer, the researcher handed out the questionnaires to the Honours students. However, not all students were present at the lectures. The researcher

administered some of the questionnaires on a personal basis (for example going to postgraduate residences and asking people to complete the questionnaires).

### **3.7.3 Structure of Questionnaire**

The researcher used a questionnaire with six sections comprising of 36 questions. Section 2 encompasses dichotomous questions, with the respondent required to encircle or tick the boxes which have either a “Yes” or “No”. The researcher made use of a 1.5 Likert scale in the development of questionnaire variables/items. Respondents were instructed to specify the extent to which they would agree or disagree with each statement using the scale ranging from: “1” as strongly disagree; “2” as disagree; “3” as neutral, neither agree, nor disagree; “4” as agree; and “5” as strongly agree. The respondents were required to place a cross (X) next to the option they felt most comfortable with. The questionnaire is attached in the List of Annexures. Section One related to the biographical data of Honours students and includes gender, age, campus, registered college, school, discipline, which year they completed their primary degree, Honours class size, the entry requirement for their Honours degree, and their experience of technology systems at the library.

The questionnaire was structured in accordance with what was discussed in the research objectives and the literature review. The questionnaire encompasses themes such as capacity constraints, internal operations and magnitude of demand, quality function deployment, and the dimensions of capacity constraints. The relevant themes that were discussed in the literature review were categorised into five dimensions in the questionnaire:

- Section 2 (Questions 11-18) relates to the first objective of this study and focus primarily on the general perceptions Honours students have towards the capacity constraints at UKZN. For example: if the dynamics of capacity constraints (teaching, learning and research) influence the postgraduate students’ throughput quality at Honours level.
- Section 3 (Questions 19-26) relates to the second research objective of this study and the capacity constraints that students at Honours level experience. For example: if the capacity constraints at Honours level require individual students to own a personal laptop, tablet, or iPad.
- Section 4 (Questions 27-31) aims at achieving the fourth research objective by assessing the extent to which the internal operations have an effect on the progress of Honours

students. For example: if allocated consultation times with the lecturer work well with student timetable schedules.

- Section 5 (Questions 32-36) aims at achieving the third research objective and assesses how the Honours students feel about how their Honours degree has been designed. For example: if the Honours degree is designed in accordance with Honours students career goals.
- The questionnaire culminates in Section 6, with the Honours students given multiple choice type of questions from which to choose the most applicable dimensions of capacity constraints. For example, some students felt that some of the most important dimensions of capacity constraints were human resource shortage (not sufficient senior lecturers and professors) and funding\budget (budget shortfalls in the higher education).

### **3.8 Pilot Testing**

A pilot study is a version of a small-scale version of a study administered in preparation for the main study to be undertaken. It is a method used to pre-test a particular research instrument. When a pilot study is conducted properly, it increases the likelihood of a successful study (Lewis-Beck et al., 2004:823). Research studies should undergo pilot studies, as they serve as a warning mechanism for deviation from protocols, possible project failures, and problems with current methods/instruments, and also to uncover any political issues that could have an effect on the research study (Lewis-Beck et al., 2004:823).

### **3.9 Ethical Considerations**

Ethical considerations in research are of particular significance, as these are activities and processes which enhance both the quality and the scientific integrity of the study. In that context then, such considerations have a bearing on the researcher and the research process in its entirety” (Gibbs, 2007:7).

#### **3.9.1 Research-based Ethical Considerations**

The researcher-based ethical considerations „prescribe“ the researcher’s expected conduct and compliance with the administrative requirements, in order that permission is granted to proceed with the study. For purpose of this study, the following researcher-based administrative procedures were observed:

- The researcher has applied for ethical clearance to conduct the study from UKZN's Ethical Clearance Committee; and
- Written notification to the Heads of Schools/Faculties and respective lecturers during whose classes the questionnaires would be administered.

### **3.9.2 Respondent-based Ethical Considerations**

Whereas the researcher-based ethical considerations are more focused on the researcher's personal conduct in compliance with administrative requirements, the respondent-based ethical considerations are more concerned with the researcher's treatment of the research subjects. In this regard, three salient principles directed the treatment of respondents; namely, the principle of respect for human dignity and the principle of justice, and the principle of beneficence.

#### **3.9.2.1 The Principle of Respect for Human Dignity**

The respect for human dignity is a fundamental human right enshrined in the Constitution of the country (Act 108, 1996:3, 6-8). Entailed in this fundamental human right are the right to self-determination, the right to full disclosure, and the right to informed consent. All these rights are applicable to all citizens irrespective of race, class, gender, or even ethnic, cultural, and religious backgrounds.

The researcher will inform respondents of the reasons for the survey. The survey will only be administered once the respondents have given their un-coerced consent. All participants will be given Informed Consent forms. Respondents will further be informed of their right to withdraw from the study at any point. Issues such as privacy, confidentiality and anonymity will be addressed in the Informed consent form. Respondents will also be assured that the findings of the study will be made available to them if required.

#### **3.9.2.2 The Principle of Justice**

The principle of justice is entrenched in the Constitution. Research subjects do not necessarily „relinquish“ their human status merely due to their involvement in a study. They are still natural persons enjoying all the forms of rights and freedom prescribed and guaranteed by the Constitution of the Republic of South Africa (Act 108 of 1996). Accordingly, research subjects are entitled to fair treatment and obliged to legal recourse in the event that any of their rights

have been violated during the research process. Their right to privacy, confidentiality, anonymity, and voluntary participation are to be observed, respected, and protected.

### **3.9.2.3 The Principle of Beneficence**

The principle of beneficence ensures that all other principles are observed and enforced. Accordingly, all respondents are guaranteed freedom from any form of exploitation, harm, and danger. Logically, the researcher applies the principle of beneficence by being transparent and informing the respondents on all aspects pertaining to the study; including the purpose of the study, and the use to which the findings will be put.

### **3.10 Chapter Summary**

This chapter provided an overview of both the research design and methodology used in the study. The core focus of Chapter 3 was to discuss the research design and methodology that were followed in this study. The methods that were used for data collection were discussed, as well as the sampling techniques that were employed to select the participants of the study. Finally, the methods used to analyse the collected data were discussed and the steps that were taken to ensure that quality standards of measurement and data collected were observed. The next chapter focuses on the data analysis and the interpretation thereof.

## **Chapter Four Data Analysis and Interpretation**

### **4.1 Introduction**

This chapter narratively describes the research processes that were utilised in the statistical analysis and interpretation of the collected data in order to allocate intelligible and meaningful explanations to the reader. The statistical approach employed in the study incorporated included univariate, bivariate, and multivariate data analysis.

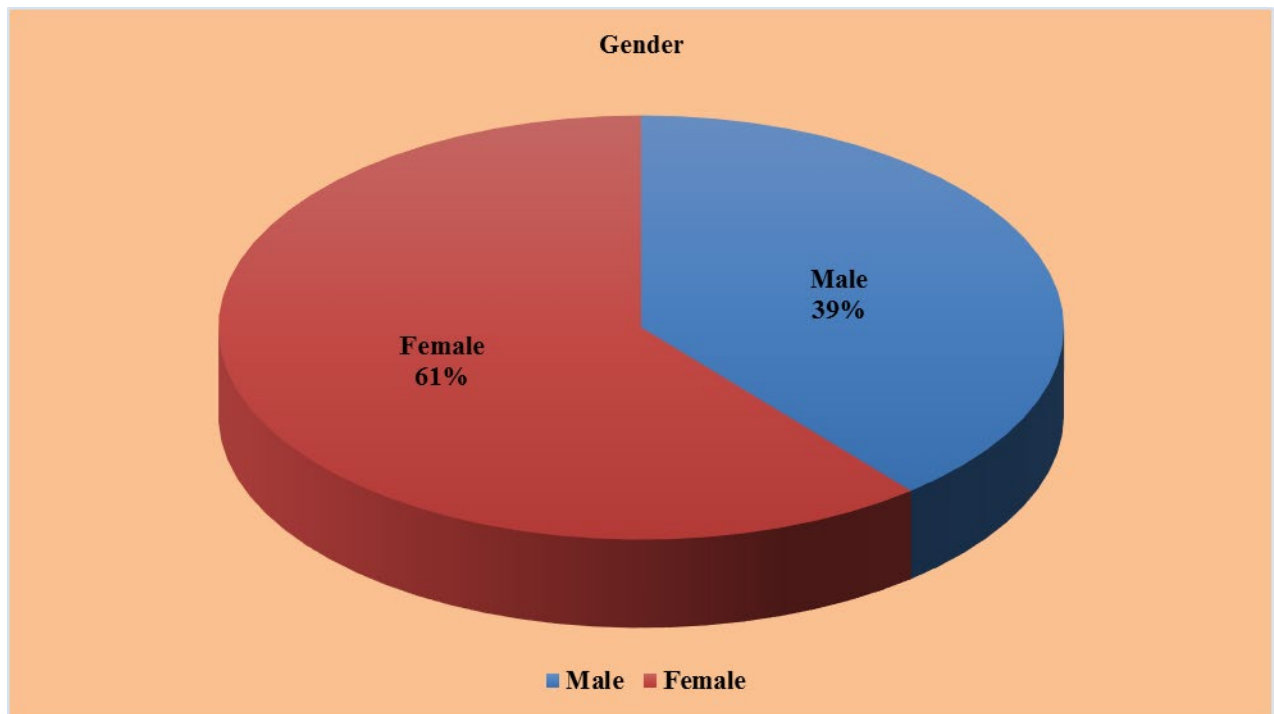
### **4.2 Univariate Data Analysis**

Univariate analysis was utilised mainly in the instance of inferences made based on interpretation of the collected data.

#### **4.2.1 Frequency Distribution**

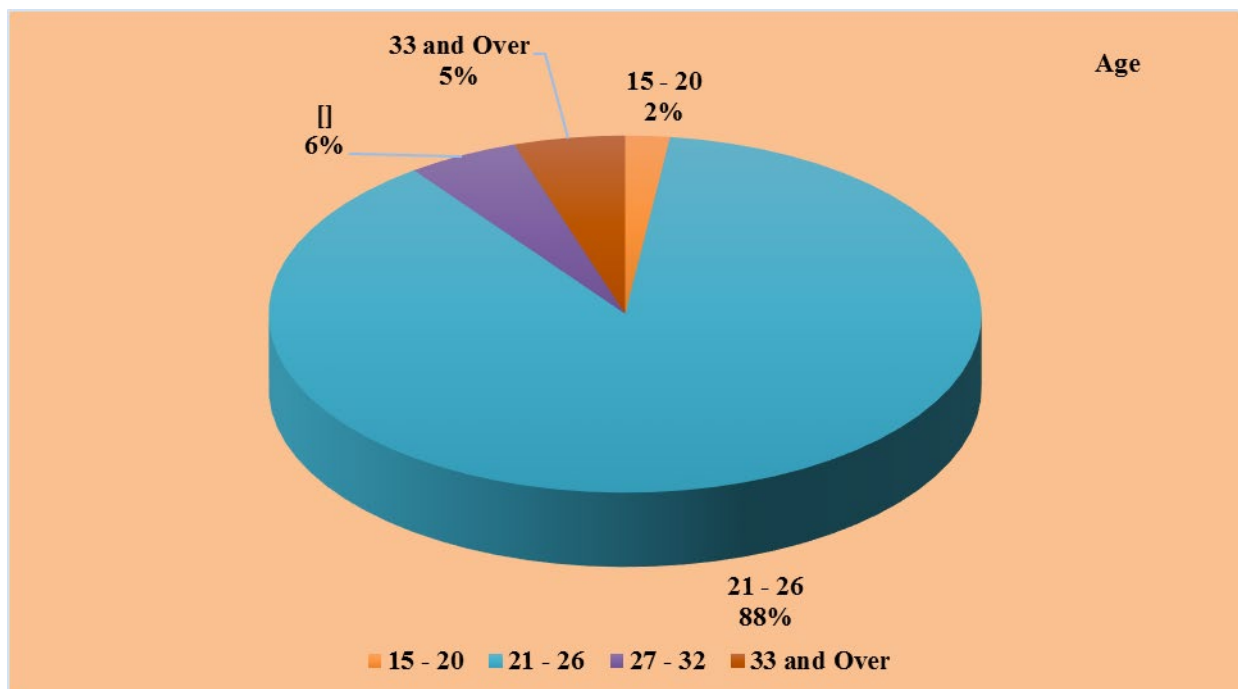
Frequency distribution graphs were presented for all question variables in the study.





**Figure 4.1: Gender**

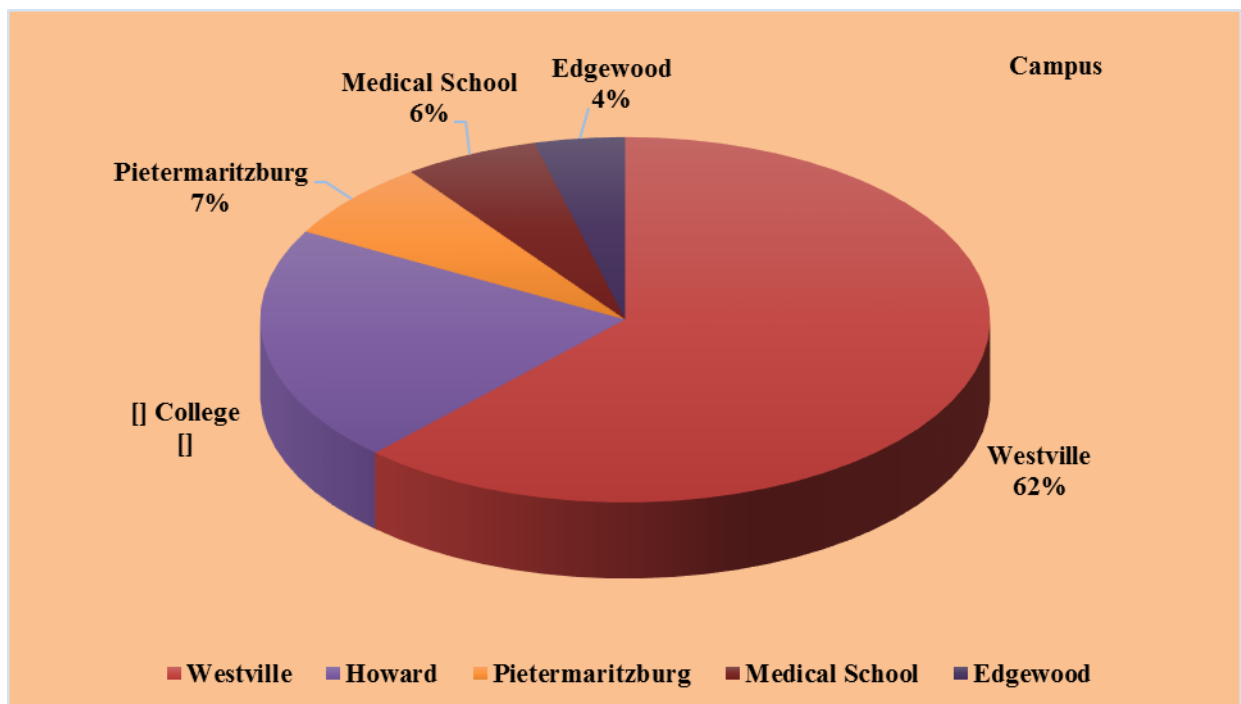
The output from this procedure shows a concise summary of the group scores distribution. Figure 4.1 suggests that a percentage of 61% female respondents higher than male respondents at 39%.



**Figure 4.2: Age**

Figure 4.2 shows that the highest respondents are from the age cohort of (21 – 26) with a percentage rate of 88%. The next age group that responded to the questions are in the age group of (27 – 32) with 6% response rate, whilst the respondents in the age group of 33 and above

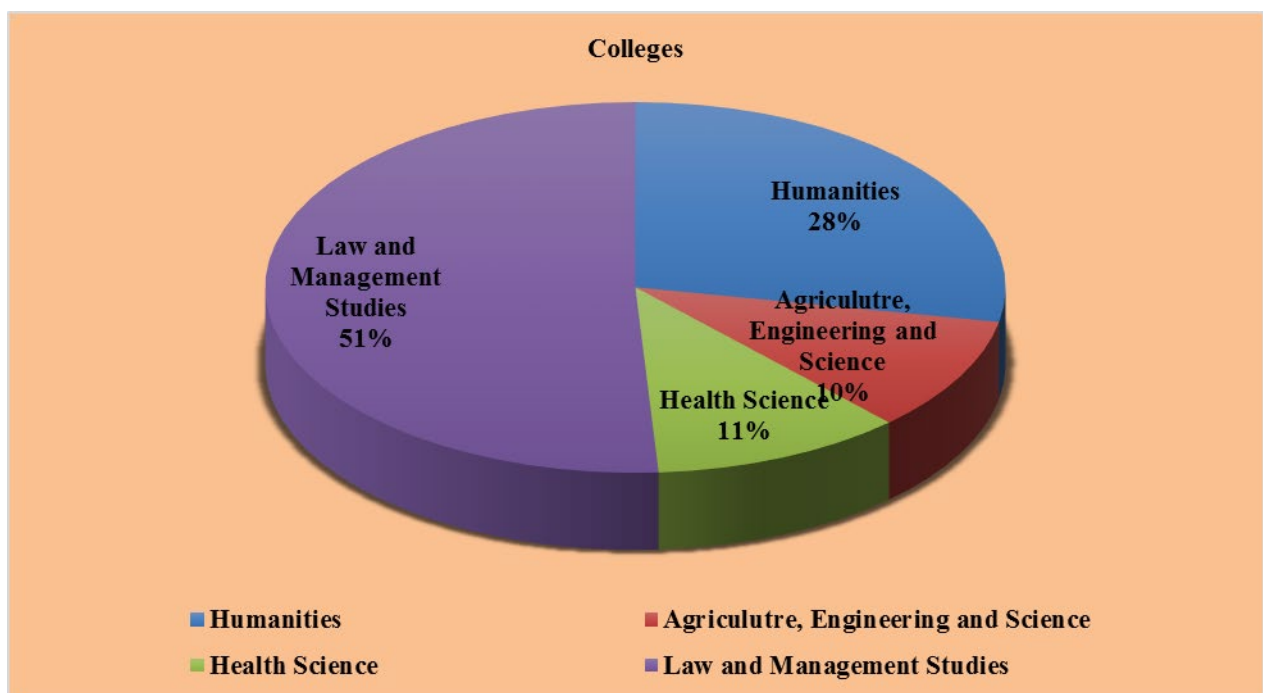
has a 5% response rate. The least responses elicited were from the age group of (1520), at 2% only. This study indicates that students within the age of (21 – 26), are pursuing their postgraduate studies in more concerted measures.



**Figure 4.3: UKZN Campuses**

The output from figure 4.3 shows that the most respondents with a 62% response rate are from the Westville campus. The Howard College recorded a response rate of 21%, followed by the Pietermaritzburg campus with a response rate of 7%. The Medical School has a total of 6% respondents, and Edgewood campus recorded a low response rate of about 4%. The high

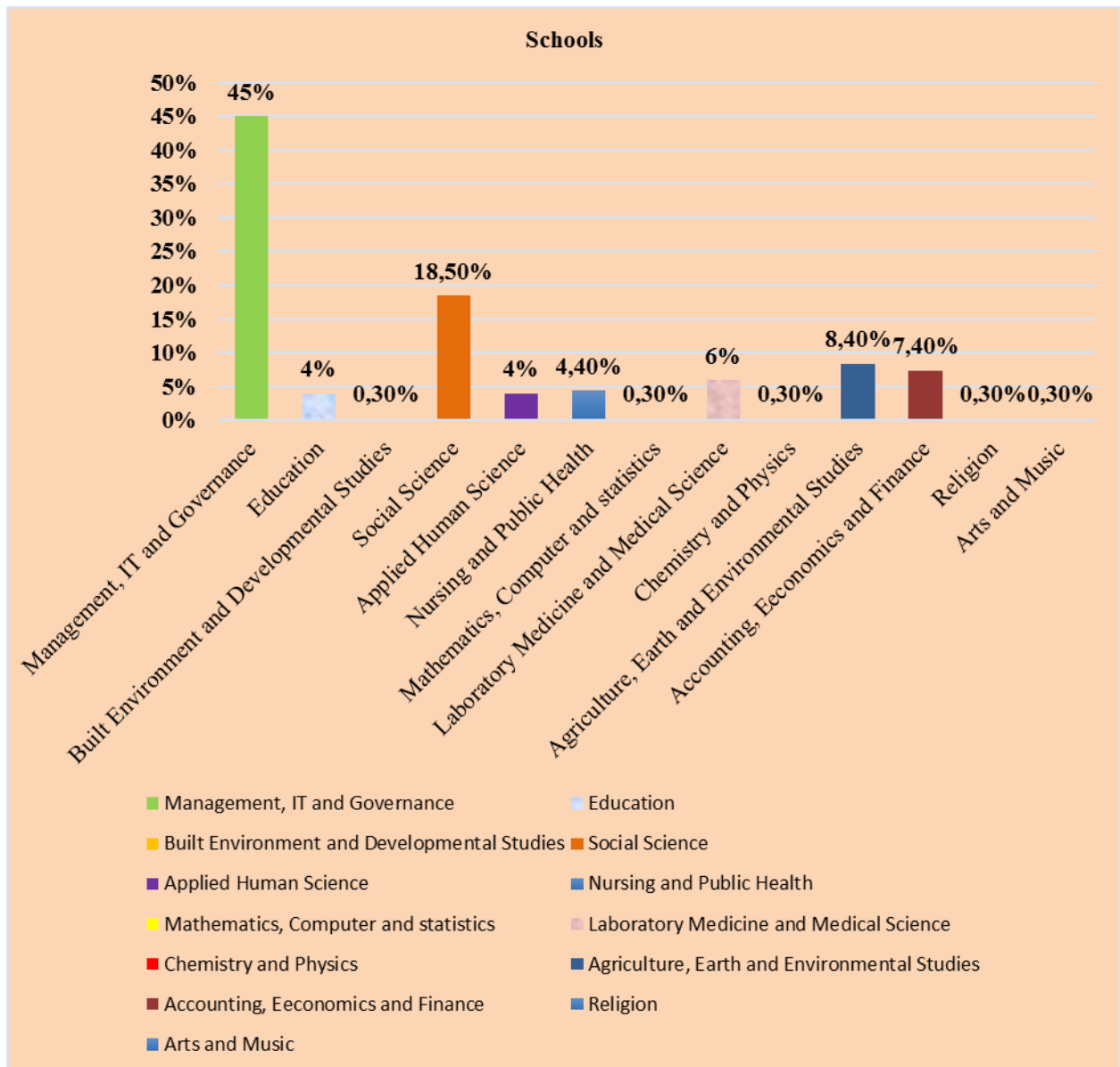
response rate from Westville campus could be attributed to the number of Colleges situated on the campus, due to the respondents' varied interest in the disciplines offered on the campus. The low response rate from the Edgewood campus could be attributed to the number of disciplines offered on the campus and the respondents' interest to pursuing such degrees.



**Figure 4.4: UKZN Colleges**

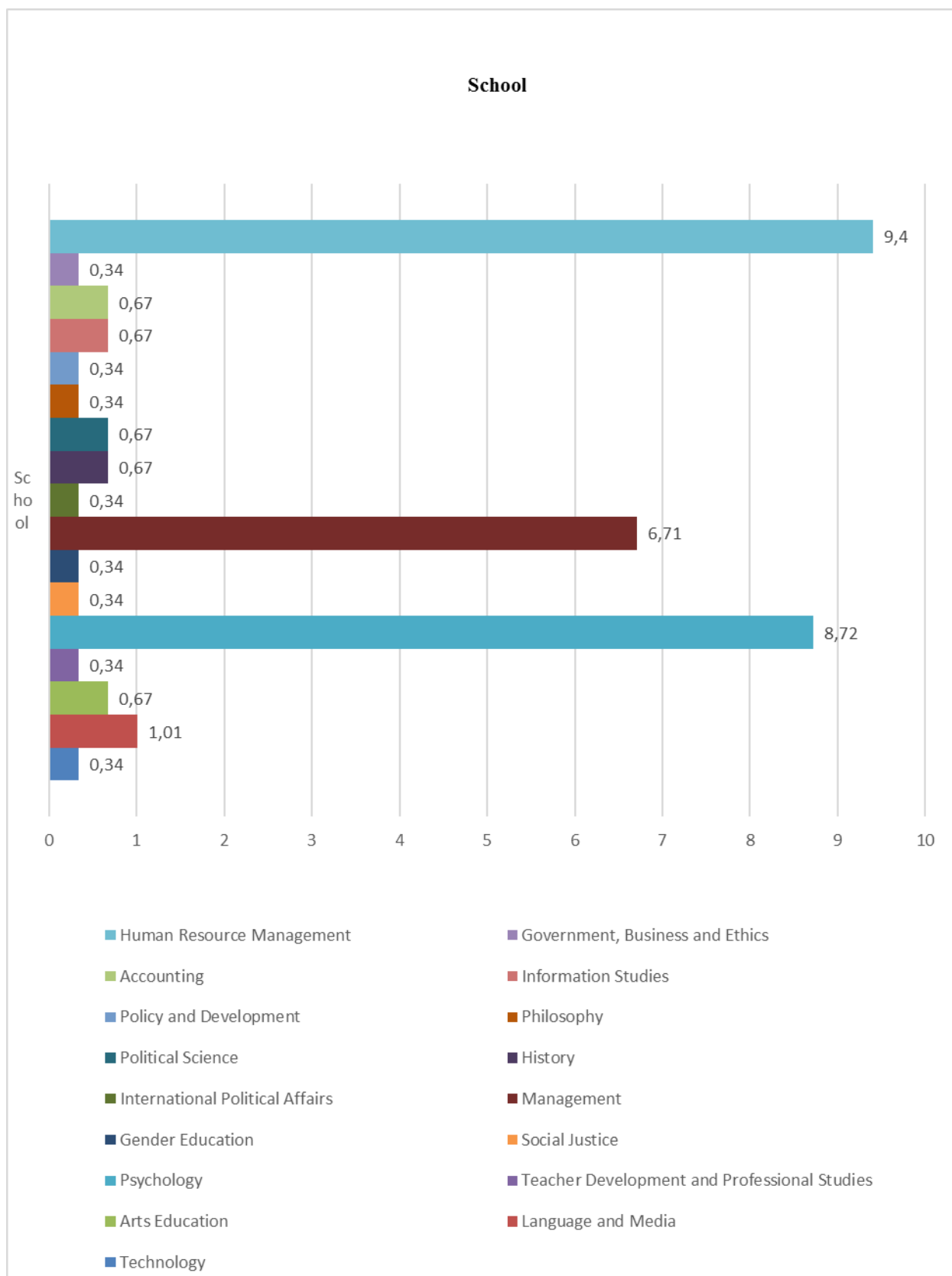
Figure 4.4 shows that respondents from Law and Management studies were the highest with a 51% response rate. The College of Humanities recorded a response rate of 28%, followed by the College of Health Sciences with a response rate of 11%. The College of Agriculture, Engineering and Science recorded the least response rate of about 10%. The high response rate from College of Law and Management studies could be related to the number of higher degrees offered in the college.





