Developing an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for a selected University of Technology in South Africa – A Case Study

by

MELANIE ELIZABETH LOURENS

Submitted in fulfilment of the requirement for

DOCTOR OF PHILOSOPHY
IN MANAGEMENT SCIENCES:
HUMAN RESOURCES MANAGEMENT

in the

Department of Human Resource Management
Faculty of Management Sciences

at

DURBAN UNIVERSITY OF TECHNOLOGY

SUPERVISOR: **PROFESSOR D.C. JINABHAI**
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JANUARY 2016

DEVELOPING AN EXPLORATORY FRAMEWORK OF HUMAN CAPITAL LINKED TO INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT FOR A SELECTED UNIVERSITY OF TECHNOLOGY IN SOUTH AFRICA – A CASE STUDY

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ABSTRACT

The aim of this study was the development of an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for the Durban University of Technology as a case study. The main problem revolved around the lack of an integrated road map for the identification, management and operationalisation of an integrated framework for the Durban University of Technology (DUT) in the UoT Sector, focusing on Human Capital capabilities, Intellectual Capital and Knowledge Management, which emphasised the need for this study. The three main objectives of the study were to investigate the importance and contribution of Human Capital at the DUT operating in a highly dynamic Knowledge-based Economy, to formulate strategies for the Institution to meet its Human Capital demands in the competitive Knowledge-based Economy and to develop an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for the Durban University of Technology.

The research design adopted was the quantitative paradigm with a pre-coded structured close ended questionnaire comprising the 5 Point Likert Scale that was used to administer the instrument to the selected sample respondents. The questionnaire comprised of 5 Sections, each under a specific main theme related to the research topic. The target population comprised of 1874 employees at the Durban University of Technology. A computerised tool called the Excel Functionality Program was used to generate the random numbers for the sample selection for each group. The sample of 320 employees was selected using simple random sampling without replacement for both the Administrative and Academic staff members at the DUT. A total of 280 questionnaires were returned by the sample respondents. However, 8 questionnaires were discarded as they were incomplete and the final questionnaire returns equated to n = 272, namely, (118 questionnaires from the Academic Staff grouping and 154 questionnaires from the Administrative Staff). This represented a high response rate of 85% which was largely attributed to the researcher using the personal method of data collection. After the study was completed, the researcher solicited the services of a Senior Librarian to run the TURNITIN Program to test the entire thesis for plagiarism which proved useful.

In the main, the analysis of the data involved the use of robust non-parametric tests for the empirical analyses using the Statistical Package for Social Sciences (SPSS) version 21 for Windows. A variety of non-parametric tests were also used to test some 71 hypotheses formulated for the various sections and components of the study as well the tenability of the Exploratory Framework (Figure 4.1) developed. Some significant findings emerged from the comprehensive statistical analyses which were also corroborated by national and international studies conducted by various researchers who also showed their concordance or discordance with the current findings and were referenced accordingly. It should be noted that the recommendations cannot be generalised to other UoTs in the HE Sector, as this was an in-house investigation involving the DUT as a case study. The main empirical findings of the study, *inter alia,* included the following: The value of integrating Intellectual Capital and Knowledge Management into strategic planning at the DUT, the importance of developing an operationalised Human Capital Scorecard to address the different functions of the Academic and Administrative groups respectively at the DUT and a strong emphasis and role of Strategic Human Resource Management at the DUT. Thus, the Exploratory Framework developed as a model for the DUT within the UoT Sector concomitant with the outcomes and recommendations of the study may prove beneficial for future goal oriented strategies by top management of DUT. The study concludes with suggestions for further research in this emerging field of endeavour.

ACKNOWLEDGEMENTS

It is my deepest gratitude and appreciation that I acknowledge those who have encouraged, supported, and believed in me throughout this journey. Firstly, my sincere gratitude is accorded to my Supervisor, Professor D.C. Jinabhai. Thank you for your dedication, guidance, feedback and encouragement. His expertise helped me to proceed in spite of many challenges and his constructive advice improved the quality of my work and academic growth immensely. His endless patience and unrelenting focus were commendable. I would also like to thank my co-supervisor, Professor N. Dorasamy, for her input and assistance provided for this study.