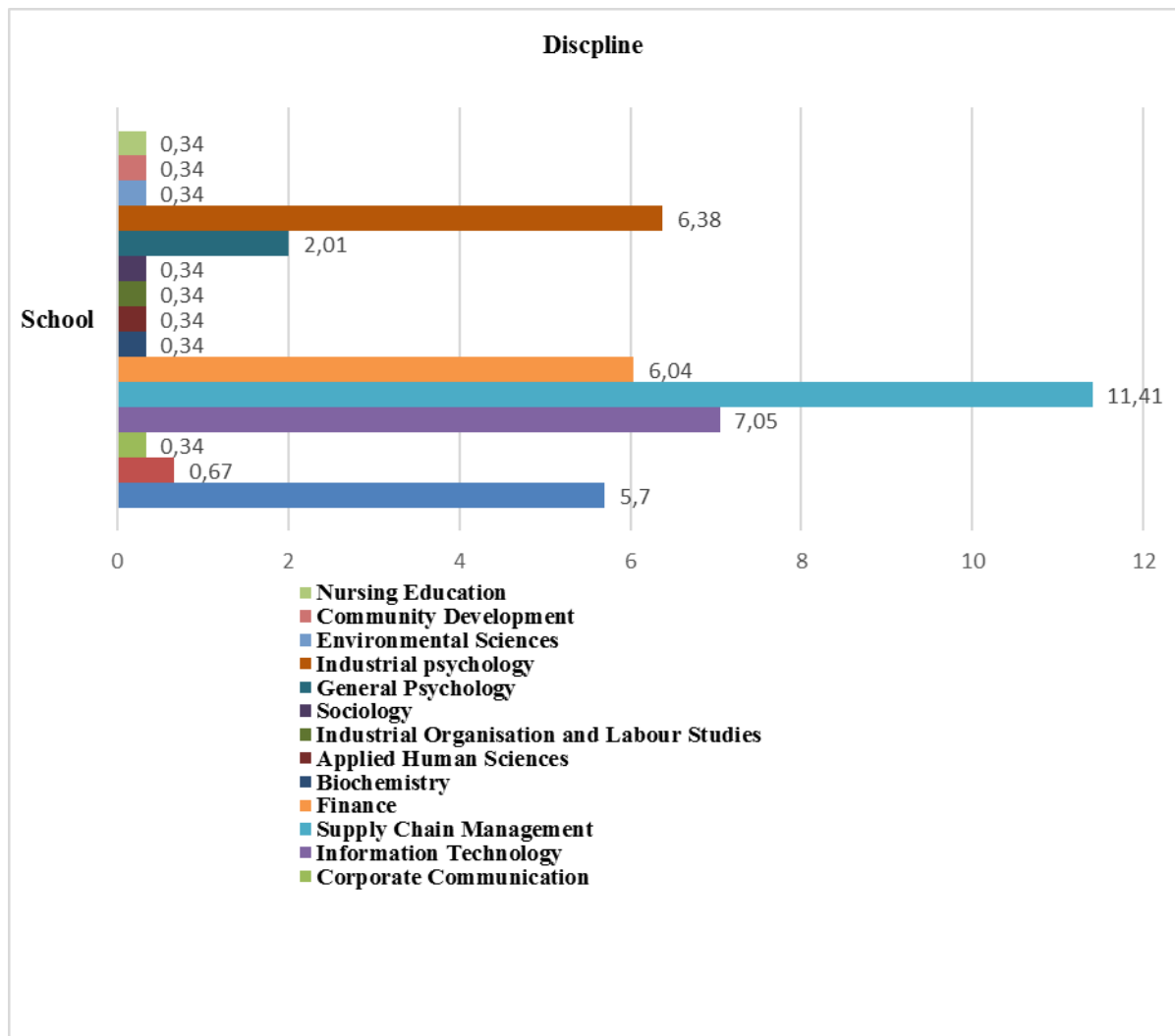
**Figure 4.5: UKZN Schools**

Figure 4.5 above describes the number of respondents in the different schools of the university that answered the questionnaire. The School of Applied Human Science respondents constitute (33%) of the total number of sampled research participants; the School of Social Science at (18%); the School of Management, IT and Governance at (11%), the School of Laboratory Medicine & Medical Science, while the School of Chemistry and Physics and School of Agriculture, Earth and Environmental Studies, all have 7%. The School of Health Science, School of Education and the School of Engineering, Agriculture are at (4%) respectively. The least respondents were recorded in the School of Built Environment and Developmental Studies and the School of Nursing and Public Health with a response rate (frequency of occurrence) of (1%) respectively.



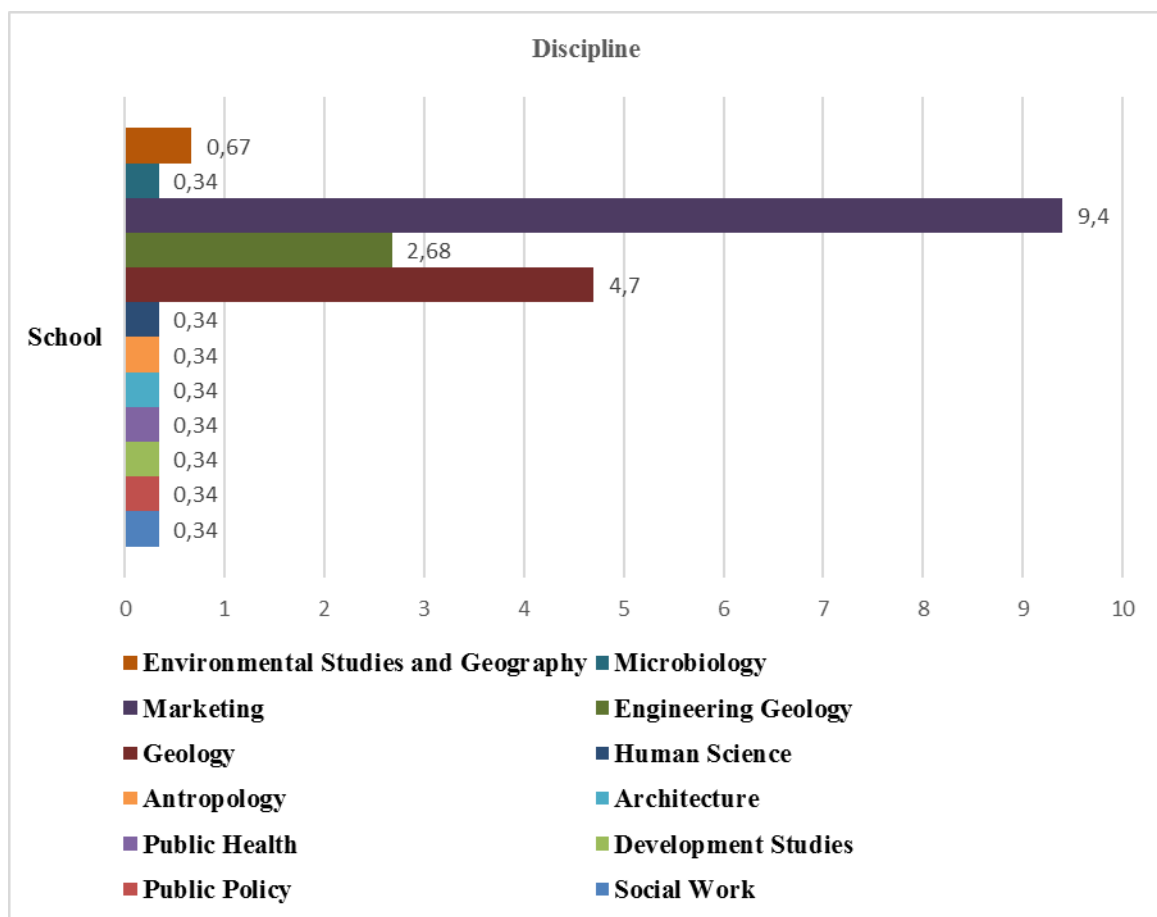
**Figure 4.6: Disciplines in UKZNs Schools (a)** The respondents' disciplines are plotted in different figures due to the prevalence of huge numbers. Four different figures represent the various disciplines. Human Resources

Management recorded a figure of about 9.4%; Government, Business and Ethics (0.34%); Accounting (0.67%); Information Studies (0.67%); Policy and Development (0.34%); Philosophy (0.34%); Political Science (0.67%); History (0.67%); International Political Affairs (0.34%); Management (6.71%); Gender Education (0.34%); Social Justice (0.34%); Psychology (8.72%); Teacher Development and Professional Studies (0.34%); Arts Education (0.67%); Technology (0.34%); and Language and Media recorded (1.01%).



**Figure 4.7: Disciplines in UKZNs Schools (b)**

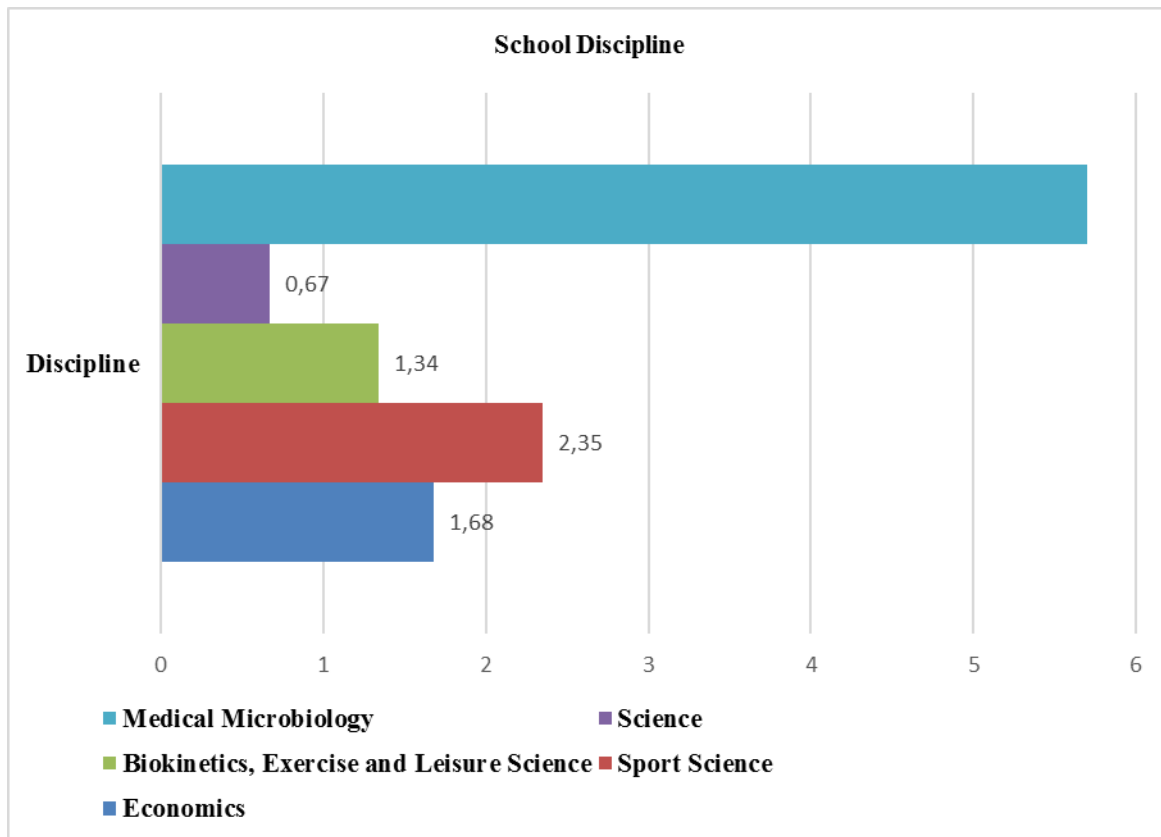
Corporate Communications recorded (0.34%); Information Technology (7.05%); Supply Chain Management (11.41%); Finance (6.04%); Biochemistry (0.34%); Applied Human Sciences (0.34%); Industrial Organizational and Labour Studies (0.34%); Sociology (0.34%); General Psychology (2.01%); Industrial Psychology (6.38%); Environmental Sciences (0.34%); Community Development (0.34%); and Nursing Education (0.34%).



**Figure 4.8: Disciplines in UKZNs Schools (c)**

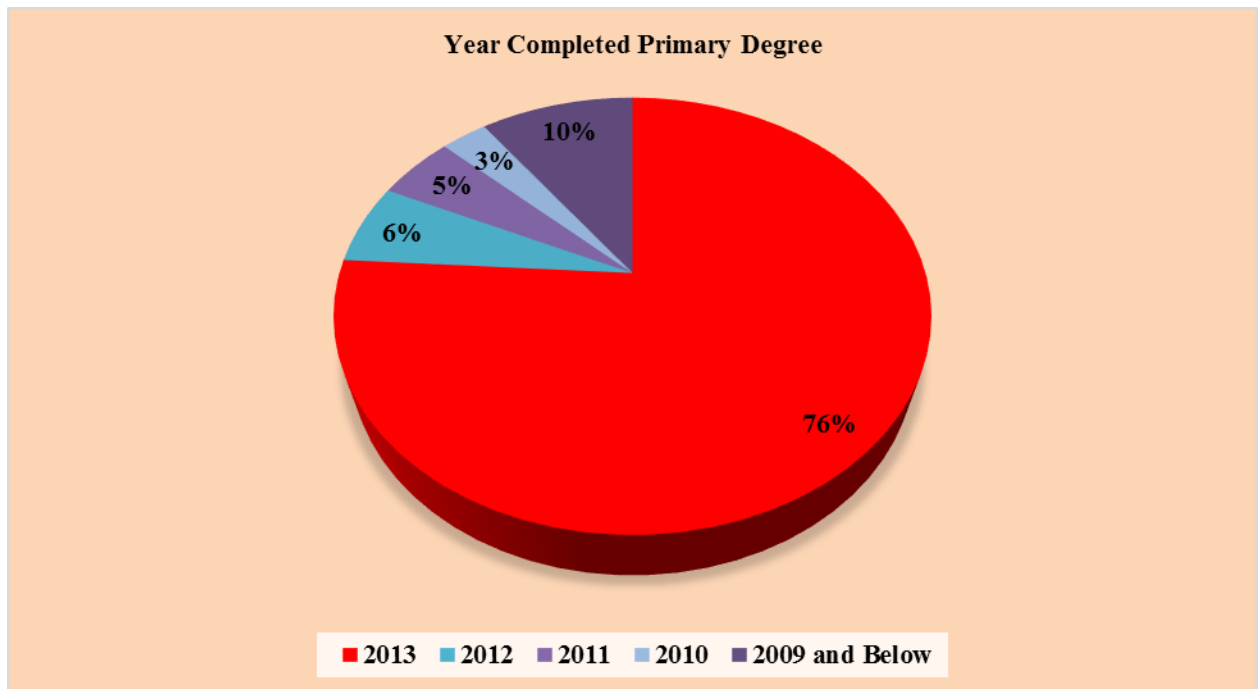
Social Work recorded a response rate of (0.34%); Public Policy (0.34%); Development Studies (0.34%); Public Health (0.34%); Architecture (0.34%); Anthropology (0.34%); Human Science (0.34%); Geology (4.70%); Engineering Geology (2.68%); Marketing (9.40%); Microbiology (0.34%); while Environmental Studies and Geography recorded (0.67%).





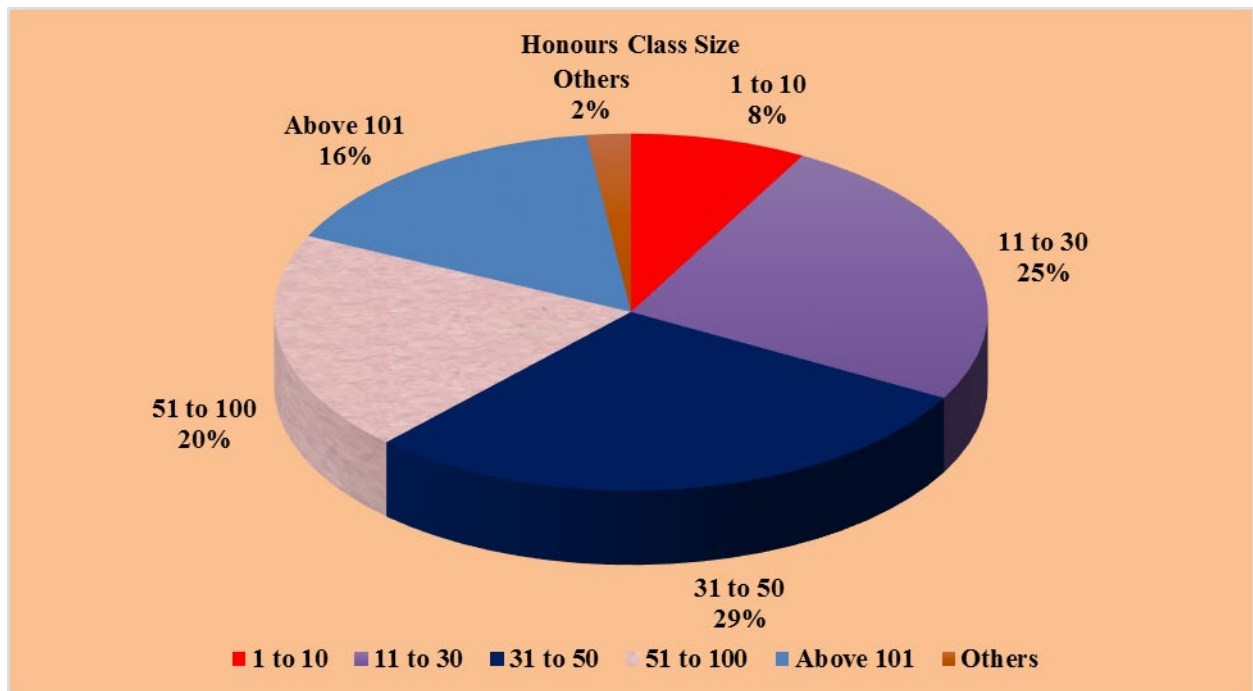
**Figure 4.9: Disciplines in UKZNs Schools (d)**

In the field of Medical Microbiology, the number of respondents were (5.70%); Biokinetics, Exercise and Leisure Science (1.34%); Economics (1.68%); Sport Science (2.35%); and Science (0.67%). In all disciplines, the highest number of response rate was in Supply Chain Management. The reason for this high response rate of response may be because much number of students registered in supply chain management than other disciplines at Honours level at the University of KwaZulu-Natal.



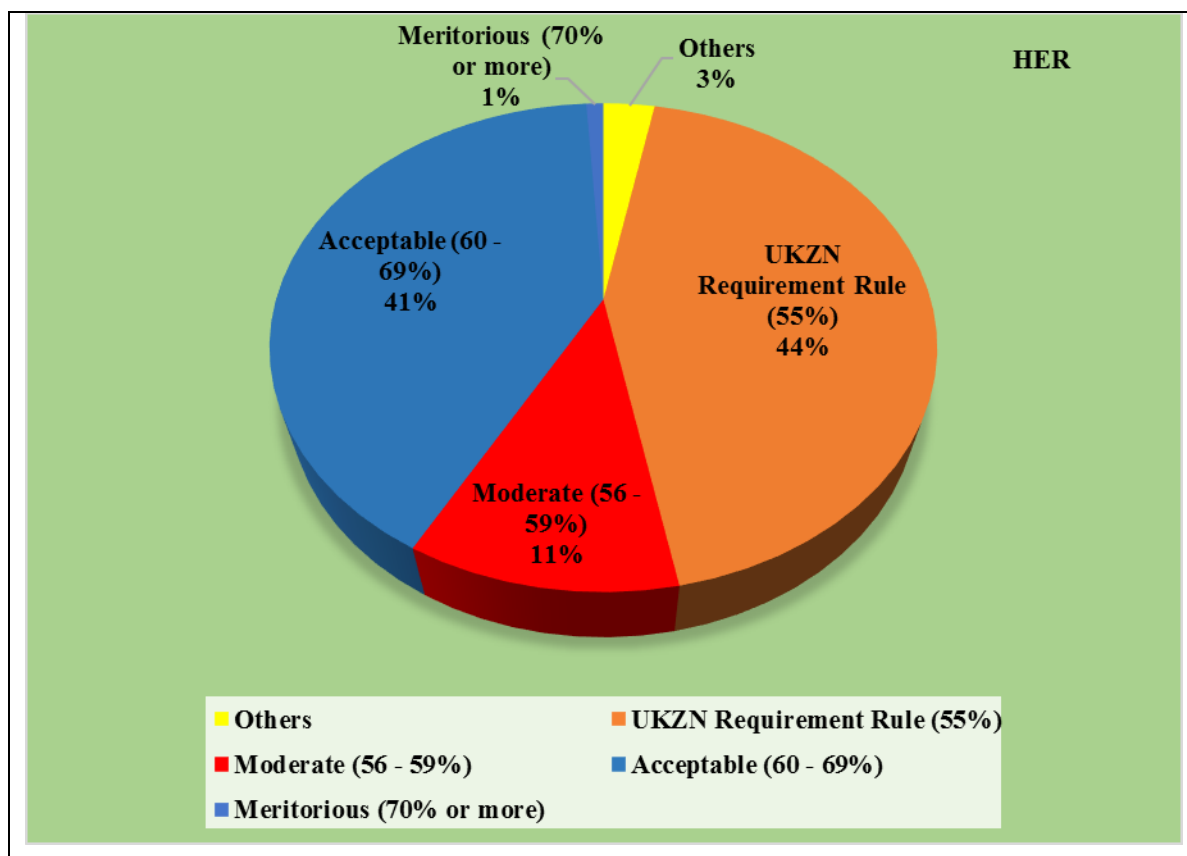
**Figure 4.10: Year Completed Primary Degree**

The result in figure 4.7 above illustrates that the number of respondents who completed the degree in the year 2013, involves a percentage rate of 76%. The number of respondents who completed their primary degree in 2009 and below is 10%, followed by the respondents who completed their degree in 2012 with a response rate of 6%. In 2011, 5% of the respondents completed their primary degree, whilst the least number of respondents (3%) completed their primary degree in 2010.



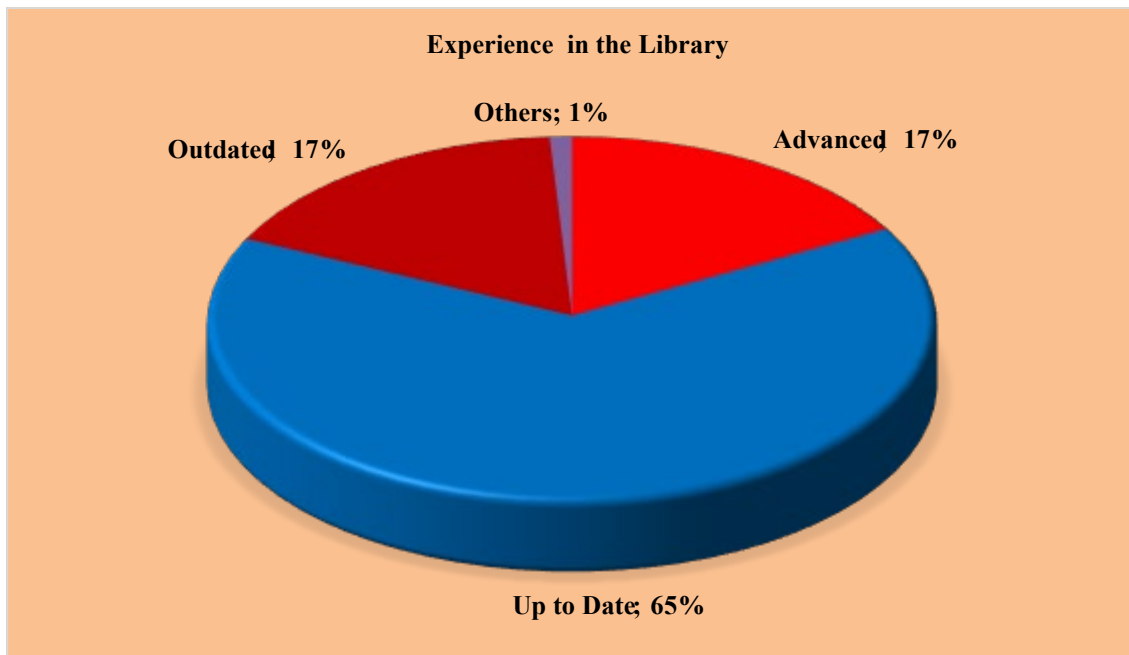
**Figure 4.11: Honours Class Sizes**

Figure 4.8 illustrates the class sizes of the Honours students in various disciplines. Most respondents (29%) suggest that their class size is between 31 and 50 students. The class size of (11-30) represents 25% of the respondents. The respondents' rate of 20% represents a class size of (51-100). At 16%, respondents showed a class size of (above 101 students). A minimal number of about 8% respondents suggest that their class is between 1 and 10 students. The least number of respondents (2%) did not answer this question. These may be respondents who are not aware of their class sizes.



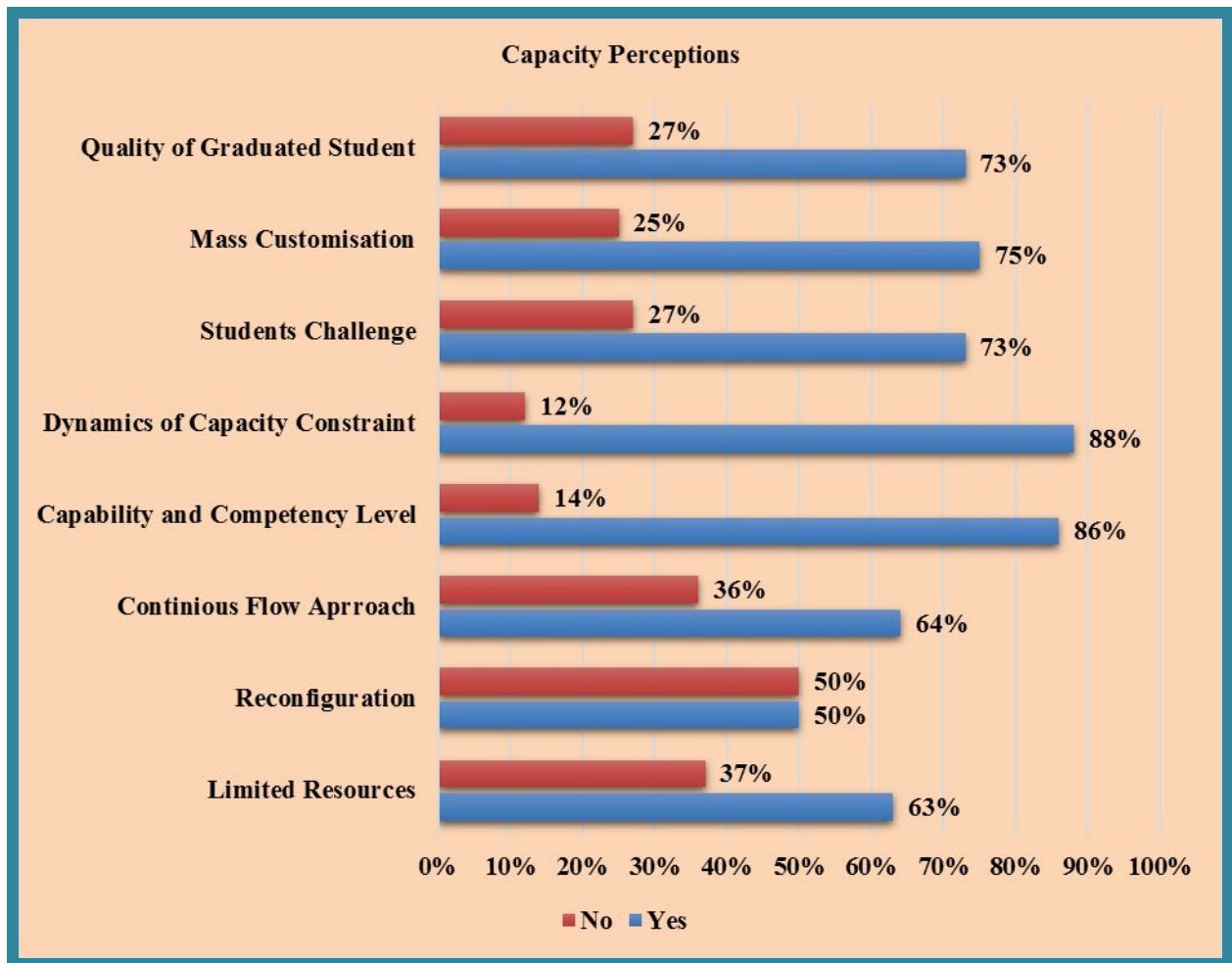
**Figure 4.12 Honours Entry Requirement (HER)**

With reference to figure 4.9, most respondents (44%) agreed with UKZN's entry requirements. At a response rate of 41%, the respondents believed the Honours entry requirements are acceptable (60 – 69%). A group of 11% respondents agreed that there is moderate (56 – 59%) entry requirements. At a (1%) response rate, respondents agreed that the entry requirement for the Honours degree is meritorious (70% or more). Another group of respondents (about 3%) could not respond to this particular question. This may be due to the respondents having insufficient information about the Honours degree's entry requirements.