This PhD thesis would not have been possible without the assistance of the following: My colleagues in the Human Resource Management Department, DUT, who supported, assisted and motivated me in completing this study; Mr Charles Robert (MSc. Statistics), for his expert analysis of the empirical data and the hypotheses tests and his advice on the presentation of the results; Mrs Mercillene Mathews for her services in language editing the whole thesis; the DUT Library staff, especially Ms Kogie Pillay, for her assistance and support; the DUT Institutional Research Ethics Committee (IREC) for giving me permission and ethical clearance to conduct this in-house research investigation at DUT, the various DUT campuses, who completed the questionnaire. At the home front I would like to express my heartfelt thanks and appreciation to my Mum and Dad and husband, Cor Lourens, for putting up with my frustrations and his constant encouragement during the course of this study. Special acknowledgement to Trippens, Gadget, Romeo, Liquirice, Buster, Simba, Biscuit and Pickachoo, who stayed up with me during the long nights and shared the many sunrises.

Above all I would like to thank the dear Lord for giving me the strength and fortitude to complete the study through His divine intervention.

DEDICATION

This study is dedicated to two very special people, my parents. Mum and Dad "thank you for believing in me, your constant motivation, unconditional love and sacrifices you have made helped me in completing my study".

Thank you for shaping and developing me to strive for the following:

Faber est suae quisque fortunae

(Every man is the artisan of his own future)

- Appius Claudius Caecus

DECLARATION

I hereby declare that the thesis submitted for Doctor in Philosophy Degree in Management Sciences: Human Resource Management in the Department of Human Resource Management, Faculty of Management Sciences at the Durban University of Technology is my original work in the text and the bibliography and has not been submitted to any other institution. I further declare that all sources cited or quoted are indicated and acknowledged in the bibliography.

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Student No: 19101735

LIST OF ACRONYMS

BSC	Balanced Score Card
CHE	Council on Higher Education South Africa
DOHET/DHET	Department of Higher Education and Training
DST	Department of Science and Technology
DUT	Durban University of Technology
GERD	Gross Expenditure of Research and Development
HC	Human Capital
HE	Higher Education
HESA	Higher Education South Africa
HRIS	Human Resource Information Systems
HRM	Human Resource Management
IC	Intellectual Capital
IREC	Institutional Research Ethics Committee
KM	Knowledge Management
PESTLE	Political, Economic, Social, Technological, Legal and Ethics
SPSS	Statistical Package for Social Sciences
UoT	University of Technology

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CHAPTER 1

BACKGROUND AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

During the last three decades, there has been an economic shift from developed economies emphasising securing natural resources to managing knowledge. The management of knowledge has gradually emerged as an organisation's means of power, providing a critical competitive advantage (Davenport and Prusak, 2000:6). Increased competition has forced management teams to reconsider organisational adaptation, survival and competence against turbulent environmental changes that characterise a Knowledge-based Economy.

The changing Knowledge-based Economy not only poses challenges to organisations, but also offers opportunities for the private and public sectors alike (Moyo, 2010:116). The private sector has been actively taking initiatives to adopt new management tools, or implement frameworks, techniques and philosophies, in order to gain competitive advantage for their survival and to meet global challenges. These initiatives have also been transferred to the public sector, especially in the Higher Education (here after referred to as HE) sector. The HE sector is tasked with preparing learners/students with the requisite knowledge, skills and expertise to function effectively within the organisational context while adding value to the economy.