**Figure 4.13 Library Experience**

The result from figure 4.10 above indicates that most respondents (65%) believe that their library experience is up-to-date. Respondents with outdated and advanced library experience, respectively shared a frequency of occurrence (response rate) of 17%. A group of respondents (about 1%) seems unsure of their library experience, and could not respond to the question at all.



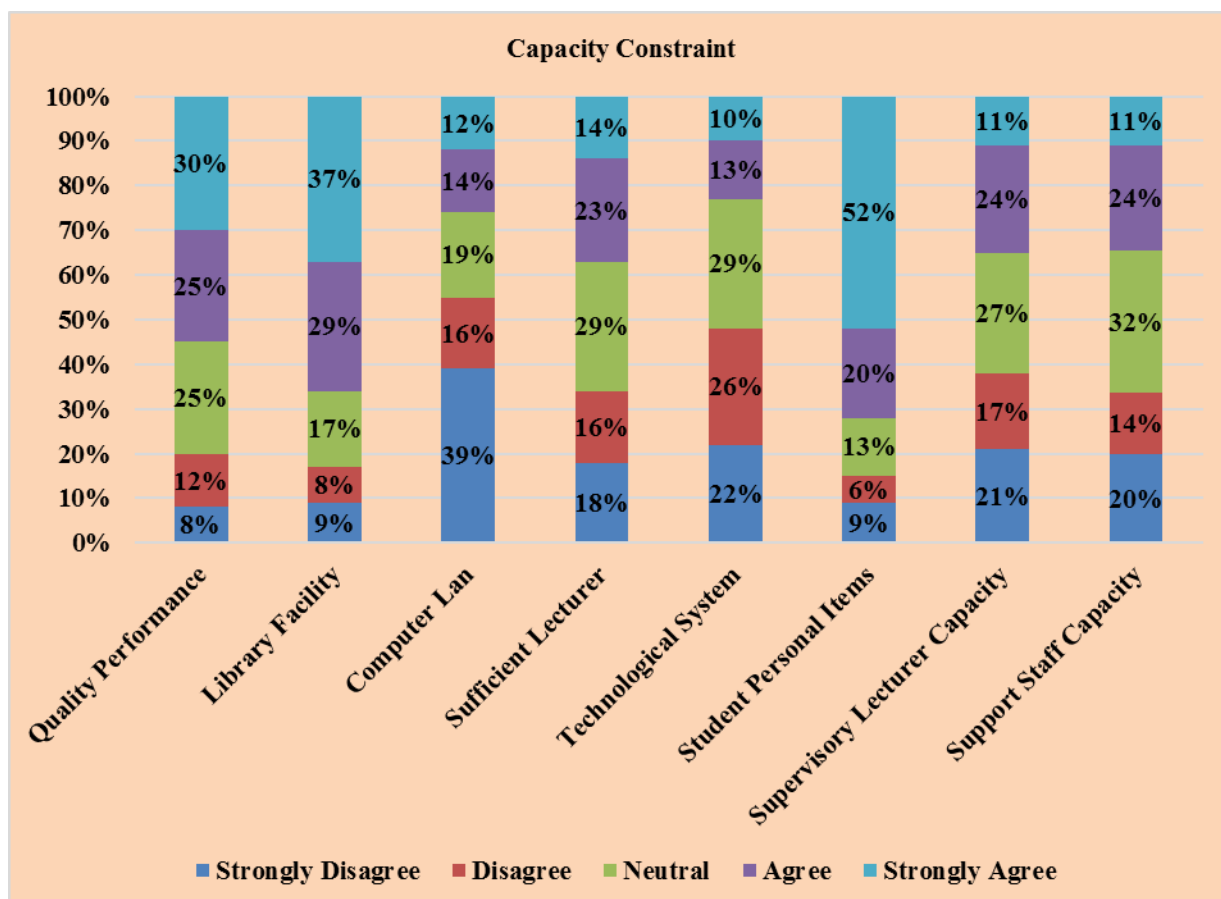
**Figure 4.14: Perceptions on Capacity Constraints**

Figure 4.11 above represents the outcomes on problems that are ontologically dichotomous. These questions focused on respondents' perceptions of capacity constraints that students at Honours level experience at UKZN. The figure above shows that 63% of the respondents believe that limited resources for running all academic activities do influence capacity constraints at the University, whilst 37% did not agree with the statement that the University uses limited resources to run all its academic activities. When asked if the University has improved its academic activities at Honours level through the integrated system design (Reconfiguration or Re-Engineering System), 50% concurred to the statement, while 50% disagreed. The highest number of respondents (64%) believed that the continuous flow approach reduces the postgraduate students work-in-progress and drop-out rate of pipeline students, while 36% did not believe so.

A high proportion of respondents with a rate of 86% said that quality student capability and competency level require common-sense operations process in teaching, learning and research

in higher education but 14% did not agree to the statement that common sense operations process is a necessity in teaching, learning and research in UKZN higher education. On the other hand, (88%) of the respondents support the statement that dynamics of capacity constraints (teaching, learning and research) influence the postgraduate students' throughput quality at Honours level, while 12% disagreed with this statement.

In the figure 4.11, 73% of the respondents agreed that students' challenges (teaching, learning and research) limit their intellectual capabilities and academic growth prospects, but 27% did not agree. The latter category of may be those who thoroughly manage their timing and schedule of activities enough in order to cope with the demands of university education. A high number (75%) of the respondents agreed that higher education has been customised due to capacity constraints, but the remaining 25% said insufficient capacity at the University does not change services rendered at the university. at 73%, respondents agreed that the number of student enrolment influences the quality of graduated students, including their competency level, while 27% respondents did not agree that student enrolment relates to graduated student quality.



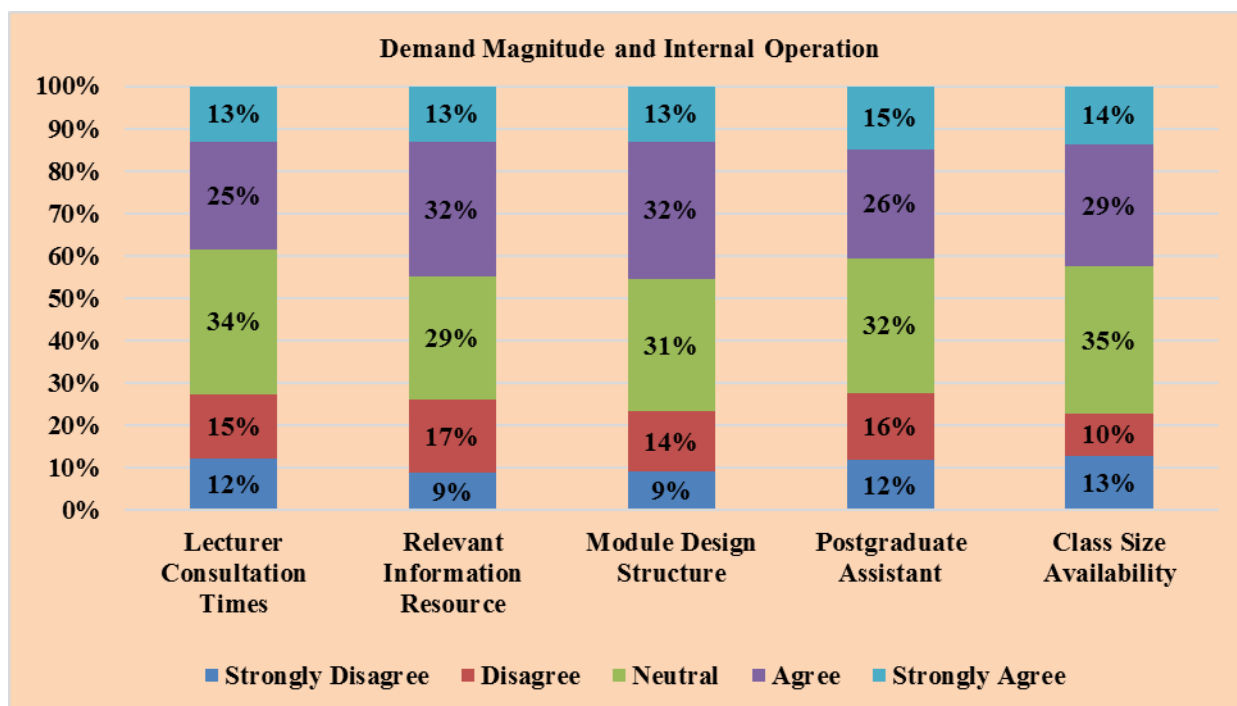
**Figure 4.15: Student Experience of Capacity Constraints**

When asked whether capacity constraints influence the quality performance of the Honours students at UKZN, 30% of the respondents agreed; 25% were neutral; while 25% also agreed that performance of students is compromised due to capacity constraints. Furthermore, 12% disagreed, whilst only 8% strongly disagreed. The statement on whether the library facilities (computers, internet, books, and journals) enhance the ability for learning and research at Honours level, was strongly agreed to by about 37% of the respondents, while 29% just agreed, and only 17% were neutral, while 9% strongly disagreed and only 8% disagreed completely. Pertaining to UKZN having enough computer LANs for Honours students to do research, 39% of the respondents strongly disagreed with this statement. The percentage rate of 19% respondents were neutral in answering the statement on computer LAN capacity level, 16% of the respondents disagreed, 14 % agreed whilst 12% strongly agreed that UKZN have enough LAN for Honours student to do research.



On whether the number of lecturers was sufficient to handle Honours modules so as to mitigate student demands, 29% of the respondents were neutral, 23% agreed, 18% strongly disagreed, 16% disagreed and only 14 % of the respondents strongly agreed. The statement on whether or not the technological systems in the computer LANs of UKZN operate at a high speed most of the time, 29% were neutral, 26% disagreed, 22% strongly disagreed, and 13% of the respondents agreed that the systems are really working well, while only 10% respondents strongly agreed with this statement.

Furthermore, 52% of the respondents strongly agreed that the capacity constraints at Honours level has caused individual students to own a personal laptop, tablet, or iPad. A number of respondents (20%) believed that due to insufficient capacity, individuals now own laptop or an iPad. Some other neutral response rate of 13% emerged from some respondents that may or may not believe the statement, while 9% of the respondents strongly disagreed, and only 6% agreed. When asked whether or not there were enough lecturers in a supervisory capacity at Honours level, 27% of the respondents gave a neutral response, 24% agreed, but 21% strongly disagreed, 17% disagreed; and only 11% of the respondents strongly agreed that UKZN provide enough lecturers for supervisory of Honours student. The response rate relating to the capacity of the academic support staff to deal with Honours students, 32% gave a neutral response while 24% of the respondents agreed; but 20% of the respondents strongly disagreed that the academic staff has enough capacity to deal with the Honours student, and 14% of the respondents disagreed also. However, only 11% of the respondents agreed strongly that enough capacity is provide for the academic staff to attend to Honours student.



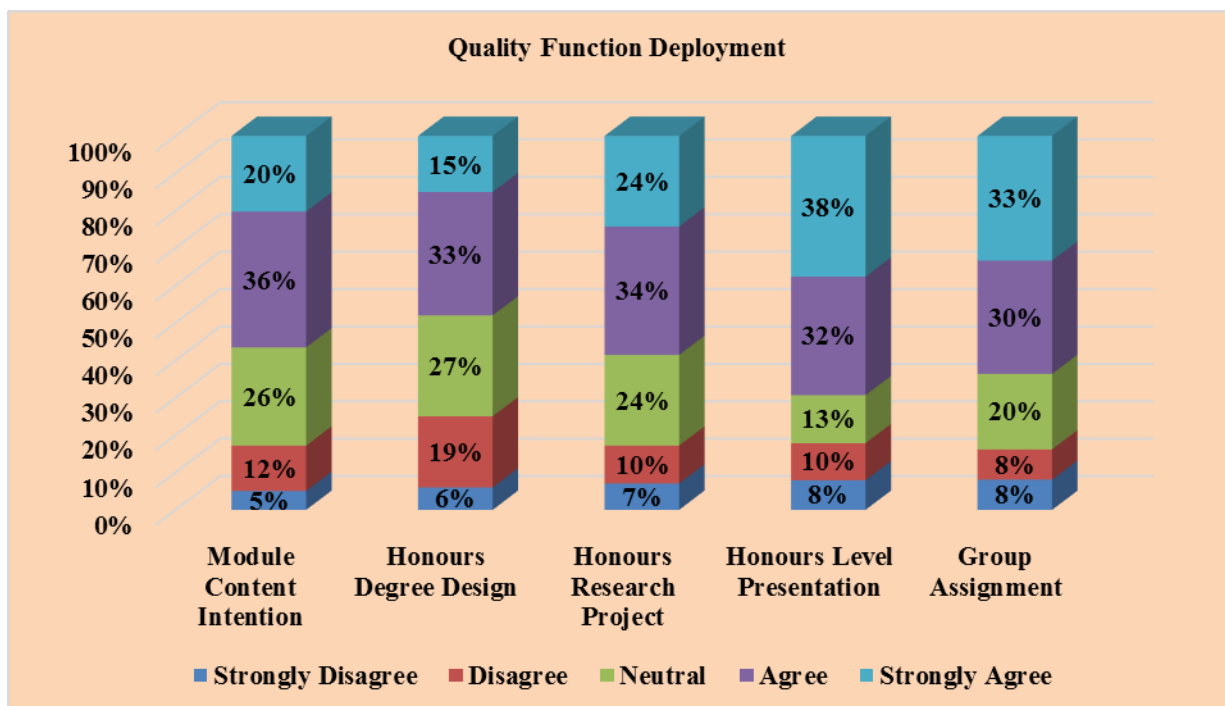
**Figure 4.16: Internal Operations and Magnitude of Demand**

When asked whether or not the times allocated for consultation with the lecturers correlated with the students' timetable schedules, 34% of the respondents were neutral, 25% agreed, whilst 15% of the respondents disagreed. About 13% of the respondents strongly agreed that the consultation times with the lectures are aligned with students' timetable schedule, but only 12% of the respondents strongly disagreed to the statement. The statement on whether the information resources provided by the library and ICT are up-to-date and relevant to the modern knowledge demand, a number of respondents of about 32% agreed to the statement, 29% respondents gave a neutral response. A group of respondents of about 17% disagreed that there is updated information resources at UKZN library, and only a small number of 13% strongly agreed that there exists up to date information at the library. A low number of 9% strongly disagreed on the resources (computers, internet, books, and journals) in the library to be updated.

With a response rate of 32%, respondents agreed that the structured design of modules is manageable and capable of producing quality postgraduate students; 31% were neutral; whilst 14% of the respondents disagreed that the module design structure were manageable to students; and 13% strongly agreed that the module design allows for quality postgraduate students production, while 9% of the respondents strongly disagreed by stating that the structure of the module design is untenable. In terms of the presence of postgraduate assistants

helping with student development at Honours level, 32% of the respondents gave a neutral response, and 26% of the respondents agreed that the postgraduate assistants do assist the students. A response rate of 16% from some respondents shows the level of disagreement, but 15% of the respondents strongly agreed that the postgraduate assistants help students in their work. A small number of respondents (about 12%) strongly disagreed that the presence of postgraduate assistants makes a huge difference in their academic pursuits.

Relating to the statement that the class size at Honours level is reflective of available capacity, 35% respondents were neutral, 29% agreed, and 14% of the respondents strongly agreed that the class size reflects the available capacity at UKZN campuses. However, 13% of the respondents strongly disagreed that the class size at Honours degree level is reflective of available capacity at UKZN, whilst only 10% of the respondents agreed to this statement.



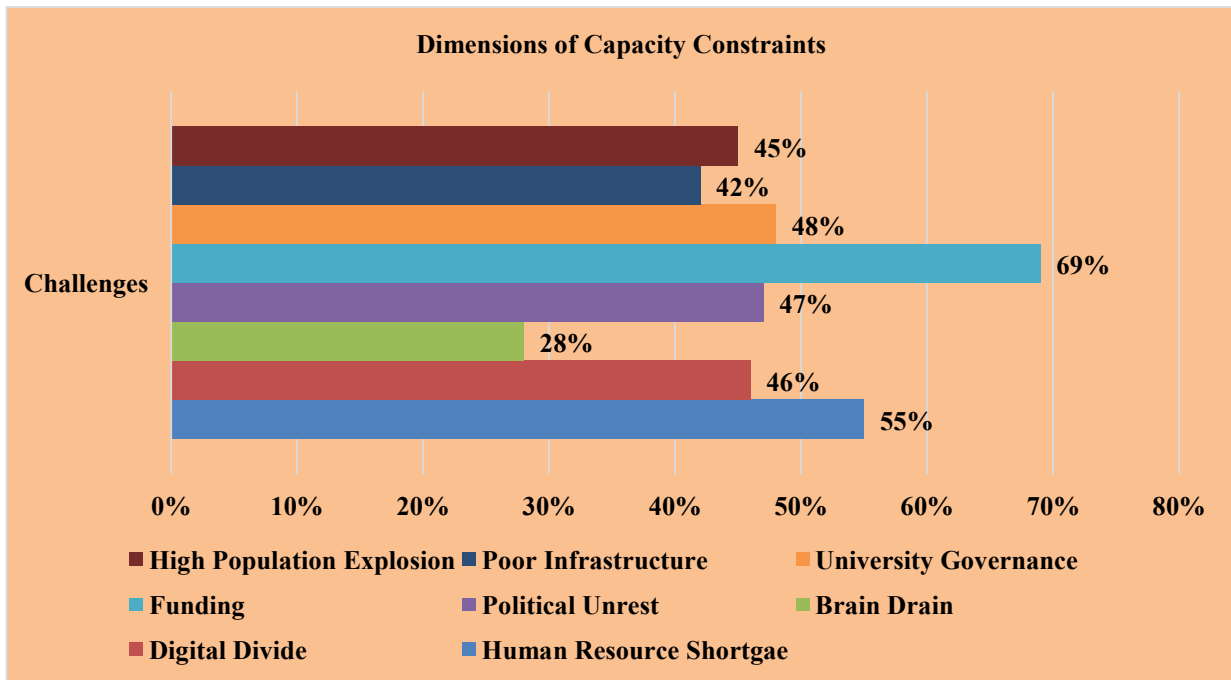
**Figure 4.17: Quality Function Deployment**

When asked whether the module content reflects the type of work the student intends on pursuing, 36% of the respondents agreed, 25% gave a neutral response to the statement, whilst 20% of the respondents strongly agreed. About 12% of the respondents disagreed that the module content shows the type of work that students want to pursue, whilst 5% of the respondents strongly disagreed. About 33% of the respondents agreed that the Honours degree is designed in accordance with the students' career goals, but 27% gave a neutral response to the statement. About 19% of the respondents disagreed with the statement concerning the

design of the Honours degree in accordance with their career goals whilst 15% of the respondents agreed strongly with the statement, and only 6% disagreed strongly.

The statement on whether or not the Honours research project provides the student with skills useful in his/her career, about 34% agreed, 24% were neutral, and another 24% strongly agreed. A group of about 10% disagreed that the Honours research project provides the student with skills useful in for their career, and only a small group of 7% respondents disagreed strongly that Honours degree provides skills that are useful in the students' career. With a response rate of about 38%, respondents strongly agreed that the Presentations at Honours level allow the student to improve their oral skills competency. About 32% of the respondents agreed that their oral competency improved due to the presentations at Honours level, whilst 13% of the respondents gave a neutral response; 10% of the respondents disagreed that the presentation at Honours level improves their oral skill competency, and 8% strongly disagreed by declaring that the presentations does not improve their oral competency.

About 33% of the respondents strongly agreed that the group assignments at Honours level allow the students to build strong „people skills“. A total of 30% respondents agreed that group assignments at Honours level allows the student to build strong „people skills“; whilst 20% gave a neutral response, and 8% of the respondents disagreed that strong people skills is built at UKZN through group assignments, and 8% of the respondents strongly disagreed that strong people skills is developed for students through group assignments.



**Figure 4.18: Challenges of Existing Capacity Constraints at UKZN**

Figure 4.15 above illustrates the dimensions of capacity constraints which the respondents believe a hampering throughput at postgraduate level at the University of KwaZulu-Natal. The highest number of respondents (69%) was recorded against funding availability. This shows that the respondents believed that funding should be accorded high priority as students could not be settled and study without payment of their university fees, The next highest rate of 55% prioritised the issue of human resource shortage. This result identifies human resource at UKZN as the next most important factor that disallows the efficient promotion of excellence at postgraduate level. A response rate of 48% indicates that respondents view university governance as a factor which reduces postgraduate students' performances at the university. An total of 47% respondents viewed political unrest as one of the most important capacity constraint at the university. Another group of respondents with a 46% response rate believes that digital divide is an important factor that describes the capacity constraint at the University of KwaZulu- Natal. This factor is followed by a response rate of about 45% of students who believe that the high population explosion in the university explains the present capacity constraint at UKZN. Poor infrastructure is seen as part of the existing capacity constraints at UKZN by 42% of the respondents. The least amount of respondents of about 28% viewed Brain drain as a factor that shows UKZN's current capacity constraint that needs immediate attention.

**Table 4.1 Binomial Test on General Perceptions on Capacity Constraints at UKZN**

| Binomial Test                                                                                                                                         |         |          |     |                |            |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|-----|----------------|------------|------------------------|
|                                                                                                                                                       |         | Category | N   | Observed Prop. | Test Prop. | Asymp. Sig. (2-tailed) |
| <b>The University uses limited resources to run all academic activities</b>                                                                           | Group 1 | Yes      | 185 | .63            | .50        | .000 <sup>a</sup>      |
|                                                                                                                                                       | Group 2 | No       | 111 | .38            |            |                        |
|                                                                                                                                                       | Total   |          | 296 | 1.00           |            |                        |
| <b>The University has improved its academic activities at Honours level through the integrated system design</b>                                      | Group 1 | Yes      | 148 | .50            | .50        | 1.000 <sup>a</sup>     |
|                                                                                                                                                       | Group 2 | No       | 147 | .50            |            |                        |
|                                                                                                                                                       | Total   |          | 295 | 1.00           |            |                        |
| <b>The continuous flow approach reduces the postgraduate students work-in-progress and drop-out rate of pipeline students</b>                         | Group 1 | Yes      | 186 | .65            | .50        | .000 <sup>a</sup>      |
|                                                                                                                                                       | Group 2 | No       | 101 | .35            |            |                        |
|                                                                                                                                                       | Total   |          | 287 | 1.00           |            |                        |
| <b>Quality student capability and competency level require common-sense operations process in teaching, learning and research in higher education</b> | Group 1 | Yes      | 257 | .87            | .50        | .000 <sup>a</sup>      |
|                                                                                                                                                       | Group 2 | No       | 40  | .13            |            |                        |
|                                                                                                                                                       | Total   |          | 297 | 1.00           |            |                        |
| <b>Dynamics of capacity constraints (teaching, learning and research) influence the postgraduate students' throughput quality at Honours level</b>    | Group 1 | Yes      | 262 | .89            | .50        | .000 <sup>a</sup>      |
|                                                                                                                                                       | Group 2 | No       | 34  | .11            |            |                        |
|                                                                                                                                                       | Total   |          | 296 | 1.00           |            |                        |
| <b>Students' challenges (teaching, learning and</b>                                                                                                   | Group 1 | no       | 82  | .28            | .50        | .000 <sup>a</sup>      |
|                                                                                                                                                       | Group 2 | Yes      | 216 | .72            |            |                        |

|                                                                                                               |         |     |     |      |     |                   |
|---------------------------------------------------------------------------------------------------------------|---------|-----|-----|------|-----|-------------------|
| research) limit their intellectual capabilities and academic growth prospects                                 | Total   |     | 298 | 1.00 |     |                   |
| Capacity constraints at the University have evolved into a stage of mass customisation of high education      | Group 1 | Yes | 221 | .75  | .50 | .000 <sup>a</sup> |
|                                                                                                               | Group 2 | No  | 73  | .25  |     |                   |
|                                                                                                               | Total   |     | 294 | 1.00 |     |                   |
| The number of student enrolment influences the quality of graduated students including their competency level | Group 1 | Yes | 217 | .73  | .50 | .000 <sup>a</sup> |
|                                                                                                               | Group 2 | No  | 82  | .27  |     |                   |
|                                                                                                               | Total   |     | 299 | 1.00 |     |                   |
| a. Based on Z Approximation.                                                                                  |         |     |     |      |     |                   |

There is a statistical significant „YES“ response that “The University uses limited resources to run all academic activities” ( $p < 0.05$ ); this assumes that the limited resources affect all academic activities at UKZN. A statistical significant „YES“ response that „The continuous flow approach reduces the postgraduate students“ work-in-progress and drop-out rate of pipeline students“ ( $p < 0.05$ ). A statistical significant „YES“ response that „Quality student capability and competency levels require common-sense operations process in teaching, learning and research in higher education“ ( $p < 0.05$ ). This indicates that students must be capable of producing good academic performance. There is a statistical significant „YES“ response that „Dynamics of capacity constraints (teaching, learning and research) influence the postgraduate students“ throughput quality at Honours level“ ( $p < 0.05$ ); this implies that the postgraduate students performance is affected by the capacity constraints dynamics. There is a statistical significant „YES“ response that „Students“ challenges (teaching, learning and research) limit their intellectual capabilities and academic growth prospects“ ( $p < 0.05$ ); this infers that the respondents are not content with the services and challenges that they face at the university. There is a statistical significant „YES“ response that „Capacity constraints at the university have evolved into a stage of mass customization of high education“ ( $p < 0.05$ );

A statistical significant „YES“ response that „The number of student enrolment influences the quality of graduated students including their competency level“ ( $p < 0.05$ ). This indicates that respondents“ views about student enrolment is that this affects the graduated students“ quality.

### 4.3 Bivariate Analysis

#### 4.3.1 Cross Tabulation

The tabulation table could be a two dimensional table that interprets the frequency by which respondents“ answers relate to each other. This research uses the cross tabulation table to evaluate the association amongst some nominal and categorical variables. A 95% significance level will be utilised in this study.

**Table 4.2: Academic activities have improved in all campuses through the integrated system design**

| Campus | Does the integrated system design relate to an improvement in all campuses |                          | Reconfiguration |       | Total  |
|--------|----------------------------------------------------------------------------|--------------------------|-----------------|-------|--------|
|        |                                                                            |                          | Yes             | No    |        |
| Campus | Westville                                                                  | Count                    | 95              | 87    | 182    |
|        |                                                                            | % within Campus          | 52.2%           | 47.8% | 100.0% |
|        |                                                                            | % within Reconfiguration | 64.6%           | 60.0% | 62.3%  |
|        |                                                                            | % of Total               | 32.5%           | 29.8% | 62.3%  |
|        | Howard                                                                     | Count                    | 18              | 43    | 61     |
|        |                                                                            | % within Campus          | 29.5%           | 70.5% | 100.0% |
|        |                                                                            | % within Reconfiguration | 12.2%           | 29.7% | 20.9%  |
|        |                                                                            | % of Total               | 6.2%            | 14.7% | 20.9%  |
|        | Edgewood                                                                   | Count                    | 5               | 6     | 11     |
|        |                                                                            | % within Campus          | 45.5%           | 54.5% | 100.0% |
|        |                                                                            | % within Reconfiguration | 3.4%            | 4.1%  | 3.8%   |
|        |                                                                            | % of Total               | 1.7%            | 2.1%  | 3.8%   |
|        | Pietermaritzburg                                                           | Count                    | 17              | 4     | 21     |
|        |                                                                            | % within Campus          | 81.0%           | 19.0% | 100.0% |
|        |                                                                            | % within Reconfiguration | 11.6%           | 2.8%  | 7.2%   |
|        |                                                                            | % of Total               | 5.8%            | 1.4%  | 7.2%   |
|        | Medical                                                                    | Count                    | 12              | 5     | 17     |



|                  |                                                                            |                          |                          |        |                      |        |
|------------------|----------------------------------------------------------------------------|--------------------------|--------------------------|--------|----------------------|--------|
|                  | School                                                                     | % within Campus          | 70.6%                    | 29.4%  | 100.0%               |        |
|                  |                                                                            | % within Reconfiguration | 8.2%                     | 3.4%   | 5.8%                 |        |
|                  |                                                                            | % of Total               | 4.1%                     | 1.7%   | 5.8%                 |        |
| Total            |                                                                            | Count                    | 147                      | 145    | 292                  |        |
|                  |                                                                            | % within Campus          | 50.3%                    | 49.7%  | 100.0%               |        |
| Campus           | Does the integrated system design relate to an improvement in all campuses |                          | Reconfiguration          |        | Total                |        |
|                  |                                                                            |                          | Yes                      | No     |                      |        |
|                  | Westville                                                                  | Count                    | 95                       | 87     | 182                  |        |
|                  |                                                                            | % within Campus          | 52.2%                    | 47.8%  | 100.0%               |        |
|                  |                                                                            | % within Reconfiguration | 64.6%                    | 60.0%  | 62.3%                |        |
|                  |                                                                            | % of Total               | 32.5%                    | 29.8%  | 62.3%                |        |
|                  | Howard                                                                     | Count                    | 18                       | 43     | 61                   |        |
|                  |                                                                            | % within Campus          | 29.5%                    | 70.5%  | 100.0%               |        |
|                  |                                                                            | % within Reconfiguration | 12.2%                    | 29.7%  | 20.9%                |        |
|                  |                                                                            | % of Total               | 6.2%                     | 14.7%  | 20.9%                |        |
|                  | Edgewood                                                                   | Count                    | 5                        | 6      | 11                   |        |
|                  |                                                                            | % within Campus          | 45.5%                    | 54.5%  | 100.0%               |        |
|                  |                                                                            | % within Reconfiguration | 3.4%                     | 4.1%   | 3.8%                 |        |
|                  |                                                                            | % of Total               | 1.7%                     | 2.1%   | 3.8%                 |        |
|                  | Pietermaritzburg                                                           | Count                    | 17                       | 4      | 21                   |        |
|                  |                                                                            | % within Campus          | 81.0%                    | 19.0%  | 100.0%               |        |
|                  |                                                                            | % within Reconfiguration | 11.6%                    | 2.8%   | 7.2%                 |        |
|                  |                                                                            | % of Total               | 5.8%                     | 1.4%   | 7.2%                 |        |
|                  | Medical School                                                             | Count                    | 12                       | 5      | 17                   |        |
|                  |                                                                            | % within Campus          | 70.6%                    | 29.4%  | 100.0%               |        |
|                  |                                                                            | % within Reconfiguration | 8.2%                     | 3.4%   | 5.8%                 |        |
|                  |                                                                            | % of Total               | 4.1%                     | 1.7%   | 5.8%                 |        |
|                  |                                                                            |                          | % within Reconfiguration | 100.0% | 100.0%               | 100.0% |
|                  |                                                                            |                          | % of Total               | 50.3%  | 49.7%                | 100.0% |
| Chi Square Tests |                                                                            |                          |                          |        |                      |        |
|                  |                                                                            |                          | Value                    | df     | Asymp. Sig. (2sided) |        |

|                                                                                               |                     |   |      |
|-----------------------------------------------------------------------------------------------|---------------------|---|------|
| <b>Pearson Chi-Square</b>                                                                     | 21.606 <sup>a</sup> | 4 | .000 |
| <b>Likelihood Ratio</b>                                                                       | 22.615              | 4 | .000 |
| <b>Linear-by-Linear Association</b>                                                           | 3.617               | 1 | .057 |
| <b>N of Valid Cases</b>                                                                       | 292                 |   |      |
| <b>a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.46.</b> |                     |   |      |

Table 4.2 above demonstrates that 50.3% of respondents were affirmative that academic activities have improved in all campuses through the integrated system design, whilst 49.7% disagreed, believing that no association exists between the different campuses of the university and the integrated system design. There is a 0% probability that academic activities improved in all campuses through the integrated system design, just by chance. The research study concludes that there is an association between the campuses of the university and integrated system design. The generated Chi-square test for independence shows a significant statistics of  $p = 0.00$ . Thus, 0.05 is greater than 0.00 probability value ( $p$ -value = 0.00).

**Table 4.3: Reconfiguration system relates to the student challenges**

| Does the reconfiguration system relate to student challenges? |     |                             | Students Challenges |       | Total  |
|---------------------------------------------------------------|-----|-----------------------------|---------------------|-------|--------|
|                                                               |     |                             | Yes                 | No    |        |
| Reconfiguration                                               | Yes | Count                       | 91                  | 54    | 145    |
|                                                               |     | % within Reconfiguration    | 62.8%               | 37.2% | 100.0% |
|                                                               |     | % within Students Challenge | 43.3%               | 68.4% | 50.2%  |
|                                                               |     | % of Total                  | 31.5%               | 18.7% | 50.2%  |
|                                                               | No  | Count                       | 119                 | 25    | 144    |
|                                                               |     | % within Reconfiguration    | 82.6%               | 17.4% | 100.0% |
|                                                               |     | % within Students Challenge | 56.7%               | 31.6% | 49.8%  |
|                                                               |     | % of Total                  | 41.2%               | 8.7%  | 49.8%  |
| Total                                                         |     | Count                       | 210                 | 79    | 289    |
|                                                               |     | % within Reconfiguration    | 72.7%               | 27.3% | 100.0% |

|                                                                                                |                             |                     |        |                       |
|------------------------------------------------------------------------------------------------|-----------------------------|---------------------|--------|-----------------------|
|                                                                                                | % within Students Challenge | 100.0%              | 100.0% | 100.0%                |
|                                                                                                | % of Total                  | 72.7%               | 27.3%  | 100.0%                |
| <b>Chi Square Tests</b>                                                                        |                             |                     |        |                       |
|                                                                                                |                             | Value               | df     | Asymp. Sig. (2-sided) |
| <b>Pearson Chi-Square</b>                                                                      |                             | 14.376 <sup>a</sup> | 1      | .000                  |
| <b>Likelihood Ratio</b>                                                                        |                             | 14.640              | 1      | .000                  |
| <b>Linear-by-Linear Association</b>                                                            |                             | 14.326              | 1      | .000                  |
| <b>N of Valid Cases</b>                                                                        |                             | 289                 |        |                       |
| <b>a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 39.36.</b> |                             |                     |        |                       |

Table 4.3 above establishes that 72.7% of the respondents agreed that the reconfiguration system design in the University of KwaZulu Natal influences the challenges that students face at the university. However, 27.3% of the respondents responded that there exists no association between the reconfiguration system design and the students challenges. There is a 0% probability that the reconfiguration system design at UKZN relates to the students challenges, just by chance. The research study concludes that there is an association between the reconfiguration system design and the challenges that students faces in the university. The generated Chi-square test for independence shows a significant statistics of  $p = 0.00$ . Thus, 0.05 is greater than 0.00 probability value ( $p\text{-value} = 0.00$ ).

**Table 4.4: Respondents campus relates to Quality of Graduated Student**

| Does the respondents campuses relates to quality of graduated students? |                  |                 | Quality of Graduated Student |       | Total  |
|-------------------------------------------------------------------------|------------------|-----------------|------------------------------|-------|--------|
|                                                                         |                  |                 | Yes                          | No    |        |
| <b>Campus</b>                                                           | Westville        | Count           | 130                          | 54    | 184    |
|                                                                         |                  | % within Campus | 70.7%                        | 29.3% | 100.0% |
|                                                                         | Howard           | Count           | 54                           | 7     | 61     |
|                                                                         |                  | % within Campus | 88.5%                        | 11.5% | 100.0% |
|                                                                         | Edgewood         | Count           | 6                            | 7     | 13     |
|                                                                         |                  | % within Campus | 46.2%                        | 53.8% | 100.0% |
|                                                                         | Pietermaritzburg | Count           | 13                           | 8     | 21     |

|                                                                                                |                |                 |                     |       |                       |
|------------------------------------------------------------------------------------------------|----------------|-----------------|---------------------|-------|-----------------------|
|                                                                                                |                | % within Campus | 61.9%               | 38.1% | 100.0%                |
|                                                                                                | Medical School | Count           | 13                  | 4     | 17                    |
| <b>Total</b>                                                                                   |                | % within Campus | 76.5%               | 23.5% | 100.0%                |
|                                                                                                |                | Count           | 216                 | 80    | 296                   |
|                                                                                                |                | % within Campus | 73.0%               | 27.0% | 100.0%                |
| <b>Chi Square Tests</b>                                                                        |                |                 |                     |       |                       |
|                                                                                                |                |                 | Value               | df    | Asymp. Sig. (2-sided) |
| <b>Pearson Chi-Square</b>                                                                      |                |                 | 14.134 <sup>a</sup> | 4     | .007                  |
| <b>Likelihood Ratio</b>                                                                        |                |                 | 14.842              | 4     | .005                  |
| <b>Linear-by-Linear Association</b>                                                            |                |                 | .053                | 1     | .818                  |
| <b>N of Valid Cases</b>                                                                        |                |                 | 296                 |       |                       |
| <b>a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.51.</b> |                |                 |                     |       |                       |

Table 4.4 above shows that 73% of the respondents believed that campus relates to the quality of graduated students at the University of KwaZulu-Natal. However, a total of 27% of the respondents gave the response that there was no relationship between the respondents' campus and quality of graduated students at the university. There is a 7% probability that the campus relates to the quality of graduated students at the university, just by chance. The research study concludes that there is indeed a relationship amongst campus and quality of graduated students at the university. The generated Chi-square test for independence shows a significant statistics of  $p = 0.007$ . Thus, 0.05 is greater than 0.007 probability value ( $p$ -value = 0.007).

**Table 4.5: Reconfiguration system design relates to Colleges at UKZN**

| Does the reconfiguration system design of the university relates to the Colleges? |                                      |                  | Reconfiguration |       | Total  |
|-----------------------------------------------------------------------------------|--------------------------------------|------------------|-----------------|-------|--------|
|                                                                                   |                                      |                  | Yes             | No    |        |
| <b>College</b>                                                                    | Humanities                           | Count            | 29              | 52    | 81     |
|                                                                                   |                                      | % within College | 35.8%           | 64.2% | 100.0% |
|                                                                                   | Agriculture, Engineering and Science | Count            | 19              | 11    | 30     |

|                                                                                                |                            |                  |                     |       |                       |
|------------------------------------------------------------------------------------------------|----------------------------|------------------|---------------------|-------|-----------------------|
|                                                                                                |                            | % within College | 63.3%               | 36.7% | 100.0%                |
|                                                                                                | Health Science             | Count            | 20                  | 11    | 31                    |
|                                                                                                |                            | % within College | 64.5%               | 35.5% | 100.0%                |
|                                                                                                | Law and Management Studies | Count            | 79                  | 71    | 150                   |
|                                                                                                |                            | % within College | 52.7%               | 47.3% | 100.0%                |
| <b>Total</b>                                                                                   |                            | Count            | 147                 | 145   | 292                   |
|                                                                                                |                            | % within College | 50.3%               | 49.7% | 100.0%                |
| <b>Chi Square Tests</b>                                                                        |                            |                  |                     |       |                       |
|                                                                                                |                            |                  | Value               | df    | Asymp. Sig. (2-sided) |
| <b>Pearson Chi-Square</b>                                                                      |                            |                  | 11.691 <sup>a</sup> | 3     | .009                  |
| <b>Likelihood Ratio</b>                                                                        |                            |                  | 11.845              | 3     | .008                  |
| <b>Linear-by-Linear Association</b>                                                            |                            |                  | 4.288               | 1     | .038                  |
| <b>N of Valid Cases</b>                                                                        |                            |                  | 292                 |       |                       |
| <b>a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.90.</b> |                            |                  |                     |       |                       |

Table 4.5 above shows that 50.3% of the respondents believed that reconfiguration system design relates to Colleges at UKZN. However, a total of 49.7% of the respondents gave the response that there was no relationship between the reconfiguration system design and the different Colleges at the university. There is a 9% probability that the reconfiguration system design relates to the colleges at the university, just by chance. This study infers that there is a relationship amongst reconfiguration system design and colleges. The generated Chi-square test for independence shows a significant statistics of  $p = 0.009$ . Thus, 0.05 is greater than 0.009 probability value ( $p$ -value = 0.009).

**Table 4.6: Students Challenges relates to Colleges at UKZN**

| Does Students Challenges relate to Colleges at UKZN? |            |                  | Students Challenge |       | Total  |
|------------------------------------------------------|------------|------------------|--------------------|-------|--------|
|                                                      |            |                  | Yes                | No    |        |
| <b>College</b>                                       | Humanities | Count            | 69                 | 14    | 83     |
|                                                      |            | % within College | 83.1%              | 16.9% | 100.0% |

|                                                                                               |                                      |                  |                    |       |                       |
|-----------------------------------------------------------------------------------------------|--------------------------------------|------------------|--------------------|-------|-----------------------|
|                                                                                               | Agriculture, Engineering and Science | Count            | 18                 | 11    | 29                    |
|                                                                                               |                                      | % within College | 62.1%              | 37.9% | 100.0%                |
|                                                                                               | Health Science                       | Count            | 19                 | 12    | 31                    |
|                                                                                               |                                      | % within College | 61.3%              | 38.7% | 100.0%                |
|                                                                                               | Law and Management Studies           | Count            | 109                | 43    | 152                   |
|                                                                                               |                                      | % within College | 71.7%              | 28.3% | 100.0%                |
| <b>Total</b>                                                                                  |                                      | Count            | 215                | 80    | 295                   |
|                                                                                               |                                      | % within College | 72.9%              | 27.1% | 100.0%                |
| <b>Chi-Square Tests</b>                                                                       |                                      |                  |                    |       |                       |
|                                                                                               |                                      |                  | Value              | df    | Asymp. Sig. (2-sided) |
| <b>Pearson Chi-Square</b>                                                                     |                                      |                  | 8.341 <sup>a</sup> | 3     | .039                  |
| <b>Likelihood Ratio</b>                                                                       |                                      |                  | 8.530              | 3     | .036                  |
| <b>Linear-by-Linear Association</b>                                                           |                                      |                  | 2.441              | 1     | .118                  |
| <b>N of Valid Cases</b>                                                                       |                                      |                  | 295                |       |                       |
| <b>a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.86.</b> |                                      |                  |                    |       |                       |

Table 4.6 above shows that 72.9% of the respondents believed that students' challenges relates to colleges at UKZN. Nevertheless, a total of 27.1% of the respondents gave the response that there was no relationship between the students' challenges relates to colleges at UKZN. There is a 39% probability that the students challenges relates to colleges at UKZN, just by chance. This study infers that there is a relationship amongst students' challenges relates to colleges at UKZN. The generated chi-square test for independence shows a significant statistics of  $p = 0.039$ . Thus, 0.05 is greater than 0.039 probability value ( $p$ -value = 0.039).

**Table 4.7: Experience in the Library relates to Colleges at UKZN**

| Experience in the Library | Total |
|---------------------------|-------|
|---------------------------|-------|

| Does Students Experience in the Library relate to the Colleges in the university?      |                                      |                  | Outdated | Up to date          | Advanced |                       |
|----------------------------------------------------------------------------------------|--------------------------------------|------------------|----------|---------------------|----------|-----------------------|
| Colleges                                                                               | Humanities                           | Count            | 16       | 49                  | 19       | 84                    |
|                                                                                        |                                      | % within College | 19.0%    | 58.3%               | 22.6%    | 100.0%                |
|                                                                                        | Agriculture, Engineering and Science | Count            | 3        | 19                  | 8        | 30                    |
|                                                                                        |                                      | % within College | 10.0%    | 63.3%               | 26.7%    | 100.0%                |
|                                                                                        | Health Science                       | Count            | 2        | 21                  | 8        | 31                    |
|                                                                                        |                                      | % within College | 6.5%     | 67.7%               | 25.8%    | 100.0%                |
|                                                                                        | Law and Management Studies           | Count            | 29       | 105                 | 17       | 151                   |
|                                                                                        |                                      | % within College | 19.2%    | 69.5%               | 11.3%    | 100.0%                |
| Chi Square Tests                                                                       |                                      |                  |          |                     |          |                       |
|                                                                                        |                                      |                  |          | Value               | df       | Asymp. Sig. (2-sided) |
| Pearson Chi-Square                                                                     |                                      |                  |          | 11.886 <sup>a</sup> | 6        | .065                  |
| Likelihood Ratio                                                                       |                                      |                  |          | 12.696              | 6        | .048                  |
| Linear-by-Linear Association                                                           |                                      |                  |          | 2.921               | 1        | .087                  |
| N of Valid Cases                                                                       |                                      |                  |          | 296                 |          |                       |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.07. |                                      |                  |          |                     |          |                       |

Table 4.7 above shows that 19.2% of the respondents believed that students' experience in the library in terms of information are out-dated in different colleges of the university.

Nevertheless, a total of 69.5% of the respondents gave the response that students' experience in the library in terms of information are updated in different colleges of the university whilst a total of 11.3% respondents stated that library information at the university are advanced at different colleges of the university. There is a 65% probability that the library information in the University of KwaZulu-Natal is related to colleges at UKZN, just by chance. This study infers that there is a relationship amongst students' library experience and colleges at UKZN.

The generated chi-square test for independence shows a significant statistics of  $p = 0.065$ . Thus, 0.05 is greater than 0.065 probability value ( $p\text{-value} = 0.065$ ).

#### **4.3.2. Descriptive Statistics**

Descriptive statistics is employed in this study in order to evaluate the total number of respondents' ideas on questions asked. The following chosen descriptors (mean, maximum, minimum, standard deviation, lower and upper bound confidence interval for mean and standard error) are important. From the descriptive analysis table (see Appendix 1), it shows that the mean values range from 4.24 to 2.15 and as recognized, mean values are resolved using average calculation means. The variable (Group Assignment) attains the highest mean value of 3.95 from Pietermaritzburg Campus indicating that it is the variable that creates most value to the post graduate students and could ensure defined quality throughput. The students are content to note that group assignment assists them towards achieving their degree.

The Pietermaritzburg campus respondents with a mean value of 4.24 recorded that the Honours level presentation has a positive effect on the quality of postgraduate students produced at UKZN. The respondents may have picked this variable (Honours level presentation) because their performance in English skill proficiency has changed positively. Some of the respondents from Pietermaritzburg Campus with a mean value of 3.95 when compared to other remaining campuses, suggests that Honours research project has created an optimistic impact towards their studies. The respondents are content because these projects give access and background to the students for the future endeavours they may take. For the variable named „Honours degree design“, the mean value of 3.57 is presented from Pietermaritzburg campus as the highest mean. This shows that the respondents affirm that the Honours degree structure of the university is well placed and is a positive strategy adopted to improve postgraduate degree standards and quality.

Westville Campus has the highest mean score of 3.58 from the variable (module content intention). The results show that the module content designed for the postgraduate program reflects what the students intend on pursuing. The outcomes also tells a lot about the university's ability to benchmark its provision of education with other higher education institution in South Africa to say the least. The mean high value of 3.37 was recorded at Westville Campus for class size availability variable. This means that the class size at Honours level of the University of KwaZulu-Natal is reflective of the available capacity which the



university could provide. Postgraduate assistants, a variable in this research, were selected by the respondents at the Pietermaritzburg Campus with a high mean value of 3.71. This result indicates that the respondents on this campus most appreciate the job which postgraduate assistants perform in the university for the Honours students. The postgraduate assistants are employed to help some of the students that have problems in some defined areas in their education. A mean high value of 3.59 was recorded against the variable (module design structure) from the respondents at the medical school campus of the University of KwaZulu-Natal. The structured design of modules is believed to be manageable and is capable of producing quality postgraduate students as stated by the respondents mean score at the Westville campus.

The mean value of 3.53 recorded by respondents at the Medical School with relevant information resource as the deciding variable has the highest value amongst the remaining four campuses. The outcome shows that the information resources provided by the library and ICT up-to-date and relevant to the modern knowledge demand. The mean value of 3.65 was recorded with the variable (lecturer consultation times) from the respondents at medical school. This means that the times allocated for the students to consult with the lecturer work aligns well with student timetable schedules. It is now dependable on the students to utilize these efforts and structures put in place by the university to enhance their achievement rate. The support staff facility, a variable in this study was identified by the respondents at the Medical school with a high mean value of 3.76. This outcome specifies that the respondents on this campus appreciate mostly the support staff capacity at the university. Support staff includes module administrators that deal directly with the day to day assistance of the students minor issues.

The mean value of 3.76 noted by respondents at the Medical School with supervisory lecturer capacity as the deciding variable has the highest value amongst the remaining four campuses. The outcome shows that the University of KwaZulu-Natal has enough lecturers to supervise Honours level students.

The Edgewood Campus of the university with the highest mean value of all the campuses at a value of 4.67 identified the variable (student personal items) as an important one. This means that when students own a personal laptop, tablet or iPad, the capacity constraint at Honours

level is reduced to a minimal level. Some of the respondents from Medical School recorded with a mean value of 2.76 in comparison to other remaining campuses, suggests that technological system have added a meaningful approach towards their studies. The respondents are content because these when the technological system are in place, things run smoothly especially when accessing information resources. The respondents at Edgewood campus recorded a high mean value of 3.42 in support of the variable (Sufficient lecturer). This shows that the respondents from Edgewood campus are content with the number of lecturers which the university employed to attend to the student demand. Some of the respondents from Edgewood campus recorded a mean value of 2.67 when compared to the other remaining campuses, suggests that (computer LAN) is a variable that has created a positive difference in their studies. The respondents are content because there exists enough computer LANs for one to engage in research for Honours students at postgraduate level at the University of KwaZulu-Natal.

The Library facility, one of the variables in this study, was recognized by the respondents at the Edgewood Campus with a high mean value of 4.08. This result demonstrates that the respondents on this campus appreciate the library capacity at the university highly. The library facility must be advanced in nature, so as to create value for its participants (students). For the variable named „quality performance“, the mean value of 3.75 is presented from Edgewood as the highest mean in this category. This shows that the respondents affirm that the capacity constraints influence the quality performance of the Honours students. Hence, the university must not comprise the set standard, objectives and strategy improve postgraduate degree standard. However, the lowest mean value of 2.15 from all categories of variables relates to the variable with computer LAN from Howard College.

#### **4.3.3: Analysis of Variance**

According to Pallant (2006:215), analysis of variance (ANOVA) is used in research to compare the mean scores of more than groups. It also compares the variance between different groups which may be independent of each other.

**Table 4.8: Analysis of Variance**

| ANOVA                                |                |                |     |             |       |      |
|--------------------------------------|----------------|----------------|-----|-------------|-------|------|
|                                      |                | Sum of Squares | df  | Mean Square | F     | Sig. |
| <b>Sufficient Lecturer</b>           | Between Groups | 26.080         | 4   | 6.520       | 4.085 | .003 |
|                                      | Within Groups  | 462.916        | 290 | 1.596       |       |      |
|                                      | Total          | 488.997        | 294 |             |       |      |
| <b>Supervisory Lecturer Capacity</b> | Between Groups | 23.799         | 4   | 5.950       | 3.712 | .006 |
|                                      | Within Groups  | 461.593        | 288 | 1.603       |       |      |
|                                      | Total          | 485.392        | 292 |             |       |      |
| <b>Support Staff Capacity</b>        | Between Groups | 34.504         | 4   | 8.626       | 5.768 | .000 |
|                                      | Within Groups  | 436.714        | 292 | 1.496       |       |      |
|                                      | Total          | 471.219        | 296 |             |       |      |
| <b>Lecturer Consultation Times</b>   | Between Groups | 20.949         | 4   | 5.237       | 3.869 | .004 |
|                                      | Within Groups  | 393.913        | 291 | 1.354       |       |      |
|                                      | Total          | 414.861        | 295 |             |       |      |
| <b>Postgraduate Assistants</b>       | Between Groups | 14.401         | 4   | 3.600       | 2.540 | .040 |
|                                      | Within Groups  | 411.111        | 290 | 1.418       |       |      |
|                                      | Total          | 425.512        | 294 |             |       |      |
| <b>Class Size Availability</b>       | Between Groups | 29.434         | 4   | 7.359       | 5.534 | .000 |
|                                      | Within Groups  | 384.321        | 289 | 1.330       |       |      |
|                                      | Total          | 413.755        | 293 |             |       |      |

An analysis of variance shows that the effects that campus as a variable has on some variables. This analysis was carried out in order to evaluate and explore the impact that the campus which respondents are registered, affects different aspects of quality performance variables. Some statistical significance were noted. There is a statistically significant difference between campus and class size availability at  $p < 0.05$  ( $F(4, 289) = 5.5$ ,  $p$ -value =

0.00). A statistical significant difference between campus and postgraduate assistants at  $p < 0.05$  ( $F(4, 290) = 2.5$ ,  $p\text{-value} = 0.040$ ). A statistical significant difference between campus and lecturer consultation times at  $p < 0.05$  ( $F(4, 291) = 3.9$ ,  $p\text{-value} = 0.004$ ). A statistical significant difference between campus and support staff capacity at  $p < 0.05$  ( $F(4, 292) = 5.8$ ,  $p\text{-value} = 0.00$ ). A statistical significant difference between campus and supervisory lecturer capacity at  $p < 0.05$  ( $F(4, 288) = 3.7$ ,  $p\text{-value} = 0.006$ ). A statistical significant difference between campus and sufficient lecturer at  $p < 0.05$  ( $F(4, 290) = 4.1$ ,  $p\text{-value} = 0.003$ ).