Knowledge management (here after referred to as KM) has emerged as a new management framework in which organisations view all their interventions as knowledge processes and emphasise the creation, dissemination and application of knowledge towards organisational survival (Chen and Huang, 2007:109). According to Ahonen (2009:119), KM embodies organisational processes that seek synergies between information, people, processes and

technological innovations in both the public and private sectors. Moyo (2010:117) asserts that the greatest challenge with the utilisation of KM is the intangible nature of the resources. Intellectual Capital (here after referred to as IC) has been identified by both business icons and academics as methods of identifying, managing and monitoring knowledge resources (Burgelman, Maidique and Wheelwright, 2001:25). Ahonen (2009:122) states that a key component for the successful implementation and monitoring of IC is the management of Human Capital (here after referred to as HC), which emphasises the contribution that employees make towards IC and KM.

1.2 BACKGROUND TO THE STUDY

The ushering in of a new South African democratic government in 1994 prompted the transformation of the public service sector which included merging a variety of public entities. Muller (1996:110) reports that mergers were also extended to the HE sector following the route that several countries (such as Australia, the United States of America, Norway, Sweden, Finland, Netherlands and Great Britain) pursued to restructure HE in the quest for greater efficiency; higher quality teaching; reducing public expenditure and meeting the challenges of the 21st century. The assertion of Muller (1996:118) is also supported by Brook (2000:23) and Stumpf (2000:20). The new HE landscape in South Africa differentiated between the Universities of Technology (here after referred to as UoTs) and Traditional or Comprehensive Universities. The new name of UoTs emerged as a consequence of the first merger between the old Technikons, in 2003, they were included in the South African HE landscape in terms of The Higher Education Act (1997) and recognised as tertiary providers of quality education.

Smit (2000:143) and Du Pré (2006a:2) describe UoTs as multi-facetted institutions focusing on career-focused education and training, offering organisations skilled employees with workplace related experience. The combination of experiential and academic learning has made UoTs a very

popular choice in the HE sector in order to add value to the economy at both the national and international levels (Bunting and Cloete, 2004:5 ; Du Pré, 2006b:7-8). UoTs are considered to be tertiary institutions that can make knowledge practical and functional while contributing meaningfully to the enhancement of technologically advanced KM, innovation, technology transfer and competitiveness (Du Pré, 2010:2). The thrust of Du Pré's (2010:1-4) strategic vision of UoTs is shared by various South African authors who acknowledge the contribution and benefits of UoTs for enhancing KM in a Knowledge-based Economy in South Africa (Cooke, Naidoo and Sattar, 2010:132; Dyanson, Lategan and Mpako-Ntusi, 2010:55).

A vast collection of literature is available on KM and IC. According to Chang and Hsieh (2011:1-2), the term 'knowledge management' seems to have appeared in the literature in the mid-1970s. O'Dell and Hubert (2011:6) cite Nicholas Henry (1974) who used KM in a manner that underpinned a symbiotic relationship to the contemporary interpretation of the term. Wallace (2007:4) highlights the following in relation to the contemporary context of KM, namely: "Knowledge Management caters to the critical issues of organizational adaptation, survival and competence in the face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies and the creative and innovative capacity of human beings".

1.3 DEFINITIONS OF KEY TERMS

Concept clarifications relevant to this study are presented by offering the definitions of leading authors on Knowledge, Knowledge-based Economy, Knowledge Management (KM), Intellectual Capital (IC) and Human Capital (HC). It should be noted that the concept clarifications below are merely to introduce the concepts at this juncture since more detailed descriptions are

highlighted in the literature review in order to reflect a more logical integration of these constructs.

1.3.1 Knowledge

According to Prusak and Davenport (1998:5), knowledge is a changeable mix of capabilities, values, morals, contextual information and skilful insights that offers a framework for evaluating and incorporating new understandings and information by employees. In organisations and academic institutions, it often becomes entrenched not only in documents or repositories but also in organisational procedures, processes, practices, standards and norms.

1.3.2 Knowledge-Based Economy

The Knowledge-based Economy is an expression coined to describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels, and the increasing need for ready access to all of these by the business and public sectors (OECD, 2005:71).

1.3.3 Knowledge Management

Marr and Chatzkel (2004:224) define KM as the “collective phrase for a group of processes and practices utilised by organisations to increase their value by improving the effectiveness of the generation and application of their intellectual capital”.