#### 4.3.4: Factor Analysis

According to Pallant (2006:172) factor analysis is a reduction technique which permits a large number of variables of data to be summarized through a smaller set of factors or components. It correlates and groups most of the chosen variables together through a manageable way before it could be used in other analysis such as multiple regression. This study will utilize the principal component analysis (PCA) technique. Through the PCA, the primary variables are reduced into a small set of analysis but the related factors are assessed through an arithmetic means, but only the shared variance is analyzed.

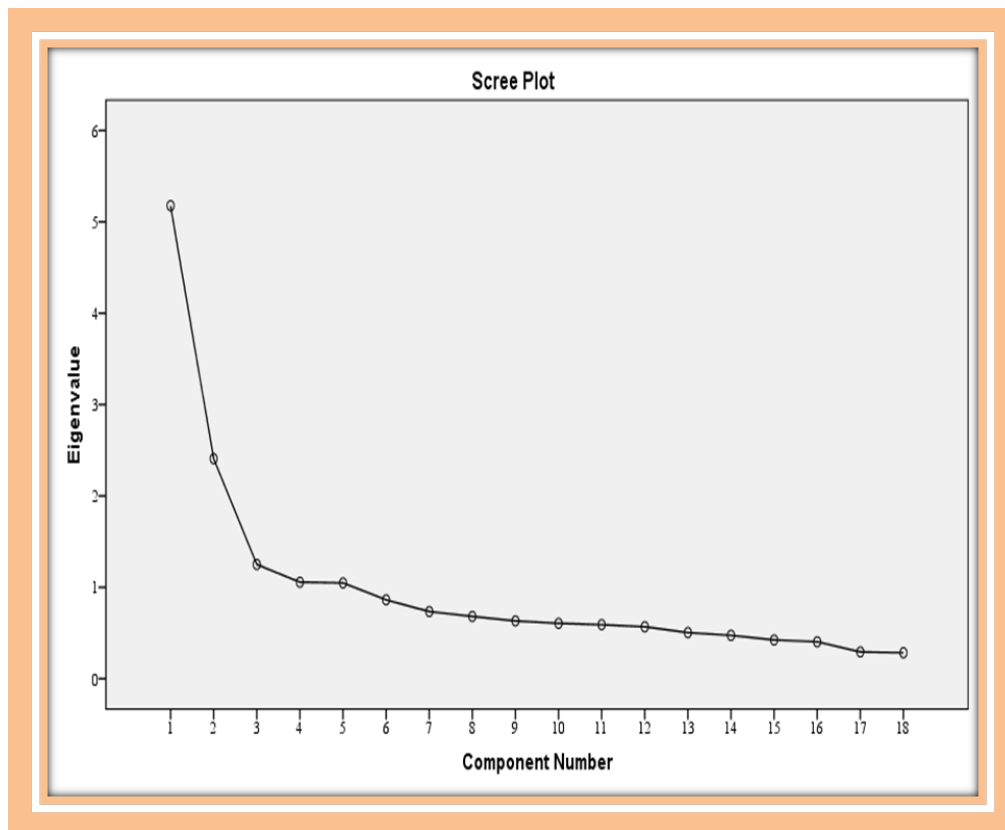
**Table 4.9: KMO and Bartlett's Test, Communalities, Total Variance Explained, Rotated Component Matrix**

| KMO and Bartlett's Test                          |                    |            |               |              |                          |          |
|--------------------------------------------------|--------------------|------------|---------------|--------------|--------------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    |            |               |              |                          | .848     |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square |            |               |              |                          | 1614.620 |
|                                                  | Df                 |            |               |              |                          | 153      |
|                                                  | Sig.               |            |               |              |                          | .000     |
| Rotated Component Matrix                         |                    |            |               |              |                          |          |
|                                                  | Factor Loading     | Eigenvalue | % of Variance | Cumulative % | Communalities Extraction | Alpha    |
| Factor One: Module content structure and Design  |                    |            |               |              |                          |          |
| Honours Degree Design                            | 0.789              | 0.424      | 2.358         | 94.550       | 0.648                    | 0.822    |

|                                                                                                                                                                                                     |       |       |        |        |       |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|--------|--------|-------|-------|
| <b>Module Content Intention</b>                                                                                                                                                                     | 0.763 | 0.474 | 2.631  | 92.193 | 0.631 | 0.822 |
| <b>Honours Level Presentation</b>                                                                                                                                                                   | 0.755 | 0.293 | 1.629  | 98.424 | 0.695 | 0.820 |
| <b>Honours Research Project</b>                                                                                                                                                                     | 0.681 | 0.404 | 2.244  | 96.795 | 0.520 | 0.825 |
| <b>Group Assignment</b>                                                                                                                                                                             | 0.650 | 0.284 | 1.576  | 100.00 | 0.601 | 0.819 |
| <b>Factor Two: Human Resource Capacity</b>                                                                                                                                                          |       |       |        |        |       |       |
| <b>Supervisory Lecturer Capacity</b>                                                                                                                                                                | 0.826 | 0.735 | 4.082  | 69.650 | 0.708 | 0.829 |
| <b>Sufficient Lecturer</b>                                                                                                                                                                          | 0.700 | 1.056 | 5.868  | 54.952 | 0.562 | 0.829 |
| <b>Support Staff Capacity</b>                                                                                                                                                                       | 0.659 | 0.681 | 3.784  | 73.434 | 0.595 | 0.822 |
| <b>Factor Three: Support Facility</b>                                                                                                                                                               |       |       |        |        |       |       |
| <b>Postgraduate Assistants</b>                                                                                                                                                                      | 0.802 | 0.735 | 3.157  | 86.758 | 0.684 | 0.828 |
| <b>Class Size Availability</b>                                                                                                                                                                      | 0.716 | 0.505 | 2.804  | 69.650 | 0.593 | 0.828 |
| <b>Factor Four: Physical Asset Capacity</b>                                                                                                                                                         |       |       |        |        |       |       |
| <b>Technological System</b>                                                                                                                                                                         | 0.750 | 1.048 | 5.823  | 60.774 | 0.635 | 0.836 |
| <b>Computer Lan</b>                                                                                                                                                                                 | 0.702 | 1.250 | 6.945  | 49.083 | 0.560 | 0.845 |
| <b>Factor Five: Performance Attributes</b>                                                                                                                                                          |       |       |        |        |       |       |
| <b>Quality Performance</b>                                                                                                                                                                          | 0.873 | 5.177 | 28.761 | 28.761 | 0.786 | 0.840 |
| <b>Library Facility</b>                                                                                                                                                                             | 0.733 | 2.408 | 13.377 | 42.138 | 0.675 | 0.830 |
| <b>„Extraction Method: Principal Component Analysis., Rotation Method: Varimax with Kaiser Normalisation., Reliability Statistics: Overall Cronbach’s Alpha = 0.836, and Number of items = 18”.</b> |       |       |        |        |       |       |

In this analysis, the KMO value is 0.848, and the Bartlett's test is significant ( $p = 0.000$ ), showing therefore the appropriateness of the factor analysis at 153 degrees of freedom. Communalities value is usually between 0 and 1, and any value that is less than 0.3 show that the item could not be used with other items in the analysis. From the table above, the communality extraction cell are more than 0.3, therefore the chosen items are fit to be in the analysis.

Nevertheless, all the components selected should have an eigenvalue of 1 or more. In the table, above, only five components have eigenvalues above 1 (1.056, 1.048, 1.250, 5.177, and 2.408). These five components explain a total of 60.774 percent of the variance. Scree plot permits someone to ascertain the number of components that is extracted by using the Kaiser Criterion (Pallant, 2006:183).



**Figure 4.19: Eigenvalue Scree Plot**

Components 1 to 5 above capture most of the variance than other remaining components, which accounts for the retention of only five components. Every point on the graph is shown on a descending order of the listed eigenvalue magnitude (Pallant, 2006:183). The relative importance of the factors could also be viewed from the scree plot. From figure 4.17, it is

evident that the scree plot identifies only five components as the most critical with little additions to solution presented from the lower end components.

### **Interpretation and Factor Labelling**

The factors are „rotated“ by showing the outline of the loadings so that it becomes simpler to understand (Pallant, 2006: 185). Using the Varimax rotation, component 1 describes 19.902 percent of the variance, component 2 explains 31.348 percent of the variance, component 3 explains 41.878 percent of the variance, component 4 describes 51.530 of the variance and component 5 describes 60.774 of the variance. The total variance explained (60.774 percent) does not alter after rotation, just the way it is distributed amongst five components. From this analysis, the main loadings are items 1 to 5, which are all positive items. The explanation is posited in terms of „factors“ thus:

#### **Factor One: Module content structure and Design**

This factor involves most of the variables that are needed in the design and structure of any module in the higher education institutions. The component in the variables includes: Honours degree design, module content intention, Honours level presentation, Honours research project and group assignment. Based on these variables, one could explain that when the university quality function is deployed sparingly with limited resource available. This factor relates to how the design of the Honours degree program is scheduled and how it is flexible for students to cope with it so as to primarily perform well despite any challenge.

#### **Factor Two: Human Resource Capacity**

This factor includes three variables such as supervisory lecturer capacity, sufficient lecturer and support staff capacity. These variables are independent to each other but when combined, involve the day-to-day human interaction among the staff of the university and the postgraduate students. Without a balanced human resource in any organisation, it becomes difficult to achieve a set objective or strategy. Hence, the university should have a manageable staff that willingly avail themselves to the service of the student.

#### **Factor Three: Support Facility**

There are two variables that make up these Factor group: Postgraduate assistants and class size availability. The number of student in a class and the difficulty that is faced by them, allows

the use of post graduate assistants. Students must be able to sort out some of the challenges they faced with the postgraduate assistants. This makes the pursued higher level degree a lot easier for the students. It also shows that internal operations provided by the university assists in various ways to enable a successful and promising higher level degree for the students.

#### **Factor Four: Physical Asset Capacity**

This factor includes two variables: Technological system and computer LAN. These are the assets provided by UKZN to assist the students towards their academic pursuits. This factor refers to the value that these physical assets composition presents as a necessity in achieving a post graduate degree. The provision and availability of these assets could not be underestimated but should be seen as important to the postgraduate degree in view.

#### **Factor Five: Performance Attributes**

This factor includes quality performance and library facility, and makes reference to the performance attributes of the library with capacity constraints affecting performance of students. This factors further touches on the capabilities of the library system to provide an up to date information in terms of resources needed for post graduate studies. Availability of updated resource in the library will reduce the capacity constraint faced by students thereby ensuring better throughput in terms of quality performance.

### **4.4 Multivariate Analysis**

#### **4.4.1 Multiple Regression**

According to Brace, Kemp and Snelgar (2012:206) multiple regression is “a statistical method which permits one to forecast someone’s mark on a variable compared to their mark on several other variables”. This statistical method could be used when discovering linear associations amongst the predictor and criterion variables – that is, when the association follows a straight line.

**Table 4.10: Model Summaries, ANOVA, and Coefficients**

| Model Summary |      |          |                   |                            |               |
|---------------|------|----------|-------------------|----------------------------|---------------|
| Model         | R    | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
| 1             | .610 | .373     | .338              | .917                       | 1.937         |



**Predictors: (Constant), Computer Lan, Quality Performance, Supervisory Lecturer Capacity, Postgraduate Assistants, Relevant Information Resource, Class Size Availability, Technological system, Student Personal Items, Sufficient Lecturer, Honours Research Project, Lecturer Consultation Times, Library Facility, Support Staff Capacity, Module Design Structure, Honours Level Presentation**

**ANOVA**

| Model    |                   | Sum of Squares | Df  | Mean Square | F      | Sig. |
|----------|-------------------|----------------|-----|-------------|--------|------|
| <b>1</b> | <b>Regression</b> | 136.817        | 15  | 9.121       | 10.847 | .000 |
|          | <b>Residual</b>   | 230.403        | 274 | .841        |        |      |
|          | <b>Total</b>      | 367.220        | 289 |             |        |      |

**Model Summary**

**Predictors: (Constant), Computer Lan, Quality Performance, Supervisory Lecturer Capacity, Postgraduate Assistants, Relevant Information Resource, Class Size Availability, Technological system, Student Personal Items, Sufficient Lecturer, Honours Research Project, Lecturer Consultation Times, Library Facility, Support Staff Capacity, Module Design Structure, Honours Level Presentation**

**Coefficients**

| del      |                             | Unstandardized Coefficients |            | Standardized Coefficients | T      | Sig. | Collinearity Statistics |       |
|----------|-----------------------------|-----------------------------|------------|---------------------------|--------|------|-------------------------|-------|
|          |                             | B                           | Std. Error | Beta                      |        |      | Tolerance               | VIF   |
| <b>1</b> | <b>Constant</b>             | .637                        | .312       |                           | 2.044  | .042 |                         |       |
|          | <b>Quality Performance</b>  | -.095                       | .051       | -.105                     | -1.858 | .064 | .713                    | 1.403 |
|          | <b>Library Facility</b>     | .027                        | .052       | .030                      | .513   | .609 | .663                    | 1.509 |
|          | <b>Computer Lan</b>         | -.029                       | .045       | -.037                     | -.654  | .513 | .721                    | 1.387 |
|          | <b>Sufficient Lecturer</b>  | .043                        | .049       | .049                      | .877   | .381 | .729                    | 1.372 |
|          | <b>Technological System</b> | .039                        | .051       | .043                      | .759   | .449 | .712                    | 1.405 |

|                      |                                      |       |      |       |       |      |      |       |
|----------------------|--------------------------------------|-------|------|-------|-------|------|------|-------|
|                      | <b>Student Personal Items</b>        | .030  | .048 | .035  | .616  | .538 | .710 | 1.408 |
|                      | <b>Supervisory Lecturer Capacity</b> | -.043 | .052 | -.049 | -.830 | .407 | .653 | 1.532 |
|                      | <b>Support Staff Capacity</b>        | .094  | .055 | .106  | 1.721 | .086 | .607 | 1.648 |
|                      | <b>Lecturer Consultaion Times</b>    | .097  | .055 | .102  | 1.759 | .080 | .676 | 1.480 |
| <b>Model Summary</b> |                                      |       |      |       |       |      |      |       |
|                      | <b>Relevant Information Resource</b> | .169  | .057 | .173  | 2.957 | .003 | .672 | 1.488 |
|                      | <b>Module Design Structure</b>       | .003  | .063 | .003  | .051  | .959 | .560 | 1.787 |
|                      | <b>Postgraduate Assistants</b>       | .034  | .052 | .036  | .647  | .518 | .742 | 1.347 |
|                      | <b>Class Size Availability</b>       | -.006 | .052 | -.007 | -.120 | .904 | .749 | 1.334 |
|                      | <b>Honours Research Project</b>      | .205  | .055 | .215  | 3.704 | .000 | .682 | 1.466 |
|                      | <b>Honours Level Presentation</b>    | .213  | .059 | .238  | 3.626 | .000 | .533 | 1.876 |

**Table 4.11: Residual Statistics**

| <b>Residuals Statistics<sup>a</sup></b> |         |         |      |                |   |  |
|-----------------------------------------|---------|---------|------|----------------|---|--|
|                                         | Minimum | Maximum | Mean | Std. Deviation | N |  |

|                                              |        |        |        |       |     |
|----------------------------------------------|--------|--------|--------|-------|-----|
| Predicted Value                              | 1.33   | 4.78   | 3.32   | .697  | 279 |
| Std. Predicted Value                         | -2.894 | 2.122  | -.006  | 1.014 | 279 |
| Standard Error of Predicted Value            | .075   | .346   | .208   | .054  | 279 |
| Adjusted Predicted Value                     | 1.29   | 4.83   | 3.32   | .706  | 278 |
| Residual                                     | -2.757 | 2.618  | -.001  | .892  | 278 |
| Std. Residual                                | -3.006 | 2.855  | -.002  | .973  | 278 |
| Stud. Residual                               | -3.233 | 2.984  | -.003  | 1.007 | 278 |
| Deleted Residual                             | -3.188 | 2.861  | -.004  | .956  | 278 |
| Stud. Deleted Residual                       | -3.291 | 3.029  | -.003  | 1.012 | 278 |
| Mahal. Distance                              | .951   | 40.152 | 14.811 | 7.879 | 279 |
| Cook's Distance                              | .000   | .102   | .005   | .010  | 278 |
| Centered Leverage Value                      | .003   | .139   | .051   | .027  | 279 |
| a. Dependent Variable: Honours Degree Design |        |        |        |       |     |

**Table 4.12: One Sample Test**

| One-Sample Test            |                |     |                 |                 |                                           |       |
|----------------------------|----------------|-----|-----------------|-----------------|-------------------------------------------|-------|
|                            | Test Value = 0 |     |                 |                 |                                           |       |
|                            | t              | Df  | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |       |
|                            |                |     |                 |                 | Lower                                     | Upper |
| <b>Quality Performance</b> | 49.296         | 296 | .000            | 3.576           | 3.43                                      | 3.72  |
| <b>Library Facility</b>    | 50.834         | 293 | .000            | 3.776           | 3.63                                      | 3.92  |

|                                      |        |     |      |       |      |      |
|--------------------------------------|--------|-----|------|-------|------|------|
| <b>Computer Lan</b>                  | 29.348 | 294 | .000 | 2.420 | 2.26 | 2.58 |
| <b>Sufficient Lecturer</b>           | 39.908 | 294 | .000 | 2.997 | 2.85 | 3.14 |
| <b>Technological System</b>          | 36.126 | 293 | .000 | 2.616 | 2.47 | 2.76 |
| <b>Student Personal Items</b>        | 51.753 | 296 | .000 | 3.980 | 3.83 | 4.13 |
| <b>Supervisory Lecturer Capacity</b> | 37.835 | 292 | .000 | 2.850 | 2.70 | 3.00 |
| <b>Support Staff Capacity</b>        | 39.919 | 296 | .000 | 2.923 | 2.78 | 3.07 |
| <b>Lecturer Consultation Times</b>   | 45.239 | 295 | .000 | 3.118 | 2.98 | 3.25 |
| <b>Relevant Information Resource</b> | 48.445 | 295 | .000 | 3.233 | 3.10 | 3.36 |
| <b>Module Design Structure</b>       | 48.953 | 295 | .000 | 3.257 | 3.13 | 3.39 |
| <b>Postgraduate Assistants</b>       | 45.105 | 294 | .000 | 3.159 | 3.02 | 3.30 |
| <b>Class Size Availability</b>       | 46.232 | 293 | .000 | 3.204 | 3.07 | 3.34 |
| <b>Honours Degree Design</b>         | 50.548 | 293 | .000 | 3.323 | 3.19 | 3.45 |
| <b>Honours Research Project</b>      | 52.139 | 295 | .000 | 3.574 | 3.44 | 3.71 |
| <b>Honours Level Presentation</b>    | 52.066 | 294 | .000 | 3.817 | 3.67 | 3.96 |

The R-squared value identified in model 1 is 0.373, thereby illustrating the variation in Honours Degree Design as the independent predictor variables and are added as part of the model. The adjusted R-squared takes into account, the amount of variables used and the fitness of the model to the sample data. Hence, the adjusted R-square value is equal to 0.338. The Durbin Watson statistics outcome is 1.937. The primary value should be in the middle of 1.5 and 2.5. This research study utilizes the ANOVA table to decide whether the multiple R in the population equals to zero and also to evaluate the result significance. The ANOVA table produced an F-statistics value of 10.847 and significant *p*-value of 0.000. Only six variables have a significance value of 0 and a conclusion is drawn there is a relationship amongst the dependent

variable (Honours degree design) and these six independent variables (quality performance, lecturer consultation times, support staff capacity, relevant information resource, Honours level presentation and Honours research project).

Honours level presentation has the highest beta value of 0.213 thereby making it the highest factor that contributes to the dependent variable when other variable is controlled. The significance level of the variable (Honours level presentation) at 95% confidence interval is  $p = 0.000$  which is less than 0.05 designating that sufficient lecturer makes a significant input when predicting the dependent variable.

Additional explanation on the independent variable being significance to the dependent variable could be clarified by the one-sample  $t$ -test from the regression analysis. This results in all sixteen predictor variables attaining a significant  $p$ -value  $0.000 < 0.05$  indicating that the average response from the sample represents the true population mean. Previously, the correlation between this study's independent variables was too high. Therefore, two of the independent variables with values above .7 respectively (Module Content Intention and Group Assignments) were omitted. This was done to avoid problems with multicollinearity.

### **Residual Statistics**

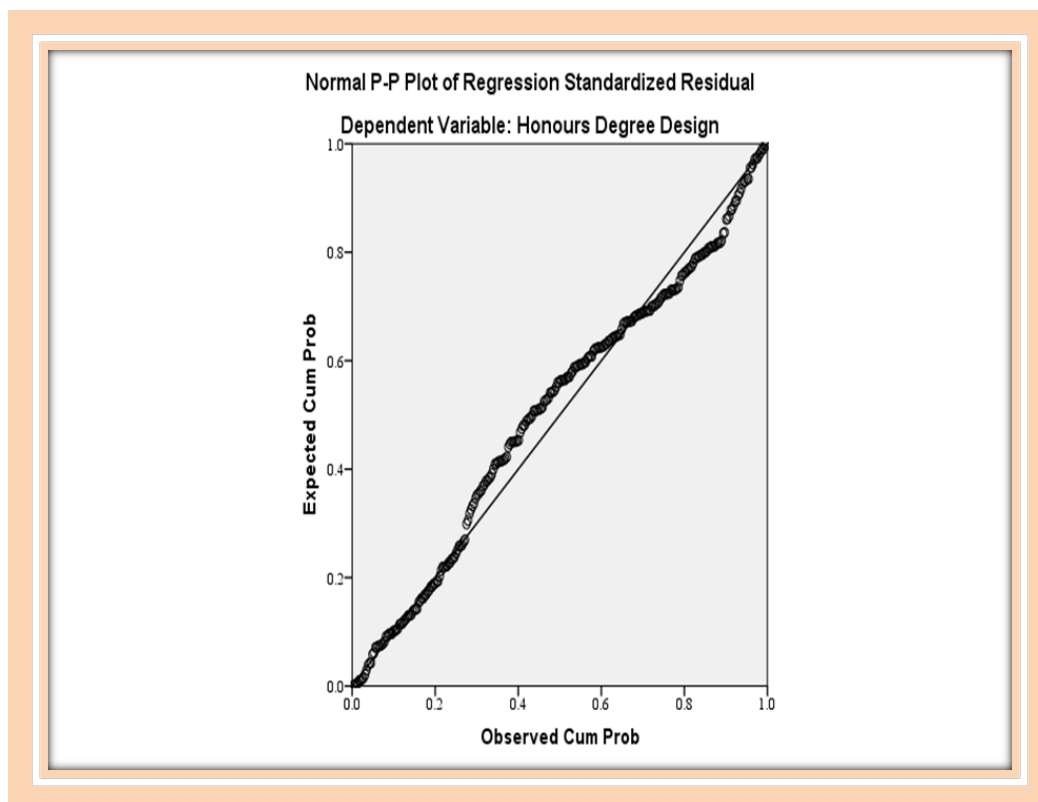
The standardised residual outcome from this study is (min = -3.006 and max = 2.855), which is within an expected value between (-3.3 and  $\pm 3$ ) and a „studentised“ residual (min = -3.233 and max = 2.984). The above model has a normal distribution with a mean of 0 (-0.002) and standard deviation close to 1 (0.973) from standardised. The cook's distance (D) measurement indicates the influence which an observation has on the complete model. When  $D > 1$ , there is existence of an outlier problem (Pallant, 2006: 151). The statistics outcome in this research designates that the cooks worth is between (min = 0.000 and max = 0.102), therefore the D value is lower than 1, showing that the observations does not actually have big effects on the regression analysis.

Leverage observation assumes the number that lies between 0 and 1 with 0 designating no issues or effect on regression and 1 designates otherwise. In this study, the leverage level ranges a minimum of 0.003 and maximum of 0.139). The Mahalanobis distance is mostly used to

detect outliers in an observation by exploring the degree at which the totals lies from the centre of all the predictor variables. The values include (min = 0 .951 and max =40.152).

### Normality and Linearity

The normality and linearity plot of regression guarantees that mutual variances are not violated. A validity representing the assumptions concerning the residual values of a normal P-P plot follows a normal distribution. The line points are the expected values that match with the diagonal line, which suggests no deviations from normality.



**Figure 4.20: Normal P-P Plot of Regression Standardised Residual**

### 4.5 Reliability and Validity

**Table 4.13: Reliability Statistics**

| Reliability Statistics |            |
|------------------------|------------|
| Cronbach's Alpha       | N of Items |
| .836                   | 18         |

Respondents were required to respond to some questions on a five point Likert scale, according to which 1 specifies „strongly disagree“ and 5 „strongly agree. Cronbach Alpha investigates the instrument’s reliability, and also describes the internal consistency of a research study. The range must be between 0 and 1, and mostly, if a value is closer to 1, it shows a higher extent of internal consistency. Reliability of a scale depends also on the sample it is used with (Pallant, 2006: 91). The Cronbach Alpha value from this analysis is 0.836 and as this value is above 0.7, the scale is reliable with the sample. By evaluating eighteen (18) variables on the five point Likert scale, Cronbach’s Alpha of the instrument is 0.836. The instrument is then deemed to be reliable.

**Table 4.14: Item Total Statistics**

| Item-Total Statistics         |                            |                                |                                  |                                  |
|-------------------------------|----------------------------|--------------------------------|----------------------------------|----------------------------------|
|                               | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| Quality Performance           | 55.45                      | 122.638                        | .190                             | .840                             |
| Library Facility              | 55.25                      | 117.061                        | .389                             | .830                             |
| Computer Lan                  | 56.64                      | 123.703                        | .120                             | .845                             |
| Sufficient Lecturer           | 56.02                      | 116.599                        | .402                             | .829                             |
| Technological System          | 56.41                      | 120.460                        | .272                             | .836                             |
| Student Personal Items        | 55.04                      | 121.071                        | .230                             | .838                             |
| Supervisory Lecturer Capacity | 56.20                      | 116.465                        | .409                             | .829                             |
| Support Staff Capacity        | 56.13                      | 113.413                        | .542                             | .822                             |
| Lecturer Consultation Times   | 55.90                      | 113.903                        | .557                             | .821                             |
| Relevant Information Resource | 55.83                      | 114.788                        | .537                             | .823                             |
| Module Design Structure       | 55.78                      | 112.747                        | .623                             | .818                             |
| Postgraduate Assistants       | 55.88                      | 116.885                        | .419                             | .828                             |

|                            |       |         |      |      |
|----------------------------|-------|---------|------|------|
| Class Size Availability    | 55.82 | 117.313 | .414 | .828 |
| Module Content Intention   | 55.51 | 115.103 | .551 | .822 |
| Honours Degree Design      | 55.72 | 115.034 | .544 | .822 |
| Honours Research Project   | 55.47 | 115.867 | .480 | .825 |
| Honours Level Presentation | 55.21 | 112.649 | .569 | .820 |
| Group Assignment           | 55.29 | 112.365 | .593 | .819 |

The degree to which each item correlates with the total score should not be less than 0.3. In this study, some of the items have a total above 0.3, while some have values below 0.3 (**indicated in Corrected Item-Total Correlation table**). The items whose values are below 0.3 includes (quality performance, computer LAN, technological systems, and student personal items).

#### 4.6 Chapter Summary

The previous chapter focused on the research design and methodology of the study. The current chapter, on the other hand, outlined the various statistical trajectories utilised in the analysis of the collected primary and secondary data. This chapter also offered the outcome Dynamics of Capacity Constraints in Managing Throughput Quality at Honours Level in the University of KwaZulu-Natal. This study allowed for the data collection process to explain more on the perceptions of the students on the capacity constraints in UKZN and how the throughput is managed and attained with regards to this. The collected data was categorised into the Honours degree students' general perceptions on capacity constraints at UKZN, capacity constraints that students at Honours level experience, and the important dimensions / challenges that mostly describe the existing Capacity Constraints at UKZN.

Some cross-tabulations were performed and verified by means of the chi-square test of independence. From the ensuing statistical analysis, the academic activities will more likely improve by means of the adopted reconfiguration system design. From the resultant factor analysis, the eighteen decisional statements on outsourcing were reduced to five factors and a one-way analysis of variance discovered significant differences among these factors.

Furthermore, a logistic regression model was fashioned for the identified relationships.





## **Chapter 5 Discussion, Findings, and Recommendations**

### **5.1 Introduction**

This chapter provides a thorough discussion on the interpretation of the results obtained from this study. This chapter further discusses the details of the theoretical and practical application of the results that were obtained. This is followed by an evaluation of the study in terms of reaching the set objectives. The contributions of the study to the supply chain management body of knowledge are then discussed, and finally the chapter concludes with a discussion on the limitations of the research and the possible directions for research in the future.

This section of the study provides an overview and a brief summary of each chapter. The chapters have been revisited and summarised in accordance with a logically coherent concatenation. Chapter One introduced the study by providing a background of the theory of constraints and the University of KwaZulu-Natal. The research problem was identified, and the objectives were outlined in the context of resolving the identified research problem. The main objective of this study was to explore the dynamics of capacity constraints in managing throughput quality at Honours level at the University of KwaZulu-Natal (UKZN). A discussion on the scope and research process were then provided, and the importance and benefits of the study outlined.

Chapter Two provided a literature review which premised on the conceptual and theoretical frameworks. The conceptual framework discussed literature related to capacity, operations management, quality, and quantity (which highlighted issues on constraints within universities). The theoretical framework outlined four specific theories which formed the foundation for the study. These theories included the theory of constraints (TOC) (which highlighted the five-step process of on-going improvement); resource-based view (RBV); dynamic capabilities (DC); and the Taguchi concept. The chapter also discussed capacity management (more specifically, capacity management within the services sector) and customer service quality. The chapter concluded with a further discussion on the extent to which the theory of constraints could be utilised as a tool to assist in the dynamics of capacity constraints in managing throughput quality at Honours level at the University of KwaZulu Natal. The main objective of Chapter Three was to discuss the research design and methodology that were followed in this study. The methods for collection of data were discussed in conjunction with

the sampling techniques that were utilised for the selection of the participants for this study. Finally, there was a thorough discussion on the methods utilised to analyse the collected data, as well as the relevant steps taken to ensure the quality of standards of the measuring instrument used and the collected data.

Chapter Four presented the results obtained from the collected data accruing from the questionnaires. First, the participants' biographical data were presented. The chapter also provides a descriptive analysis of the constructs and their items used for measurement. The results obtained from data analysis techniques such as the binomial test, one sample t-test, chi-square test, and the analysis of variance (ANOVA), were presented. The results obtained from testing the hypotheses of the study were also presented. The last and current chapter of the study (Chapter 5) discusses and interprets the research findings. A further discussion is provided on the results obtained from Chapter Four and their implications on the dynamics of capacity constraints at the University of KwaZulu-Natal. The chapter also provides an evaluation process to test whether or not the set research objectives were achieved. The chapter concludes by discussing the theory of constraints based on the set constructs that could be utilised to improve the throughput quality of students at Honours level at the University of KwaZulu-Natal.

## **5.2 Discussion and Implication of the Results**

A discussion on the implications of the study's results/findings established a context for the justification of the recommendations of the study. Accordingly, the research objectives are the logical points of reference in the determination of the study's findings and legitimacy (Babbie & Mouton, 2001:4; Fouche, 2002:106).

**First research objective:** *To investigate how the TOC influences student throughput quality at Honours level at the University of KwaZulu-Natal.*

The results indicated that more female respondents participated in this study than their male counterparts (see Figure 4.1). Most of the respondents in this study were between the ages of 21 and 26. Westville Campus consisted of the most number of respondents, primarily because it offers the highest number of Honours programmes offered in various colleges and disciplines. Although Pietermaritzburg has the most number of colleges, it has a small number of students in each discipline. Reviewing related literature assisted this study in the establishment of

challenges and limitations that need to be overcome by the University of KwaZulu-Natal in order to manage the throughput quality of Honours level students. The theory of constraints was centralised as the primary conceptual parameters within which inhibitive factors were identified in order to initiate and implement improvements relating to Honours degree students' academic performance and throughput levels. The TOC concept essentially reinforces the prevalence of at least one constraint (bottleneck) in every organisation.

According to Simatupang et al., (2004:4), a constraint is anything that limits an organisation from accomplishing its objectives or excelling beyond its initial tasks. The University of KwaZulu-Natal has tasked itself to produce Honours students at the end of every academic year. The TOC thus helps as to identify those constraints that may prevent the Honours students from achieving high levels of academic performance and assist in finding solutions to alleviate the limitation. Panizzolo and Garengo (2013:1) indicated that the purpose of the theory of constraints is to identify and manage the bottlenecks in a manufacturing process.

The results of the study support the above view, because the primary step of the TOC's five-step process of on-going improvement is to identify the bottleneck within a system. Spector (2011:3389) provides the five-step process of on-going improvement thus:

- i. Identify the constraint; ii. Exploit the constraint; iii. Subordinate the system to the constraint; iv. Elevate the system's constraint; and
- v. If a constraint has been dealt with, restart the entire process. Do not allow inertia to become the constraint.

The results obtained indicated the Honours students' constraints/ bottlenecks. For instance, a large percentage of respondents agreed that the University's technological infrastructure was not sufficient, which hinders them from achieving higher levels of performance and therefore could be referred to as a constraint. The first step of this process was productive because a constraint was "identified". It is very important to highlight the fact that the theory of constraints does not aim to perfect the operations within an organisation, it never claimed to solve all the problems within an organisation. The main focus is to help identify what may constrict operations within the University. It is a tool that should be used for "on-going improvement".

**Second research objective:** *To evaluate the challenges of bottlenecks affecting the throughput levels and quality of Honours students at the University of KwaZulu-Natal* The discussion and findings in this section are based on the results obtained in Figure 4.4.

These results are further discussed in relation to what was obtained from the literature review. In an attempt to achieve this research objective, the researcher posed questions in relation to capacity constraints. The questionnaire consisted of six sections. Sections two, three and six specifically aimed at achieving the above-cited second research objective. Section two was designed to obtain information through the use of dichotomous “Yes” or “No”) questions with regard to the Honours student’s general perceptions on capacity constraints at UKZN. There was significant agreement that UKZN does use the available limited resources to run all academic operations and activities. However, when asked whether or not UKZN had improved its academic activities at Honours level through the integrated system design, almost half of the Honours students were of the view that the University had not improved its reconfiguration or re-engineering systems.

Significantly, more respondents indicated that the university’s approach each semester aided in reducing the number of students who drop out. They were of the view that the capacity constraints experienced at Honours level have an influence on the type of graduate they become at the end of the academic year. There was significant agreement that the number of students enrolled in the University has an influence on their level of competency and the qualities they possess as graduates. The literature review also focused on capacity constraints with regard to infrastructural challenges engendered by funding challenges. The expansion of infrastructure has not increased at the same rate as the number of enrolled students in the University. It is important for the University to increase the available capacity so that the enrolment demands could be mitigated. Situations still exist in which the availability of lecture theatres, administrative offices, laboratories and sanitary facilities is insufficient to mitigate a large student and staff population. Kanyengo (2009:376) reports that challenges continue to intensify for institutions of higher education due to the massive influx of students.

As indicated in Chapter Four, a combined majority of respondents (54.6 % and 15.9%) disagreed, and 38.7% strongly disagreed when asked whether or not the computer LANs had enough computers for students’ research related activities. Similarly, most of the respondents stated that the systems did not operate at high speeds most of the time. Constraints pertaining

to technological infrastructure were discussed in the literature review. Mohamedbhai (2007) stated that computer and Internet resource facilities at universities were numerically and functionally inadequate. It is utterly unacceptable that Honours students have to wait for long periods of time before they could access computer LAN. Kanyengo (2009:380) placed emphasis on campuses having limited Internet connectivity, bandwidth, and the issue of educational institutions being heavily dependent on external sources for information services. However, it should be noted that in section six (dimensions of capacity constraints) of the questionnaire, the respondents indicated that they did not perceive poor infrastructure as a major challenge. This is in stark contradistinction to the results obtained in previous sections of the self-same questionnaire. This shows that there were inconsistencies with some of the answers elicited by the study's respondents.

**Third research objective:** *To examine the deployment and quality of the supply chain function as a mechanism to develop competitive responses to Honours student needs and demands*

Section five of the questionnaire was designed in accordance with the above research objective. The questions related to the design of the Honours degree in accordance with their respective disciplines. The aim of questions in this section was to ascertain whether or not their module content and activities were in line with their career goals and relevant skills. As stated by Raharjo et al. (2011:3653), quality function deployment (QFD) collects and translates customer requirements into the suitable technical requirements at each phase of development and production. Maewell and Dumas (2012:6) postulate that the core advantage of QFD is its complete focused on the customer's needs. With this in mind, the researcher structured questions in section five of the questionnaire in order to determine whether or not the Honours degrees were designed in accordance with students' future career plans.

Section five of the questionnaire was the third and final section, and made use of the five- point Likert scale. The first question interrogated the correlation between module content future career plans of the Honours students after graduating from UKZN. The majority of the respondents felt that the module content included in their Honours degree was reflective of the type of work they plan to pursue after completing their studies. The second statement of section five interrogated the correlation between the Honours degree in which they enrolled, and their future career plans. The majority of respondents were of the view that their Honours degrees were stepping-stones and in line with what they planned to achieve along their career.

**Fourth research objective:** *To assess the effects of internal operations processes in relation to the interface between programme capacity and the magnitude of demand*

The internal operations of the university are directly related to the effectiveness of managing the Honours degree and the magnitude of demand. The literature review enabled the researcher to „invent“ a view according to which the study would translate “goods and services being produced” into “Honours students graduating”. It is important to understand that the operations of any organisation are responsible for production. The operations process includes three components: inputs (land, labour, capital, and information)“ transformation (conversion process – Honours modules); and outputs (goods and services – Honours graduates) (Stevenson, 2005). In order for the university to ensure that it optimally obtains the desired output, measurements could be taken at numerous points during the transformation process. Honours modules, tests, assignments, presentations and exams) and comparisons could be made with established standards.

Ricket (2010), supported by Marlies et al., (2011), mentions that capacity is the propensity or potential of an organisation (size, type, and structure) to accommodate or contain something within a given period of time. A significant percentage of respondents indicated that they did not have enough postgraduate assistants helping in student development. This may entail that the number of postgraduate assistants is not sufficient as opposed to the quality of postgraduate assistants that are available. In most cases, students need to be able to consult their lecturers beyond the classroom for insight and additional information. Of all respondents, 27% were of the view that consultation times with their lecturers did not fit well with their timetables for the academic year. Heizer and Render (2011:314) highlighted the importance of capacity planning, since a facility that is not large enough could cause the organisation to lose customers and, inevitably, lose market share. In this case, Honours students could opt for alternative HEIs if the Honours degree (especially because it is research intensive) does not have sufficient capacity to mitigate demand. Since the Honours degree is of 12 months“ duration, Jacobs and Chase (2014:110) emphasise intermediate range capacity planning (which is a monthly or quarterly arrangement) ranging from 6 to 18 months. Ricket (2010) states further that every organisation needs to ask itself what it plans to accommodate. Once the university has identified how many students will be enrolled in an Honours degree (in all colleges and schools) for that academic year, it could then establish how much capacity will be needed for the particular

number of students it will be accommodating. A clear understanding of the magnitude of demand will enable UKZN to mitigate the vagaries of demand.

### **5.3 Chapter Summary**

This chapter provided a thorough discussion on the interpretation of the results obtained from this study. This chapter further discussed the details of the theoretical and practical application of the results that were collected. This was followed by an evaluation of the study in terms of reaching the set objectives. The contributions of the study to the supply chain management body of knowledge were discussed, and finally the chapter concluded with a discussion on the limitations of the research and the possible directions for future research.

This section of the study provides an overview and a brief summary of each chapter. The chapters were revisited and summarised in accordance with a logically coherent concatenation. Chapter One introduced the study by providing a background of the theory of constraints and the University of KwaZulu-Natal. The research problem was identified, and the objectives were outlined in the context of resolving the identified research problem. The main objective of this study was to explore the dynamics of capacity constraints in managing throughput quality at Honours level at the University of KwaZulu-Natal (UKZN). A discussion on the scope and research process was provided, and the importance and benefits of the study outlined.



## Chapter Six Conclusions and Recommendations

### 6.1 Introduction

The most profound goal of this chapter is to determine the scientific worth and integrity of the study in relation to practical socio-economic relevance. In this regard, the chapter then adopts an eclectic approach according to which both theoretical and empirical perspectives are thematically incorporated, with TOC as the central point of reference Akoojee).

### 6.2 Conclusions on Major Findings

The conclusions derived from the study provide the parameters within which the main findings are stated, developed, extended, and defended (Muller, 2004:6). In doing so, “redherring argument” – delving on peripheral and irrelevant issues to the main argument (Mouton, 2001:120); as well as “*non sequitur* reasoning” – conclusions that have no logical connection to data or evidence presented (Mouton, 2001: 120).

The discussion of results in the previous chapter notes some similarities with findings on previous research. This study could be seen as an advantage to resolve a few of the inefficiencies and constraints that students at Honours level encounter. Table 6.1 below is a summary of the discussion and results that were obtained when the research objectives were answered. The findings of this study and the major points may possibly have an impact on the dynamics of capacity constraints in managing throughout quality at Honours level at the University of KwaZulu-Natal.

**Table 6.1: Conclusions on the Major Findings of the Study**

| Objectives                                                                                                | Major Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. To explore the theory of constraints in influencing student throughput quality at Honours level</b> | <p><b>i.</b> Different types of organisations have applied the theory of constraints such as:</p> <p>court systems, engineering/product design, banks, education, food services, and government sector services.</p> <p><b>ii.</b> The five step process of on-going improvement is applicable in manufacturing and service organisations, as well as administrative and supply chain processes. <b>iii.</b> The foundation of the theory of constraints is that only by addressing the weakest link in a chain will it enable an organisation to achieve its bottom line at a desired rate.</p> |

| Objectives                                                                                                                                            | Major Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                       | <p>iv. The drum-buffer-rope (DBR) scheduling tool could be applied in a service environment. In the manufacturing sector, organisations utilise the DBR tool to schedule their machinery operations, on the other hand, services could schedule human resources by utilising the DBR tool. This could be used to envisage lead times for customers or administer appointments for customers. Weaknesses or problems that could disrupt the operations of a system could be addressed by utilising buffer management.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p><b>2. To assess the challenges of bottlenecks towards throughput quality Honours students at the University of KwaZulu-Natal</b></p>               | <p>v. Woepfel (2001:12) postulated that three kinds of constraints exist within an organisation; these include policy, resource, and material. Policy being anything that commands organisational behaviour. Resources are the tangible and intangible assets used to run the university. Material constraints constitute whether or not materials are available or are in short supply.</p> <p>vi. An increased enrolment of students over the years has left higher education institutions short-staffed and unable to recruit more academic staff. Fabiyi and Uzoka (2007:4) state that most universities enrol more students than there are available lecturers and facilities such as desks, classrooms, equipment, laboratories and material. There has been an over shot of students into the system at UKZN compared to the number of resources available.</p> <p>vii. The computer and Internet resource facilities at universities are inadequate both in functionality and numbers (Mohamedbhai, 2007). At times, students have to wait for long periods of time before they are able to make use of a computer. This is usually the case at Honours level because it is a research-based degree and requires aggressive use of the Internet for information sources such as journals, articles, and e-books</p> |
| <p><b>3. To examine the supply chain quality function deployment on Honours students to develop competitive response to student needs/demands</b></p> | <p>viii. Quality function deployment (QFD) is customer-driven and is a very important process in designing a product. It is vital to understand that the main focus should be on who the customer is because this will set the tone for the work that needs to be accomplished.</p> <p>ix. The Honours students felt that the QFD approach at UKZN is being applied according to their expectations. For each question asked regarding the QFD process there was a significant over agreement (see Figure 4.14) that module content, degree design, research projects, presentations and assignments were in line with what they had expected before commencing the Honours degree. However, it should be noted that 17% of the Honours students were of the opinion that the Honours research project did not equip them with useful skills for their careers. This needs to be addressed because the Honours degree is research intensive and the research project plays a major role in the students final year mark.</p>                                                                                                                                                                                                                                                                                                |

| Objectives                                                                                                                                       | Major Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4. To assess the effects of internal operations processes in assessing the interface between program capacity and the magnitude of demand</b> | <p>x. Operations management is the conversion of inputs (students) into outputs (graduates). The inputs that are employed into an Honours degree include labour, land, information, capital and the Honours newly graduated students. The transformation/conversion processes are all the activities employed into the Honours modules. The outputs are the Honours graduates at the end of the academic year.</p> <p>xi. The integration between complex tasks performed by an organisation to enhance output is known as operations capability. The internal operations of UKZN should employ strategic resources that have value in such a way that they influence customer value. Strategic resources need to be extremely difficult to imitate so that it could yield a competitive advantage for UKZN.</p> |

**Source: Designed by the researcher**

### **6.2.1 Literature-Based Conclusions**

The literature findings by numerous international authors cited in this study concur with the results in this study. This may be viewed as an opportunity to bring to attention the dynamics of capacity constraints in managing throughput quality, and develop a better understanding of areas that need improvement. Applying and adopting improvement methods and tools in the higher education sector. According to the literature, most African universities have not advanced in the critical area of capacity management when compared to its global counterparts. However, being able to identify the most pertinent constraints allows for management tools such as the theory of constraints to be utilised. Indeed, research studies such as this could prove beneficial for universities to further explore management methods and tools tailored to the needs of the particular university.

### **6.2.2 Empirical Conclusions**

From a management perspective, this study places significant pressure on the management of UKZN. As much as there was valuable data and information collected from the Honours students, there are still underlying dynamics that were not addressed; such as why certain Honours degrees are so well supported to the extent that the students are not as constrained as other students. However, this study could enhance the UKZN management's understanding the dynamics of capacity constraints in managing the throughput quality of Honours level students. Several benefits could be drawn from this study that could help and assist not only UKZN, but

also other HEIs to improve on their operations and increasing the quality of student graduates at the university.

### 6.3 Recommendations

The following propositions are based on the main findings and conclusions of the study. After thoroughly reviewing the findings of the study, the following recommendations are highlighted within the confines of this research. Based on previous studies and the results of this study, these recommendations are aimed at providing a platform for higher education institutions to build and manage an effective system of continuous improvement in the realm of the dynamics of capacity constraints experienced by Honours level. The University KwaZulu-Natal is not at the forefront of such implementations, in comparison to its global counterparts. However, knowledge is important, and with the use of this study, higher education institutions could utilise the findings of this study as a basic framework for a further, deeper, and enlightened understanding of the dynamics of capacity constraints in managing throughput quality at Honours level at UKZN.

**Table 6.2: Recommendations**

| Recommendations                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. The main focus should be on who the customer is, since the customer sets the tone on the work that needs to be accomplished. The needs and wants of the customer will determine whether simple improvements are possible. Identify who the customer is                                                                                    |
| 2. Proper preparation for the Honours degree includes selecting the right instruments of work and eliminating everything that is deemed unusable. The Honours degree needs to be structured in such a way that eligible students are selected for the degree. Selecting the appropriate functions will ensure that operations are efficient. |
| 3. Ensuring that Honours students are in a suitable environment. Preparing the required resources in such a manner that it enables quick and simple utilisation by the Honours students.                                                                                                                                                     |
| 4. When the Honours degree is supported by a conducive environment it allows an increase in the control of facilities, and responsibility regarding how Honours students will be managed at UKZN                                                                                                                                             |

|                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5. It is important for the postgraduate staff members to reminded about their duties regarding equipment, resources and ensuring that the Honours students are well attended |
| for                                                                                                                                                                          |
| 6. Staff members and Honours students need to adapt to the organisations principles, and independently eliminate any bad custom or training                                  |
| 7. Identifying and exploiting bottlenecks (on an on-going basis) within the operations of an Honours degree is vital for continuous improvement                              |
| 8. It is important that student facilities are reliable, responsible, guaranteed and for staff members to be sympathetic towards the Honours students                        |

**Source: Designed by Researcher**

### **6.3.1 Recommendations on Relevance of the Study**

Since the theory of constraints (TOC) is a management tool designed to alleviate bottlenecks within a system on an on-going basis, it could be used to address some of the constraints that the Honours students are experiencing. The TOC's five-step process of on-going improvement includes identifying the constraint, exploiting the constraint, subordinating other activities to the constraint, elevating the constraint, and restarting the entire process to avoid inertia and ensure that there is continuous improvement. One of the more prominent constraints that were identified from the results of this study was the shortage of computers in the postgraduate computer LANs. In addition, the technological systems in the postgraduate computer LAN do not operate at high speeds most of the time.

Utilising the TOC has enabled this study to "identify" the type of capacity constraints/bottlenecks the Honours students are experiencing. Sadat et al. (2013:62), indicate that whatever seems to be limiting the system from achieving high performance levels in relation to its goal must be isolated. Groop (2012:38) states further that it is also helpful to answering questions such as: "If the university had more of this, would it enable the university to achieve its goal at the desired rate?" If the university had faster technological systems in the computer LANs, would it enable students to achieve their goals more effectively? Exploiting the constraint means maximising the performance of the constraint, by making use of current resources. Eliminating any policy constraints, dummy constraints, and ensuring that resource constraints that govern throughput are maximised. Subordinating other activities in the

university to the constraints will ensure that non-constraints or noncritical resources are managed efficiently. More effort will need to be employed in sourcing more computers and increasing and speeding-up the technological systems.

The third step of the process is the elevation of the constraint, which focuses on investing in capacity. There is a need to identifying sponsors willing to source personal laptops or iPads for the Honours students, as the results indicate that there are not enough computers for every student to utilise simultaneously. Restarting the entire process will ensure that when a constraint appears within the Honours program it will be identified immediately. The results show that students are more concerned with budgetary shortfalls, and feel that this needs to be dealt with on an urgent basis. Continuously improving UKZN's Honours program will put the degree in a better position for the future.

#### **6.4. Contribution of the Study**

This study will contribute to the body of knowledge on the dynamics of capacity constraints in managing throughout quality at Honours level in the University of KwaZulu-Natal. Previously, there was little research supporting this study although students have been facing capacity constraints at the university. It should also be noted that UKZN is not the only institution of higher education facing capacity constraints as was outlined in the literature review previously in this dissertation. It is an issue which affects higher education institutions in different parts of the world. With the new knowledge and awareness developed in this study on a costly and sensitive topic such as capacity constraints in an institution of higher education, the results show that the theory of constraints could be used as a management tool to identify the nature of experiences of students at Honours level. The theory of constraints does not necessarily mean that if applied, all the bottlenecks in the university's system would be perfect. Rather, it suggests that it enhances continuous improvement in an organisation, since no organisation could be perfect all the time. It is a combined effort from all members of an organisation that will prove effective within the university.

#### **6.5 Limitations of the Study**

This study revealed possible research and methodology limitations. In addition, the paucity of research on this particular topic is also a limitation. Also, there was a lack of participation by some of the students enrolled in an Honours degree at the University of KwaZulu-Natal. *As a result, the full sample of 302 students was not reached.* Even the respondents who did complete

a questionnaire still left some questions blank, and this limited the amount of collected data. The study was also administered at a time when students were preparing for their end-of-year exams, and were reluctant to participate because of time constraints. Methodological limitations, however, fitted into the intentions of the research design intended to explore and understand the dynamics of capacity constraints in managing throughout quality at Honours level from the perspective of an Honours student.

## **6.6 Future Research**

It is important to understand that in order to gain a broader understanding of the dynamics of capacity constraints, concepts must be viewed from the perspective of the Honours students. Future research needs to make a thorough attempt to examine the extent to which students place pressure on the universities to address these capacity constraints, as well as the pressure of the impact on the university. The reviewed literature shows that customer/supplier involvement is one of the main external drivers for organisations to address the issues faced. It would be interesting to conduct research on the extent to which the university's supply chain is influenced by its upstream and downstream supply chain members.

Another important area that could be considered is the extent to which technological advances provide a competitive advantage to universities that could afford, have access to and correctly implement management tools. Capacity management has featured significantly in most themes of this study, and most of the major findings in this study have been driven by capacity management. In order to narrow the scope and attempt to address one issue at a time, it may be beneficial to address a specific constraint that received major attention. Addressing one constraint at a time could prove more effective than trying to rectify numerous constraints simultaneously.

Further studies should be conducted within the realm of higher education curriculum transformation in order to reflect the new post-democratic dispensation of publicly funded South African HEIs as institutions located *in* society, serving the interests *of* society, as opposed to elitist ivory towers that are averse to both epistemological and programmatic transformation and serving the interests of industry only at the expense of communities that need to benefit from the educational and socio-economic fruits of freedom and democracy. In this manner throughput constraints experienced by all postgraduate students in the country

would be addressed holistically, thus affording higher education, government, and industry policymakers the unique opportunity to confront the country's challenges more seriously.

## **6.7 Chapter Summary**

This study is able to answer the research questions and objectives outlined at the beginning of the research. Now that information is available for understanding the dynamics of capacity constraints in managing throughput quality at Honours level at the University of KwaZuluNatal, further research could be explored to complement this study in order to provide an overall perspective on the dynamics of capacity constraints in higher education institutions. The findings of the study have been highlighted along with recommendations in further managing the dynamics of capacity constraints experienced by students at Honours level at UKZN.