1.3.4 Intellectual Capital

Stewart (1997:4) defines IC as “the sum of everything everybody in your company knows that gives you a competitive edge in the marketplace”.

1.3.5 Human Capital

Easterbury-Smith and Lyles (2011:23) state that “Human Capital combines knowledge, skills, innovativeness and the ability of employees to meet the tasks at hand”.

1.4 PROBLEM STATEMENT

Knowledge Management (KM) was initially pioneered in the private sector and thereafter the public sector followed suit by gradually recognising the value of KM for enhancing service delivery (Lategan, 2000a:108; Ferlie, Lynn and Pollitt, 2007:4). Van Staden (2010:156) expressed similar sentiments in the South African context, such that the HE UoT sector has come under scrutiny in terms of service delivery since the advent of democracy. Brook (2000:22) states that KM is gradually gaining acceptance in the academic sector since UoTs, with particular reference to the Durban University of Technology (here after referred to as DUT), are confronted with a challenge to produce and disseminate knowledge to society, while simultaneously assisting organisations in developing HC. Lategan (2000b:11), Rossouw (2003:42) and De Beer (2010:66) share the viewpoint of Brook (2000:22-23) and add that the role of the HE UoT sector has shifted from merely producing graduates to ensuring that those graduates are able to add value to the Knowledge-based Economy. However, research conducted by Therkildsen (2000:67) and Guthrie and Lee (2010:7) suggests that KM in the public sector and the HE UoT sector needs to be further explored to reap the full benefits. In this regard, the suggestion made by Therkildsen (2000:67) and Guthrie and Lee (2010:7) is supported by Onyach-Olaa (2003:109) and Van Kemenade, Pupius and Hardjono (2008:176).

Dew (2009:7) emphasises the importance of HC driving the development and implementation of an IC and KM framework. This view is supported by Sidhu (2009:239), Itami, Kusunoki and Numagami (2010:156-157) and Kong (2010:97). These opinions are positively embraced by South African authors in

that HC plays an important role in the development of IC and will promote technologically advanced KM in the HE UoT context (Botha, 2001:276; Comins, 2005:18-19 and Winberg, 2006:163). Dalkir and Liebowitz (2011:12-13) and Pasher and Ronen (2011:15) recognise KM as a major source of competitive advantage for HE UoT institutions, such as DUT, that operate in a dynamic environment. However, Goddard (1998:6) argues that little is known about how to produce, manage and control KM in practice. This dilemma is further exacerbated by the problem that KM, IC and HC are invisible assets that directly influence the competitive success of an institution's strategy (Mani, 2009:12).

Boudreau and Ramstad (2007:47) reinforce the view that the strategies of HE UoTs have changed dramatically with the arrival of the new information age, shifting the focus of value creation from tangible based activities (such as building, equipment and land) to intangible value creation (such as employees' skills, knowledge and experience). According to Bart, Baetz and Pancer (2009:128), the value of intangible assets (such as HC) has constantly increased in the last two decades from an average of 40% of total market value of business organisations to over 80% at the end of the 20th century. Van Kemenade, Pupius and Hardjono (2008:181) assert that the increased importance of HC in the UoT context has necessitated the integration of HC, IC and KM frameworks. The importance of KM is also acknowledged in the DUT Annual Report (2014:2). DUT operating in the HE UoT sector is expected to manage KM, IC and HC amidst a rapidly changing HE environment and increased expectations from stakeholders to deliver quality educational programmes, while addressing the social, economic and intellectual development of the society in which it operates (DUT Annual Report, 2014:10). DUT is faced with the challenge of attracting, developing and retaining a suitably qualified workforce to ensure that the HC needs of the institution are met.

In exploring the vast array of literature, four distinctive gaps are identified which forms the basis for formulating the research questions. Firstly, constraints and challenges are identified in highlighting KM and IC in the context of the role played by UoTs. Secondly, research gaps are recognised regarding the identification and evaluation of the types of IC frameworks. Thirdly, concerns relating to HC elements are highlighted. Lastly, an overview of research gaps in IC pertaining to the public service, and specifically to the HE sector and its alignment to KM is explored further in the context of the study as a critical challenge that needs to be investigated.