## LIST OF REFERENCES

- Abari, AAF. Yarmohammadian, MH. & Esteki, M. (2011). Assessment of Quality of Education a Non-Governmental University via SERVQUAL Model. *Procedia Social and Behavioural Sciences*, 15: 2299–2304.
- Abdi, H. (2006) The Binomial Distribution: The Binomial and Sign Tests [online], available: <https://www.utd.edu/~herve/Abdi-Binomial2007-pretty.pdf> [6 July 2015].
- Abdous, M. (2011). Towards a Framework for Business Process Reengineering in Higher Education”. *Journal of Higher Education Policy and Management*, 33(4): 427–433. ACCA. (2011). Throughput Accounting and the Theory of Constraints [online], available: [http://www.accaglobal.com/content/dam/acca/global/pdf/sa\\_nov11\\_throughput2.pdf](http://www.accaglobal.com/content/dam/acca/global/pdf/sa_nov11_throughput2.pdf) [7 August 2014].
- Adenso-Diaz, B., Gonzalez-Torre, & Garcia, V. (2002). A Capacity Management Model in Service Industries. *International Journal of Service Industry Management*, 13(3): 286-302.
- Akhlaghi, E., Amini, S. & Akhlaghi, H. (2012). Evaluating Educational Service Quality in Technical and Vocational Colleges Using SERVQUAL Model. *Procedia - Social and Behavioural Sciences*, 46: 5285 – 5289.
- Akoojee, S. (2002). Access and Quality in South African Higher Education: The Challenge for Transformation. Pretoria: HSRC.
- Al Smadi, S. (2009). Kaizen Strategy and the Drive for Competitiveness: Challenges and Opportunities. *Competitiveness Review: An International Business Journal*, 19(3): 203-211.
- Babbie, E. & Mouton, J. (2001). The Practice of Social Research. Cape Town: Oxford University Press.
- Babbie, E. (2007). The Practice of Social Research. 9<sup>th</sup> edition. California: Wadsworth.
- Babbie, E. & Mouton, J. (2009). The Practice of Social Research. 12<sup>th</sup> edition. Cape Town: Oxford University Press.
- Babbie, E. (2010). International Edition: The Practice of Social Research. 12<sup>th</sup> edition. California, USA: Wadsworth CENGAGE Learning.

- Bailey, T. (2014) The Role and Functions of Higher Education Councils and Commissions in Africa: A Case Study of the South African Council on Higher Education [online], available: <http://chet.org.za/files/South%20Africa%20ROLE%20AND%20FUNCTIONS%20OF%20HE%20COMMISSIONS%20AND%20COUNCILS.pdf> [21 September 2014].
- Bailey, T. Cloete, N. & Pillay, P. (2011). Case Study: South Africa and Nelson Mandela University Metropolitan University [online], available: <http://chet.org.za/files/uploads/reports/Case%20Study%20-%20SA%20and%20Nelson%20Mandela%20Metropolitan%20University.pdf> [21 January 2015].
- Barnard, A. (2011). What is Theory of Constraints (TOC)? [online], available: <http://www.goldrattresearchlabs.com/documents/What%20is%20Theory%20of%20Constraints%20by%20Dr%20Alan%20Barnard.pdf> [4 August 2014].
- Beske, P. (2012). Dynamic Capabilities and Sustainable Supply Chain Management. *International Journal of Physical Distribution & Logistics Management*, 42(4): 372 – 387.
- Benito, JG., Lorente, ARM. & Dale, BG. (2008). Business Process Reengineering to Total Quality Management: An Examination of the Issues [online], available: [http://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CDAQFjAB&url=http%3A%2F%2Fwww.researchgate.net%2Fpublication%2F36720708\\_Business\\_process\\_reengineering\\_to\\_total\\_quality\\_management\\_an\\_examination\\_of\\_the\\_issues%2Flinks%2F004635208b099d7e4b000000&ei=rowmVPmLOvDe7Aano4DIAQ&usq=AFQjCNFYcp1t76LC1rNqDfwyxeQQjcFEvQ&sig2=LMHC6MqXom1BGzSxqbn9iw](http://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CDAQFjAB&url=http%3A%2F%2Fwww.researchgate.net%2Fpublication%2F36720708_Business_process_reengineering_to_total_quality_management_an_examination_of_the_issues%2Flinks%2F004635208b099d7e4b000000&ei=rowmVPmLOvDe7Aano4DIAQ&usq=AFQjCNFYcp1t76LC1rNqDfwyxeQQjcFEvQ&sig2=LMHC6MqXom1BGzSxqbn9iw) [27 September 2014].
- Black, T. & Gallagher, L. (1999). Are Physical Capacity Constraints Relevant? Applying Finance-Economics Theory to a Management Accounting Misconception. *Australian Journal of Management*, 24(2): 143-158
- Bless, C. Higson-Smith, C. & Sithole, SL. (2013). Fundamentals of Social Research Methods: An African Perspective. 5<sup>th</sup> edition. Juta: Cape Town.
- Blom, L. (2011). Theory of Constraints Focus on Continuous Improvement in Manufacturing [online], available:

[http://www.transmuteconsulting.com/Transmute\\_Consulting/Resources\\_files/Theory%20of%20Constraints%20Focus%20on%20Continuous%20Improvement%20ement.pdf](http://www.transmuteconsulting.com/Transmute_Consulting/Resources_files/Theory%20of%20Constraints%20Focus%20on%20Continuous%20Improvement%20ement.pdf) [4 August 2014].

Brace, N. Kemp, R. & Snelgar, R. (2012). SPSS for Psychologists. 5<sup>th</sup> edition., Palgrave Macmillian: UK.

Bryman, A. & Bell, E. (2007). Business Research Methods. 2<sup>nd</sup> edition. Oxford University Press: New York.

Buyukozkan, G. & Berkol, C. (2011). Designing a Sustainable Supply Chain Using an Integrated Analytic Network Process and Goal Programming Approach in Quality Function Deployment. *Expert Systems with Applications*, 38: 13731-13748.

Calderon, A. (2012). Higher Education in 2035: The Ongoing Massification [online], available: [http://www.academia.edu/2612867/High Education in 2035\\_The Ongoing Massification](http://www.academia.edu/2612867/High_Education_in_2035_The_Ongoing_Massification) [22September 2014].

Couldnon, JN., Couldnon, HM. & Low, JT. (2013). Modeling Tactical Product-Mix Decisions: A Theory-of-Constraints Approach. *Simulation & Gaming*, 44(5), :624-644.

Cardona, MM. & Bravo, J.J. (2012). Service Quality Perceptions in Higher Education Institutions: The Case of a Colombian University. *Estud.gerenc.* 28: 23-29.

Chartered Institute of Purchasing and Supply. (2011). Operations Management [online], available: [19 November 2014].

Chin-Tsai, L., Chie-Bein, C. & Ying-Chan, T. (2011). “Business Process Re engineering for Supplier Selection in Electronics Industry. *The Journal of Grey System*, 2: 175-182.

Chou, YC. Lu, C.H. & Tang, YY. (2012). Identifying Inventory Problems in the Aerospace Industry Using the Theory of Constraints, *International Journal of Production Research*, 50(16): 4686 – 4698.

Council on Higher Education. (2013) The Higher Education Qualifications Sub Framework [online], available:

<http://www.che.ac.za/sites/default/files/publications/HEQSF%202013.pdf> [5 September 2014].

Creswell, JW. (2009). Research Design. 3<sup>rd</sup> edition. Thousand Oaks (CA): SAGE.

De Jager, J. & Gbadamosi, G. (2013). Predicting Students’ Satisfaction Through Service Quality in Higher Education. *The International Journal of Management Education*, 11: 107–118.

- De Laine, M. (2000). *Fieldwork, Participation and Practice: Ethics and Dilemmas in Qualitative Research*. London: Sage Publishers Ltd.
- Delpont, CSL. (2002). Quantitative Data Collection Methods. In: De Vos, AS. (ed). *Research at Grass Roots*. 2nd edn. (pp. 165-196). Pretoria: Van Schaik Publishers.
- Denisa, F. (2012). Bottleneck Management in Discrete Batch Production. *Journal of Competitiveness*, 4(2):161-171.
- De Vos, AS., Strydom, H., Fouche, CB. & Delpont, CSL. (2011). *Research at Grass Roots For the Social Sciences and Human Service Professions*. 4<sup>th</sup> edn. Hatfield: Van Schaik Publishers.
- Dian-Fu, C. & Yeh, CC. (2012). Teaching Quality After the Massification of Higher Education in Taiwan: A Student Perspective. *Chinese Education and Society*, 45(5-6): 31-44.
- Ekundayo, MS. & Ekundayo, J.M. (2009) .Capacity Constraints in Developing Countries: A Need for More E-Learning Space? The Case of Nigeria [online], available: <http://www.ascilite.org/conferences/auckland09/procs/ekundayo.pdf> [4 September 2014].
- Eriksson, T. Nummela, N. & Saarenketo, S. (2014). Dynamic Capability in a Small Global Factory. *International Business Review*, 23: 169-180.
- Fabiyi, A. & Uzoka, N. (2007). Massification and Quality in Higher Education: The Nigerian Experience. Department of Educational Administration, Faculty of Education, University of Lagos: Akoka Yaba, Nigeria.
- Faganel, A. (2010).. Quality Perception Gap Inside the Higher Education Institution. *International Journal of Academic Research*, 2(1): 213 – 215.
- Fapohunda, JA. (2014). Evaluation of Site Managers’ Hindrances Towards Optimal Utilisation of Construction Resources. *Journal of Engineering, Design and Technology*, 12(3): 348 – 363.
- Feiler, P. & Teece, D. (2014). Case Study, Dynamic Capabilities and Upstream Strategy: Supermajor EXP. *Energy Strategy Reviews*: 1-7.
- Fisher, G. & Scott, I. (2011). Background Paper 3: The Role of Higher Education in Closing the Skills Gap in South Africa [online]. available: [http://www.ched.uct.ac.za/usr/ched/docs/Fisher\\_Higher%20Education%20role.pdf](http://www.ched.uct.ac.za/usr/ched/docs/Fisher_Higher%20Education%20role.pdf) [21 September 2014].
- Fouche, CB. (2002). Problem Formulation. In: De Vos, AS. (ed). *Research at grass roots*. (pp. 104-113). Pretoria: Van Schaik Publishers.

- Glover, WJ., Liu, WH., Farris, J.A. & Van Aken, EM. (2013). Characteristics of Established Kaizen Event Programs: An Empirical Study. *International Journal of Operations & Production Management*, 33(9): 1166-1201.
- Goldratt Institute. (2009). The Theory of Constraints and its Thinking Processes: A Brief Introduction to TOC. [online]. available: [6 September 2014].
- Gouthier, M. & Schmid, S. (2003). Customers and Customer Relationships in Service Firms: The Perspective of the Resource-Based View. *Marketing Theory*, 3(1): 119–143.
- Groop, J. (2012). Theory of Constraints in Field Service: Factors Limiting Productivity in Home Care Operations. Department of Industrial Engineering and Management, :Aalto University.
- Gumport, PJ., Iannozzi, M., Shamman, S. & Zemsky, R. (1998) .Trends in United States Higher Education: From Massification to Post Massification [online], available: [http://web.stanford.edu/group/ncpi/documents/pdfs/1-04\\_massification.pdf](http://web.stanford.edu/group/ncpi/documents/pdfs/1-04_massification.pdf) [22 September 2014].
- Henning, E. (2005). Finding Your Way in Academic Writing. 2nd edn. Pretoria: Van Schaik Publishers.
- Henry, M., Lingard, B., Rizvi, F. & Taylor, S. (2001). The OECD, Globalisation and Education Policy. Amsterdam: Pergamon.
- Hesson, M., Al-Ameed, H. & Samaka, M. (2007). Business Process Reengineering in UAE Public Sector: A Town Planning Case Study. *Business Process Management Journal*, 13(3): 348-378.
- Higher Education Qualifications Subframework. (2013) [online], available: [http://www.unisa.ac.za/cgs/news/wp-content/uploads/2014/06/ANNEXURE-2\\_HEQSF.pdf](http://www.unisa.ac.za/cgs/news/wp-content/uploads/2014/06/ANNEXURE-2_HEQSF.pdf) [18 November 2014].
- Hinckeldyn, J. Dekkers, R., Altfeld, N. & Kreutzfeldt, J. (2013) Expanding Bottleneck Management From Manufacturing to Product Design and Engineering Processes. *Computers and Industrial Engineering*: 1-14.
- Honiball, HR. (2012). The Implementation of Theory of Constraints in a Multi-Project Environment: An Action Research Approach, Gordon Institute of Business Science, University of Pretoria.
- Huang, F. (2012). Higher Education From Massification to Universal Access: A Perspective from Japan. *Higher Education*, 63: 257–270.

- Jacobs, FR. & Chase, RB. (2014). Operations and Supply Chain Management. 14th edn. Berkshire: McGraw-Hill Education.
- Kamhawi, EM. (2008). Determinants of Bahraini Managers' Acceptance of Business Process Reengineering. *Business Process Management Journal*, 14(2): 166-187.
- Kanyengo, CW. (2009). A Library Response to the Massification of Higher Education: The Case of the University of Zambia Library. *Higher Education Policy*, 22: 373-387.
- Karkoszka, T. & Honorowicz, J. (2009). Kaizen Philosophy: A Manner of Continuous Improvement of Processes and Products. *Journal of Achievements in Materials and Manufacturing Engineering*, 35(2): 197-203.
- Kerfoot, K. & Rohe, D. (1989). Kaizen: Innovations for Nurse Managers to Improve Productivity. *Nursing Economics*, 7(4): 228-230.
- Khan, ZA. & Al-Darrab, IA. (2010). Taguchi Techniques-Based Study on the Effect of Mobile Phone Conversation of Drivers' Reaction Time. *International Journal of Quality and Reliability Management*, 27(1): 63-77.
- King, PL. (2011). The Bottleneck Conundrum: Breaking up Logjams Could be Key for Process Plant Production. *Industrial Engineer: Engineering and Management Solutions at Work*, 43(1): 41-46.
- Klassen, KJ. & Rohleder, TR. (2002). Demand and Capacity Management Decisions in Services: How They Impact on One Another. *International Journal of Operations & Production Management*, 22(5): 527-548.
- Kraaijenbrink, J., Spender, JC. & Groen, AJ. (2010). The Resource-Based View: A Review and Assessment of Its Critiques. *Journal of Management*, 36(1): 349-372.
- Kreuger, L. & Neuman, W. (2006). Social Work Research Methods: Qualitative and Quantitative Applications. Boston: Pearson Education Inc.
- Kruger, D., De Wit, P. & Ramdass, K. (2005). Operations Management. Cape Town: Oxford University Press Southern Africa.
- Kumar, R. (2005). Research Methodology: A Step-By-Step Guide for Beginners. 2<sup>nd</sup> edn. London: Sage Publications Ltd.
- Kumar, R. (2011) Research Methodology: A Step-By-Step Guide for Beginners. 3<sup>rd</sup> edn. London: Sage Publications Ltd.

- Leedy, P. & Ormrod, JE. (2005). *Practical Research*. (8th edn): Planning and Design. Upper Saddle River, New Jersey: Merrill Prentice Hall.
- Lewis-Beck, MS., Bryman, A. & Liao, TF. (2004). *The SAGE Encyclopedia of Social Science Research Methods*, 2. California: SAGE Publications, Inc.
- Librelato, TP., Lacerda, P., Rodrigues, LH. & Veit, DR. (2014). A Process Improvement Approach based on the Value Stream Mapping and the Theory of Constraints. *Business Process Management Journal*, 20(6): 922 – 949.
- Liu, R., Cui, L., Zeng, G., Wu, H., Wang, C., Yan, S. & Yan, B. (2014). Applying the Fuzzy SERVQUAL Method to Measure the Service Quality in Certification & Inspection Industry. *Applied Soft Computing*: 1-5.
- Lofthouse, T. (1999). The Taguchi Loss Function. *Work Study*, 48(6): 218-223.
- Lupo, T. (2013). A Fuzzy ServQual Based Method for Reliable Measurements of Education Quality in Italian Higher Education Area. *Expert Systems With Applications*, 40: 7096-7110.
- Mabin, VJ., Forgeson, S. & Green, L. (2001). Harnessing Resistance: Using the Theory of Constraints to Assist Change Management. *Journal of European Industrial Training*, 25(2/3/4): 168-191.
- Magnier-Watanabe, R. (2011). Getting Ready for Kaizen: Organisational and Knowledge Management Enablers. *VINE*, 41(4): 428-448.
- Marlies, GB., Matthias, K. & Dirk, K. (2011). *Logistics Capacity Management: A Theoretical Review and Applications to Outbound Logistics*. University of Applied Sciences.
- Maewell, M. & Dumas, P. (2012). *Quality Function Deployment: Healthcare Improvement* [online], available: [http://www.wpi.edu/Pubs/E-project/Available/E\\_project-080212-180157/unrestricted/QFD\\_Final\\_Report2.pdf](http://www.wpi.edu/Pubs/E-project/Available/E_project-080212-180157/unrestricted/QFD_Final_Report2.pdf) [1 September 2014].
- McDonald, MP. (2009). *Massification : Using Technology to Bring the High End to the Rest of us* [online], available: [http://blogs.gartner.com/mark\\_mcdonald/2009/09/03/massification-using-technology-to-bring-the-high-end-to-the-rest-of-us/](http://blogs.gartner.com/mark_mcdonald/2009/09/03/massification-using-technology-to-bring-the-high-end-to-the-rest-of-us/) [22 September 2014].
- Mehatha, A. & Ravishankar, B. (2007). A Critical Analysis on the Effect of Synchronous Index in a typical Manufacturing Sector Using Synchronous Analyser [online], available: [http://www.poms.org/conferences/poms2007/cdprogram/topics/full\\_length\\_papers\\_files/007-0308.pdf](http://www.poms.org/conferences/poms2007/cdprogram/topics/full_length_papers_files/007-0308.pdf) [3 September 2014].



- Mert, G. Waltemode, S. & Aurich, J.C. (2014). Quality Assessment of Technical ProductService Systems in the Machine Tool Industry. *Procedia CIRP 16*: 253-258.
- Minitab, U (2014). One Sample T-test [online], available: <http://www.minitab.com/uploadedFiles/Documents/sample materials/MortgageProcessTime-EN.pdf> [6 July 2015].
- Mohamedbhai, G. (2007). The Effects of Massification on Higher Education in Africa [online], available: <http://www.africouldbookscollective.com/books/the-effects-of-massification-on-higher-education-in-africa> [22 September 2014].
- Mohamedbhai, G. (2008). The Effects of Massification on Higher Education in Africa [online], available: [4 September 2014].
- Moss, HK. (2007). Improving Service Quality with the Theory of Constraints, [online], available: <http://www.pinnaclestrategies.com/articles/Improving%20Service%20Quality%20with%20ToC%20short.pdf> [3 September 2014].
- Motwani, J., Klein, D. & Harowitz, R. (1996) The Theory of Constraints in Services Part 2: Examples From Health Care. *Managing Service Quality: An International Journal*, 6(2): 30 – 34.
- Muller, A. (2004). Resource Pack for Postgraduate Students. Aucklandpark: University of Johannesburg Faculty of Management.
- Naor, M., Jones, JS., Bernardes, ES., Goldstein, SM. & Schroeder, R. (2014). The CultureEffectiveness Link in a Manufacturing Context: A Resource-Based Perspective. *Journal of World Business*, 49; 321-331.
- Nath, P., Nachiappan, S. & Ramanathan, R. (2010). The Impact of Marketing Capability, Operations Capability and Diversification Strategy on Performance: A Resource Based View. *Industrial Marketing Management* 39: 317-329.
- Neuman, WL. (2011). Social Research Methods: Qualitative and Quantitative Approaches. 7<sup>th</sup> edn. Boston: Pearson Education, Inc.
- Ngok, K. (2008). Massification, Bureaucratization and Questing for “World Class Status”. *International Journal of Educational Management*, 22(6): 547-564.
- NRF. (2005). Institutional Review of the National Research Foundation. Pretoria: NRF.
- Ozcelik, Y. (2010). Do Business Process Reengineering Projects Payoff? Evidence from the United States. *International Journal of Project Management*, 28: 7–13.



- Pallant, J. (2006). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS*, 4<sup>th</sup> edn. Australia: Allan and Unwin.
- Pandit, SV. & Naik, GR. (2013). Application of Theory of Constraints on Scheduling of Drum-Buffer-Rope System. *Journal of Mechanical and Civil Engineering*: 15-20.
- Panizzolo, R. & Garengo, P. (2013). Using Theory of Constraints to Control Manufacturing Systems: A Conceptual Model. *Industrial Engineering & Management*, 2(3): 1-9.
- Perri. & Bellamy, C. (2012). *Principles of Methodology: Research Design in Social Science*. London: SAGE Publications Ltd.
- Polit, D.F. & Beck, CT. (eds). (2004). *Essentials for Nursing Research: Methods, Appraisal and Utilization*. 6<sup>th</sup>edn. Philadelphia: Lippincott.
- Prashar, A. (2014). Redesigning an Assembly Line through Lean-Kaizen: An Indian Case. *The TQM Journal*, 26(5): 475-498.
- Prudence, CC. & Li-Tien, W. (2012). Who Benefits from the Massification of Higher Education in Taiwan? *Chinese Education and Society*, 45(5–6): 8–20.
- Purcarea, VL., Gheorghe, IR. & Petrescu, CM. (2013). The Assessment of Perceived Service Quality of Public Health Care Services in Romania Using the SERVQUAL Scale. *Procedia Economics and Finance*, 6: 573 – 585
- Puszczak, K., Fronczyk, A., Urbanski, M. & Pashova, S. (2013) Analysis of Sampling Frames [online], available: [http://www.oecd.org/std/leading\\_indicators/GFK%20K.Puszczaksampling%20frames%20in%20customer%20surveys\\_aper.pdf](http://www.oecd.org/std/leading_indicators/GFK%20K.Puszczaksampling%20frames%20in%20customer%20surveys_aper.pdf) [16 May 2015].
- Raharjo, H. Xie, M. & Brombacher, A.C. (2011) A Systematic Methodology to Deal with the Dynamics of Customer Needs in Quality Function Deployment, *Expert Systems with Applications* 38, 3653–3662
- Rajesh, M. (2014). A Mixed Integer Linear Goal Programming Model for Optimising Multiple Constrained Resources Product-Mix Problem under the Theory of Constraints. *The IUP Journal of Operations Management*, 8 (1): 7 – 19.
- Ricket, D. (2010). Capacity Building [online], available: <http://www.gmi.org/files/Capacity%20Building.pdf> [22 September 2014].
- Riezebos, J. (2009). Order Sequencing and Capacity Balancing in Synchronous Manufacturing. *International Journal of Production Research*: 1-28.
- Ronen, B. & Starr, M.K. (1990). Synchronised Manufacturing as in OPT: From Practice to Theory [online], available: [4 September].

- Sadat, S., Carter, M.W. & Golden, B. (2013). Theory of Constraints for Publicly Funded Health Systems. *Healthcare Management Sciences*, 16: pp. 62 – 74.
- Sale, ML. & Sale, RS. (2013). Theory of Constraints as Related to Improved Business Unit Performance. *Journal of Accounting and Finance*, 13(1): 108-114.
- Scholte, JA. (2000). Globalization: A critical Introduction. New York: Palgrave.
- SAQA. (2012). Level Descriptors for the South African National Qualifications Framework [online], available: [http://www.saqa.org.za/docs/misc/2012/level\\_descriptors.pdf](http://www.saqa.org.za/docs/misc/2012/level_descriptors.pdf) [18 November 2014].
- Suarez-Barraza, MF. & Miguel-Davila, JA. (2014). Assessing the Design, Management and Improvement of Kaizen Projects in Local Governments. *Business Process Management Journal*, 20(3): 392-411.
- Shu-Mei, T. & Pei-Shan, L. (2014). The Effect of Knowledge Management Capability and Dynamic on Organisational Performance. *Journal of Enterprise Information Management*, 27(2): 158-179.
- Siha, S. (1999). A Classified Model for Applying the Theory of Constraints to Service Organisations. *Managing Service Quality: An International Journal*, 9(4): 1255-264.
- Simatupang, T.M., Wright, AC. & Sridharan, R. (2004). Applying the Theory of Constraints to Supply Chain Collaboration. *Supply Chain Management: An International Journal*, 9(1): 1-29.
- Singh, J. & Singh, H. (2009). Kaizen Philosophy: A Review of Literature. *The Icfai University Journal of Operations Management*, 8(2): 51-72.
- South African Qualifications Authority. (2012). Level Descriptors for the South African National Qualifications Framework [online], available: [http://www.saqa.org.za/docs/misc/2012/level\\_descriptors.pdf](http://www.saqa.org.za/docs/misc/2012/level_descriptors.pdf) [24 July 2014].
- Spector, Y. (2011). Theory of Constraint Methodology Where the Constraint is the Business Model. *International Journal of Production Research*, 49(11): 3387 – 3394.
- Stevenson, WJ. (2002). Operations Management. 7<sup>th</sup> edn. New York: McGraw-Hill Irwin.
- Stevenson, WJ. (2005). Operations Management. 8<sup>th</sup> edn, New York: McGraw-Hill Irwin.
- Stevenson, WJ. (2007). Operations Management. 9<sup>th</sup> edn. New York: McGraw-Hill Irwin

- Strydom, H. & Delport, CSL. (2002). Sampling and Pilot Study in Qualitative Research. In De Vos, A.S. (ed). *Research at grass roots* (pp. 333-338). (2<sup>nd</sup> edn). Pretoria: Van Schaik Publishers.
- Strydom, H. & Venter, L. (2002). Sampling and sampling methods. In De Vos, A.S. (Editor). *Research at grass roots* (pp. 197-209). 2<sup>nd</sup> edition. Pretoria: Van Schaik Publishers.
- Strydom, K., Hay, D. & Strydom, A. (2001). Restructuring Higher Education Curricula: The Leading Policy Formulation and Implementation Organizations. In Breier, M. (ed). *Curriculum Restructuring in Higher Education in Post-Apartheid South Africa* (pp. 38-58). Cape Town: University of the Western Cape Policy Unit.
- Stuurman, A. (1999). Case Study Methods. In: Keeves JP. & Lakomski, G. (eds). *Issues in Educational Research* (pp.79-91). Pergamon. Amsterdam.
- Taner, T. & Antony, J. (2000). The Assessment of Quality in Medical Diagnostic Tests: A Comparison of ROC/Youden and Taguchi Methods. *International Journal of Health Care Quality Assurance*, 13(7): 300-307.
- Teece, DJ., Pisano, G. & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, 18(7): 509-533.
- Thaichon, P., Lobo, A., Prentice, C. & Quach, TN. (2014). The Development of Service Quality Dimensions for Internet Service Providers: Retaining Customers of Different Usage Patterns. *Journal of Retailing and Consumer Services*, 21: 1047–1058
- Timilsina, B. (2012) Removing Bottleneck from a Manufacturing Unit: A Case Studies to Bet-Ker Oy. Ylivieska-84100, Finland.
- Titu, MA. Oprean, C. & Grecu, D. (2010). Applying the Kaizen Method and the 5S Technique in the Activity of Post-Sale Services in the Knowledge-Based Organisation, Proceedings of the International Multi-Conference of Engineers and Computer Scientists, Vol. III.
- Udo, GJ., Bagchi, KK. & Kirs, PJ. (2011). Using SERVQUAL to Assess the Quality of ELearning Experience. *Computers in Human Behaviour*, 27: 1272–1283.
- UKZN. (2014). Campuses. [online], available: <http://www.ukzn.ac.za/about-ukzn/campuses> [25 September 2014].
- UKZN. (2014) History. [online], available: <http://www.ukzn.ac.za/about-ukzn/history> [4 September 2014].

- UKZN. (2014). Organisational Structures [online], available: <http://www.ukzn.ac.za/about/ukzn/vision-and-mission/organisational-structure> [16 September 2014].
- UKZN. (2014). Schools. [online], available: <http://www.ukzn.ac.za/schools> [17 September 2014].
- UKZN. (2014). University of KwaZulu-Natal [online], available: <http://www.ukzn.ac.za/> [23 September 2014].
- UKZN. (2014). Vision & Mission [online], available: <http://www.ukzn.ac.za/about/ukzn/vision-and-mission> [4 September 2014].
- Ulin, PR., Robinson, ET. & Tolley, EE. (2005). Qualitative Methods in Public Health. A Field Guide for Applied Research. USA. Jossey-Bass.
- Umamaheswari, JL. (2014). Exploring Internal Service Quality in a Manufacturing Organization: A study in Lucus TVS, Chennai. *Procedia Economics and Finance 11*: 710 – 725.
- Van Aken, EM., Farris, JA. Glover, W.J. and Letens, G. (2010). A Framework for Designing, Managing, and Improving Kaizen Event Programs. *International Journal of Productivity and Performance Management*, 59(7): 641-667.
- Van Wyk, B. (2012). Research Design and Methods: Part 1 [online], available: [https://www.uwc.ac.za/Students/.../Research\\_and\\_Design\\_I.pdf](https://www.uwc.ac.za/Students/.../Research_and_Design_I.pdf) [2 November 2015].
- Vogt, WP. (1993). Dictionary of Statistics and Methodology: A Nontechnical Guide for the Social Sciences. California: Sage Publication, Inc.
- Wang, S.Y. (2010) Constructing the Complete Linguistic-Based and Gap-Oriented Quality Function Deployment. *Expert Systems With Applications*, 37: 908-912.
- Wang, X.T & Xiong, W. (2011). An Integrated Linguistic-based Group Decision-Making Approach for Quality Function Deployment. *Expert Systems with Applications*, 38: 14428–14438.
- Wisner, JD. & Stanley, LL. (2008). Process Management: Creating Value Along the Supply Chain, Mason: Thomson South-Western.
- Woeppel, MJ. (2001). Manufacturer's Guide to Implementing the Theory of Constraints, Florida: CRC Press LLC.
- Yilmaz, H. (2009). Optimization of the Product Design Through Quality Function Deployment (QFD) and Analytical Hierarchy Process (AHP): A Case Study in Ceramic Washbasin, Master of Science in Industrial Design.

Yin, RK. (2003). Case Study Research: Design and Methods (3rd edition). Thousand Oaks, CA: Sage.

Yokozawa, K. & Steenhuis, HJ. (2013) The Influence of National Level Factors on International Kaizen Transfer. *Journal of Manufacturing Technology Management*, 24(7): 1051-1075.

Yousapronpaiboon, K. (2014) SERVQUAL: Measuring Higher Education Service Quality in Thailand. *Procedia - Social and Behavioural Sciences*, 116: 1088 – 1095.

## LIST OF APPENDICES

### Appendix A: Questionnaire

#### Section One: Biographical Data

The questions below ask about your personal profile. Please “**encircle or tick**” on the appropriate box(es) below.

1. What is your gender?

|      |  |        |  |
|------|--|--------|--|
| Male |  | Female |  |
|------|--|--------|--|

2. In which age bracket are you?

|       |       |       |             |
|-------|-------|-------|-------------|
| 15-20 | 21-26 | 27-32 | 33 and Over |
|       |       |       |             |

3. Which Campus do you attend?

|           |  |                |  |          |  |                  |  |                |  |
|-----------|--|----------------|--|----------|--|------------------|--|----------------|--|
| Westville |  | Howard College |  | Edgewood |  | Pietermaritzburg |  | Medical School |  |
|-----------|--|----------------|--|----------|--|------------------|--|----------------|--|

4. Which College are you registered for?

|            |                                    |                 |                          |
|------------|------------------------------------|-----------------|--------------------------|
| Humanities | Agriculture, Engineering & Science | Health Sciences | Law & Management Studies |
|            |                                    |                 |                          |

5. Which School are you registered for? (Please Specify)

|  |
|--|
|  |
|--|

6. Which Discipline are you registered for? (Please Specify)

|  |
|--|
|  |
|--|

7. Which year did you complete your primary degree?

| 2013 | 2012 | 2011 | 2010 | 2009 and Below |
|------|------|------|------|----------------|
|      |      |      |      |                |

8. What is the size of your Honours Class in your Discipline?

|      |  |       |  |       |  |        |  |           |  |
|------|--|-------|--|-------|--|--------|--|-----------|--|
| 1-10 |  | 11-30 |  | 31-50 |  | 51-100 |  | Above 101 |  |
|      |  |       |  |       |  |        |  |           |  |

9. What is the entry requirement for the Honours Degree in your School?

|                       |     |                   |                     |                           |
|-----------------------|-----|-------------------|---------------------|---------------------------|
| UKZN requirement rule | 55% | Moderate (56-59%) | Acceptable (60-69%) | Meritorious (70% or more) |
|                       |     |                   |                     |                           |

10. Please indicate your experience on technology systems at the Library

|           |  |            |  |          |  |
|-----------|--|------------|--|----------|--|
| Out-Dated |  | Up-to-Date |  | Advanced |  |
|-----------|--|------------|--|----------|--|

### **Section Two: Dichotomous Questions**

This section aims to obtain information on dichotomous questions (*Yes or No*) with regard to general perceptions on capacity constraints at UKZN. Please “**encircle or tick**” on the appropriate box(es) below:

| General perceptions |                                                                                                                                                     |     |    |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 11                  | The University uses limited resources to run all academic activities                                                                                | Yes | No |
| 12                  | The University has improved its academic activities at Honours level through the integrated system design (Reconfiguration or Reengineering System) | Yes | No |
| 13                  | The continuous flow approach reduces the postgraduate students work-inprogress and drop-out rate of pipeline students                               | Yes | No |
| 14                  | Quality student capability and competency level require common-sense operations process in teaching, learning and research in higher education      | Yes | No |

|    |                                                                                                                                             |     |    |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 15 | Dynamics of capacity constraints (teaching, learning and research) influence the postgraduate students' throughput quality at Honours level | Yes | No |
| 16 | Students' challenges (teaching, learning and research) limit their intellectual capabilities and academic growth prospects                  | Yes | No |
| 17 | Capacity constraints at the University have evolved into a stage of mass customisation of high education                                    | Yes | No |
| 18 | The number of student enrolment influences the quality of graduated students including their competency level                               | Yes | No |

### **Section Three: Capacity Constraints**

The questions listed below are in relation to the capacity constraints that students at Honours level experience. For the next few sections please „tick“ the appropriate number. Based on your experience and perception (“1” as strongly disagree, “3” as neutral or neither agree nor disagree, “5” as strongly agree).

|    |                                                                                                                                  |   |   |   |   |   |
|----|----------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| 19 | Capacity constraints influence the quality performance of the Honours students                                                   | 1 | 2 | 3 | 4 | 5 |
| 20 | The library facilities (computers, internet, books, and journals) enhance the ability for learning and research at Honours level | 1 | 2 | 3 | 4 | 5 |
| 21 | The computer LANs have enough computers to do research for Honours students                                                      | 1 | 2 | 3 | 4 | 5 |
| 22 | The number of lecturers for Honours modules is sufficient to mitigate the student demand                                         | 1 | 2 | 3 | 4 | 5 |
| 23 | Technological systems in the computer LANs operate at a high speed most of the time                                              | 1 | 2 | 3 | 4 | 5 |
| 24 | The capacity constraints at Honours level require individual students to own a personal laptop, tablet, or iPad                  | 1 | 2 | 3 | 4 | 5 |
| 25 | There are enough lecturers at supervisory capacity at Honours level                                                              | 1 | 2 | 3 | 4 | 5 |
| 26 | The academic support staff are fully capacitated to deal with Honours students                                                   | 1 | 2 | 3 | 4 | 5 |

### **Section Four: Internal Operations and Magnitude of Demand**

To what extent do you think the internal operations have an effect on the progress of Honours students?

|    |                                                                                           |   |   |   |   |   |
|----|-------------------------------------------------------------------------------------------|---|---|---|---|---|
| 27 | Allocated consultation times with the lecturer work well with student timetable schedules | 1 | 2 | 3 | 4 | 5 |
|----|-------------------------------------------------------------------------------------------|---|---|---|---|---|

|    |                                                                                                                                                                    |   |   |   |   |   |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| 28 | Information resources provided by the library and ICT (books, internet, online databases, and journals) are up-to-date and relevant to the modern knowledge demand | 1 | 2 | 3 | 4 | 5 |
| 29 | The structured design of modules is manageable and capable of producing quality postgraduate students                                                              | 1 | 2 | 3 | 4 | 5 |
| 30 | The presence of postgraduate assistants help in student development at Honours level                                                                               | 1 | 2 | 3 | 4 | 5 |
| 31 | The class size at Honours level is reflective of available capacity                                                                                                | 1 | 2 | 3 | 4 | 5 |

### **Section Five: Quality Function Deployment**

The following questions relate to how the Honours degree has been designed.

|    |                                                                                           |   |   |   |   |   |
|----|-------------------------------------------------------------------------------------------|---|---|---|---|---|
| 32 | Module content reflects the type of work the student intends on pursuing                  | 1 | 2 | 3 | 4 | 5 |
| 33 | The Honours degree is designed in accordance with the students career goals               | 1 | 2 | 3 | 4 | 5 |
| 34 | The Honours research project provides the student with skills useful in his/her career    | 1 | 2 | 3 | 4 | 5 |
| 35 | Presentations at Honours level allow the student to improve their oral skills competency. | 1 | 2 | 3 | 4 | 5 |
| 36 | Group assignments at Honours level allow the student to build strong people skills        | 1 | 2 | 3 | 4 | 5 |

### **Section Six: Dimensions of Capacity Constraints**

Select **FOUR** (by “ticking” in the boxes) important dimensions / challenges that mostly describe the existing Capacity Constraints at UKZN. These four constraints should reflect immediate attention:

| <b>Dimensions of Capacity constraints at Higher Education:</b>               | <b>Most Important</b> |
|------------------------------------------------------------------------------|-----------------------|
| Human Resource Shortage (Not sufficient Senior lecturers and Professors)     |                       |
| Digital Divide (Lack of Information technology infusion or mismatch)         |                       |
| Brain Drain (Higher turnover rate on Senior lecturers/Staff)                 |                       |
| Political Unrest (Unfulfilled students agenda – Education and Careers)       |                       |
| Funding/Budget (Budget shortfalls in the higher education)                   |                       |
| University Governance (Management approaches and Structural design)          |                       |
| Poor Infrastructure (Aging of infrastructure and less information resources) |                       |
| High Population Explosion (Oversupply of student enrolment)                  |                       |



|        |  |
|--------|--|
| Other: |  |
|--------|--|

### End of the Questionnaire

Thank you for taking the time to complete the questionnaire.

#### Appendix B: Descriptive Statistics

| Descriptive Statistics     |                  |     |      |          |            |                                  |             |     |      |
|----------------------------|------------------|-----|------|----------|------------|----------------------------------|-------------|-----|------|
|                            |                  | N   | Mean | Std. Dev | Std. Error | 95% Confidence Interval for Mean |             | Min | Maxi |
|                            |                  |     |      |          |            | Lower Bound                      | Upper Bound |     |      |
| <b>Quality Performance</b> | Westville        | 185 | 3.55 | 1.211    | .089       | 3.38                             | 3.73        | 1   | 5    |
|                            | Howard           | 62  | 3.73 | 1.308    | .166       | 3.39                             | 4.06        | 1   | 5    |
|                            | Edgewood         | 12  | 3.75 | 1.215    | .351       | 2.98                             | 4.52        | 2   | 5    |
|                            | Pietermaritzburg | 21  | 3.43 | 1.165    | .254       | 2.90                             | 3.96        | 1   | 5    |
|                            | Medical School   | 17  | 3.35 | 1.618    | .392       | 2.52                             | 4.18        | 1   | 5    |
|                            | Total            | 297 | 3.58 | 1.250    | .073       | 3.43                             | 3.72        | 1   | 5    |
| <b>Library Facility</b>    | Westville        | 183 | 3.75 | 1.255    | .093       | 3.57                             | 3.93        | 1   | 5    |
|                            | Howard           | 61  | 3.80 | 1.352    | .173       | 3.46                             | 4.15        | 1   | 5    |
|                            | Edgewood         | 12  | 4.08 | 1.084    | .313       | 3.39                             | 4.77        | 2   | 5    |
|                            | Pietermaritzburg | 21  | 3.81 | 1.078    | .235       | 3.32                             | 4.30        | 2   | 5    |
|                            | Medical School   | 17  | 3.71 | 1.611    | .391       | 2.88                             | 4.53        | 1   | 5    |
|                            | Total            | 294 | 3.78 | 1.273    | .074       | 3.63                             | 3.92        | 1   | 5    |
| <b>Computer Lan</b>        | Westville        | 185 | 2.50 | 1.415    | .104       | 2.29                             | 2.70        | 1   | 5    |
|                            | Howard           | 60  | 2.15 | 1.300    | .168       | 1.81                             | 2.49        | 1   | 5    |
|                            | Edgewood         | 12  | 2.67 | 1.723    | .497       | 1.57                             | 3.76        | 1   | 5    |

|                               |                  |     |      |       |      |      |      |   |   |
|-------------------------------|------------------|-----|------|-------|------|------|------|---|---|
|                               | Pietermaritzburg | 21  | 2.52 | 1.436 | .313 | 1.87 | 3.18 | 1 | 5 |
|                               | Medical School   | 17  | 2.24 | 1.602 | .389 | 1.41 | 3.06 | 1 | 5 |
|                               | Total            | 295 | 2.42 | 1.416 | .082 | 2.26 | 2.58 | 1 | 5 |
| <b>Sufficient Lecturer</b>    | Westville        | 185 | 3.12 | 1.254 | .092 | 2.94 | 3.30 | 1 | 5 |
|                               | Howard           | 60  | 2.43 | 1.254 | .162 | 2.11 | 2.76 | 1 | 5 |
|                               |                  |     |      |       |      |      |      |   |   |
|                               | Edgewood         | 12  | 3.42 | 1.311 | .379 | 2.58 | 4.25 | 1 | 5 |
|                               | Pietermaritzburg | 21  | 3.00 | 1.304 | .285 | 2.41 | 3.59 | 1 | 5 |
|                               | Medical School   | 17  | 3.35 | 1.320 | .320 | 2.67 | 4.03 | 1 | 5 |
|                               | Total            | 295 | 3.00 | 1.290 | .075 | 2.85 | 3.14 | 1 | 5 |
| <b>Technological System</b>   | Westville        | 182 | 2.63 | 1.267 | .094 | 2.44 | 2.81 | 1 | 5 |
|                               | Howard           | 62  | 2.58 | 1.209 | .153 | 2.27 | 2.89 | 1 | 5 |
|                               | Edgewood         | 12  | 2.67 | 1.435 | .414 | 1.75 | 3.58 | 1 | 5 |
|                               | Pietermaritzburg | 21  | 2.48 | 1.078 | .235 | 1.99 | 2.97 | 1 | 5 |
|                               | Medical School   | 17  | 2.76 | 1.251 | .304 | 2.12 | 3.41 | 1 | 5 |
|                               | Total            | 294 | 2.62 | 1.241 | .072 | 2.47 | 2.76 | 1 | 5 |
|                               |                  |     |      |       |      |      |      |   |   |
| <b>Student Personal Items</b> | Westville        | 185 | 3.91 | 1.369 | .101 | 3.72 | 4.11 | 1 | 5 |
|                               | Howard           | 62  | 4.06 | 1.186 | .151 | 3.76 | 4.37 | 1 | 5 |
|                               | Edgewood         | 12  | 4.67 | 1.155 | .333 | 3.93 | 5.40 | 1 | 5 |
|                               | Pietermaritzburg | 21  | 3.90 | 1.261 | .275 | 3.33 | 4.48 | 1 | 5 |
|                               | Medical School   | 17  | 4.00 | 1.500 | .364 | 3.23 | 4.77 | 1 | 5 |
|                               | Total            | 297 | 3.98 | 1.325 | .077 | 3.83 | 4.13 | 1 | 5 |
| <b>Supervisory</b>            | Westville        | 184 | 2.89 | 1.219 | .090 | 2.71 | 3.07 | 1 | 5 |

|                               |                  |     |      |       |      |      |      |   |   |
|-------------------------------|------------------|-----|------|-------|------|------|------|---|---|
| <b>Lecturer Capacity</b>      | Howard           | 61  | 2.48 | 1.456 | .186 | 2.10 | 2.85 | 1 | 5 |
|                               | Edgewood         | 11  | 2.64 | 1.286 | .388 | 1.77 | 3.50 | 1 | 5 |
|                               | Pietermaritzburg | 20  | 2.95 | 1.099 | .246 | 2.44 | 3.46 | 1 | 5 |
|                               | Medical School   | 17  | 3.76 | 1.200 | .291 | 3.15 | 4.38 | 1 | 5 |
|                               | Total            | 293 | 2.85 | 1.289 | .075 | 2.70 | 3.00 | 1 | 5 |
| <b>Support Staff Capacity</b> | Westville        | 185 | 2.96 | 1.188 | .087 | 2.78 | 3.13 | 1 | 5 |
|                               | Howard           | 62  | 2.42 | 1.325 | .168 | 2.08 | 2.76 | 1 | 5 |

|                                      |                  |     |      |       |      |      |      |   |   |
|--------------------------------------|------------------|-----|------|-------|------|------|------|---|---|
|                                      |                  |     |      |       |      |      |      |   |   |
|                                      | Edgewood         | 12  | 2.83 | 1.115 | .322 | 2.13 | 3.54 | 1 | 5 |
|                                      | Pietermaritzburg | 21  | 3.48 | 1.209 | .264 | 2.93 | 4.03 | 1 | 5 |
|                                      | Medical School   | 17  | 3.76 | 1.300 | .315 | 3.10 | 4.43 | 1 | 5 |
|                                      | Total            | 297 | 2.92 | 1.262 | .073 | 2.78 | 3.07 | 1 | 5 |
| <b>Lecturer Consultation Times</b>   | Westville        | 185 | 3.17 | 1.156 | .085 | 3.00 | 3.34 | 1 | 5 |
|                                      | Howard           | 61  | 2.69 | 1.311 | .168 | 2.35 | 3.02 | 1 | 5 |
|                                      | Edgewood         | 12  | 3.00 | .853  | .246 | 2.46 | 3.54 | 1 | 5 |
|                                      | Pietermaritzburg | 21  | 3.57 | .978  | .213 | 3.13 | 4.02 | 2 | 5 |
|                                      | Medical School   | 17  | 3.65 | 1.057 | .256 | 3.10 | 4.19 | 1 | 5 |
|                                      | Total            | 296 | 3.12 | 1.186 | .069 | 2.98 | 3.25 | 1 | 5 |
| <b>Relevant Information Resource</b> | Westville        | 185 | 3.22 | 1.102 | .081 | 3.06 | 3.38 | 1 | 5 |
|                                      | Howard           | 61  | 3.13 | 1.335 | .171 | 2.79 | 3.47 | 1 | 5 |
|                                      | Edgewood         | 12  | 3.42 | 1.240 | .358 | 2.63 | 4.20 | 1 | 5 |
|                                      | Pietermaritzburg | 21  | 3.33 | 1.197 | .261 | 2.79 | 3.88 | 1 | 5 |
|                                      | Medical School   | 17  | 3.53 | .800  | .194 | 3.12 | 3.94 | 2 | 5 |

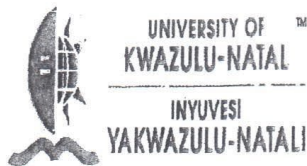
|                                        |                  |     |      |       |      |      |      |   |   |
|----------------------------------------|------------------|-----|------|-------|------|------|------|---|---|
|                                        | Total            | 296 | 3.23 | 1.148 | .067 | 3.10 | 3.36 | 1 | 5 |
| <b>Module<br/>Design<br/>Structure</b> | Westville        | 185 | 3.27 | 1.085 | .080 | 3.11 | 3.43 | 1 | 5 |
|                                        | Howard           | 61  | 2.97 | 1.354 | .173 | 2.62 | 3.31 | 1 | 5 |
|                                        | Edgewood         | 12  | 3.58 | .900  | .260 | 3.01 | 4.16 | 2 | 5 |
|                                        | Pietermaritzburg | 21  | 3.52 | 1.209 | .264 | 2.97 | 4.07 | 1 | 5 |
|                                        | Medical School   | 17  | 3.59 | .870  | .211 | 3.14 | 4.04 | 2 | 5 |
|                                        | Total            | 296 | 3.26 | 1.145 | .067 | 3.13 | 3.39 | 1 | 5 |
| <b>Postgraduate</b>                    | Westville        | 185 | 3.17 | 1.162 | .085 | 3.00 | 3.34 | 1 | 5 |

|                                         |                  |     |      |       |      |      |      |   |   |
|-----------------------------------------|------------------|-----|------|-------|------|------|------|---|---|
| <b>Assistants</b>                       |                  |     |      |       |      |      |      |   |   |
|                                         | Howard           | 61  | 2.84 | 1.306 | .167 | 2.50 | 3.17 | 1 | 5 |
|                                         | Edgewood         | 12  | 3.50 | .798  | .230 | 2.99 | 4.01 | 2 | 5 |
|                                         | Pietermaritzburg | 21  | 3.71 | 1.007 | .220 | 3.26 | 4.17 | 2 | 5 |
|                                         | Medical School   | 16  | 3.25 | 1.483 | .371 | 2.46 | 4.04 | 1 | 5 |
|                                         | Total            | 295 | 3.16 | 1.203 | .070 | 3.02 | 3.30 | 1 | 5 |
| <b>Class Size<br/>Availability</b>      | Westville        | 185 | 3.37 | 1.082 | .080 | 3.22 | 3.53 | 1 | 5 |
|                                         | Howard           | 61  | 2.59 | 1.346 | .172 | 2.25 | 2.93 | 1 | 5 |
|                                         | Edgewood         | 10  | 3.30 | .823  | .260 | 2.71 | 3.89 | 2 | 5 |
|                                         | Pietermaritzburg | 21  | 3.43 | 1.207 | .263 | 2.88 | 3.98 | 1 | 5 |
|                                         | Medical School   | 17  | 3.24 | 1.251 | .304 | 2.59 | 3.88 | 1 | 5 |
|                                         | Total            | 294 | 3.20 | 1.188 | .069 | 3.07 | 3.34 | 1 | 5 |
| <b>Module<br/>Content<br/>Intention</b> | Westville        | 185 | 3.58 | 1.086 | .080 | 3.42 | 3.74 | 1 | 5 |
|                                         | Howard           | 61  | 3.48 | 1.163 | .149 | 3.18 | 3.77 | 1 | 5 |
|                                         | Edgewood         | 12  | 3.25 | 1.138 | .329 | 2.53 | 3.97 | 1 | 5 |

|                                   |                  |     |      |       |      |      |      |   |   |
|-----------------------------------|------------------|-----|------|-------|------|------|------|---|---|
|                                   | Pietermaritzburg | 21  | 3.52 | 1.167 | .255 | 2.99 | 4.06 | 1 | 5 |
|                                   | Medical School   | 17  | 3.47 | 1.068 | .259 | 2.92 | 4.02 | 2 | 5 |
|                                   | Total            | 296 | 3.53 | 1.104 | .064 | 3.41 | 3.66 | 1 | 5 |
| <b>Honours Degree Design</b>      | Westville        | 184 | 3.34 | 1.090 | .080 | 3.18 | 3.50 | 1 | 5 |
|                                   | Howard           | 61  | 3.20 | 1.138 | .146 | 2.91 | 3.49 | 1 | 5 |
|                                   | Edgewood         | 12  | 3.17 | 1.115 | .322 | 2.46 | 3.87 | 1 | 5 |
|                                   | Pietermaritzburg | 21  | 3.57 | 1.399 | .305 | 2.93 | 4.21 | 1 | 5 |
|                                   | Medical School   | 16  | 3.38 | 1.204 | .301 | 2.73 | 4.02 | 1 | 5 |
|                                   | Total            | 294 | 3.32 | 1.127 | .066 | 3.19 | 3.45 | 1 | 5 |
|                                   |                  |     |      |       |      |      |      |   |   |
| <b>Honours Research Project</b>   | Westville        | 185 | 3.61 | 1.119 | .082 | 3.44 | 3.77 | 1 | 5 |
|                                   | Howard           | 61  | 3.30 | 1.418 | .182 | 2.93 | 3.66 | 1 | 5 |
|                                   | Edgewood         | 12  | 3.50 | .905  | .261 | 2.93 | 4.07 | 2 | 5 |
|                                   | Pietermaritzburg | 21  | 3.95 | 1.071 | .234 | 3.46 | 4.44 | 1 | 5 |
|                                   | Medical School   | 17  | 3.82 | 1.074 | .261 | 3.27 | 4.38 | 1 | 5 |
|                                   | Total            | 296 | 3.57 | 1.179 | .069 | 3.44 | 3.71 | 1 | 5 |
| <b>Honours Level Presentation</b> | Westville        | 185 | 3.83 | 1.243 | .091 | 3.65 | 4.01 | 1 | 5 |
|                                   | Howard           | 60  | 3.67 | 1.284 | .166 | 3.33 | 4.00 | 1 | 5 |
|                                   | Edgewood         | 12  | 3.50 | 1.314 | .379 | 2.66 | 4.34 | 1 | 5 |
|                                   | Pietermaritzburg | 21  | 4.24 | 1.091 | .238 | 3.74 | 4.73 | 1 | 5 |
|                                   | Medical School   | 17  | 3.94 | 1.478 | .358 | 3.18 | 4.70 | 1 | 5 |
|                                   | Total            | 295 | 3.82 | 1.259 | .073 | 3.67 | 3.96 | 1 | 5 |
| <b>Group</b>                      | Westville        | 185 | 3.79 | 1.189 | .087 | 3.62 | 3.97 | 1 | 5 |

|                   |                  |     |      |       |      |      |      |   |   |
|-------------------|------------------|-----|------|-------|------|------|------|---|---|
| <b>Assignment</b> | Howard           | 61  | 3.44 | 1.360 | .174 | 3.09 | 3.79 | 1 | 5 |
|                   | Edgewood         | 12  | 3.67 | 1.231 | .355 | 2.88 | 4.45 | 1 | 5 |
|                   | Pietermaritzburg | 21  | 3.95 | 1.161 | .253 | 3.42 | 4.48 | 1 | 5 |
|                   | Medical School   | 17  | 3.71 | 1.448 | .351 | 2.96 | 4.45 | 1 | 5 |
|                   | Total            | 296 | 3.72 | 1.242 | .072 | 3.58 | 3.87 | 1 | 5 |

## APPENDIX C: Ethical Clearance



14 October 2014

Mr Mbonye Nkondo (209523778)  
School of Management, IT & Governance  
Westville Campus

Protocol reference number: HSS/1334/014M

Project title: Dynamics of Capacity Constraints in Managing throughput quality at Honours Level: University of KwaZulu-Natal

Dear Mr Nkondo,

### Full Approval – Expedited Application

In response to your application received on 08 October 2014, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

**PLEASE NOTE:** Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Dr TP Mbhele  
Cc Academic Leader Research: Professor Brian McArthur  
Cc School Administrator: Ms Angela Pearce

Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

Postal Address: Private Bag X54001, Durban 4000

Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 260 4609 Email: [kimbep@ukzn.ac.za](mailto:kimbep@ukzn.ac.za) / [snymam@ukzn.ac.za](mailto:snymam@ukzn.ac.za) / [mohunp@ukzn.ac.za](mailto:mohunp@ukzn.ac.za)

Website: [www.ukzn.ac.za](http://www.ukzn.ac.za)



100 YEARS OF ACADEMIC EXCELLENCE

Four Living Campuses: Edgewood

Howard College

Medical School

Pietermaritzburg

Westville