1.5 AIM OF THE STUDY

The aim of this study is to develop an exploratory HC Framework linked to IC and KM for a selected HE UoT, namely, the Durban University of Technology (here after referred to as the DUT), operating in a technologically advanced Knowledge-based Economy in South Africa. The study aims to develop a road map for the identification, management and operationalisation of an integrated framework in South African HE UoTs focusing on HC capabilities, IC and KM. For the purpose of this study both the intrinsic individual considerations and internal organisational factors will be incorporated when referring to the term HC.

1.6 OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

- To investigate the importance and contribution of HC to the DUT operating in a Knowledge-based Economy;
- To identify the dimensions of KM applied to evaluating HC at the DUT;
- To determine whether the DUT integrates the constructs of IC to produce, manage and control KM;

- To identify the appropriate elements incorporated in HC within an IC framework to facilitate human resources management at the DUT;
- To investigate the perceptions of staff at the DUT on the processes used when attracting and retaining competent personnel, *vis-à-vis* HC;
- To formulate strategies for the DUT to meet its HC demands in the competitive Knowledge-based Economy; and
- To develop an exploratory HC Framework linked to IC and KM for the DUT.

1.7 RESEARCH QUESTIONS

The research questions of the study are as follows:

- What are the contributions that the DUT make towards the South African Knowledge-based Economy?
- What importance is associated with the management of HC at the DUT?
- Which categories of IC are being used at the DUT?
- How is the DUT using Strategic Human Resource Management to integrate the constructs of IC?
- What is the contribution that IC can make towards the successful implementation of KM at the DUT?
- What is the impact of HC towards the implementation of IC at the DUT?
- What strategies are in place at the DUT to attract suitable HC?
- How does the DUT develop its HC levels?
- Which processes does the DUT use to retain its HC?
- How can the DUT accelerate HC strategies to enhance its competitive advantage in the Knowledge-based Economy?

1.8 SIGNIFICANCE OF THE STUDY

The envisaged significance of the study is two-folded in that it will contribute (i) academically (i.e. theoretically, methodologically and practically) to the fields of KM, IC and HC; and (ii) the adaptability of these constructs in the HE UoT sectors. The significance of this study is to make an original contribution to the body of knowledge with regard to the development of an exploratory HC Framework linked to IC and KM for the DUT. The present study attempts to integrate concepts, IC frameworks and existing practices, as applied in the private and public sectors. Furthermore, the study explores the most beneficial structure for implementation of HC in UoTs, with specific reference to the DUT. Current techniques and paradigms are investigated to formulate an integrated strategic framework, which may find applicability in attracting, retaining and maintaining HC at the DUT.

In the context of the current study, tangible (such as finances, equipment and products) and intangible institutional assets (such as employee knowledge, skills and expertise) are considered to be inseparable components when developing an exploratory HC Framework linked to IC and KM for the DUT. The focus of the current study is not primarily on the constructs of IC, but on the development of an conceptual framework that can guide the synergies of the identified HC capabilities in a practical way. In the current study, IC is viewed as a multi-dimensional approach towards stakeholder value by integrating individually and organisationally, strategically and operationally; the formal and informal elements to develop an exploratory HC Framework linked to IC and KM for the DUT operating in a Knowledge-based Economy.

1.9 SCOPE OF THE STUDY

The study is confined to the South African HE Sector with particular reference to merged UoTs as tertiary providers of quality education. The focus of this study is on a selected UoT, namely, the DUT, based in KwaZulu-Natal in South Africa

with a total staff complement of 1874 employees. Within the new merged UoTs in the new HE Sector, the DUT was the merged UoT in KwaZulu-Natal. This arose out of a merger between the former M L Sultan Technikon and Natal Technikon. Mangosuthu Technikon, also based in KwaZulu-Natal, did not merge with any other tertiary institution and remained a standalone entity and was later also classified as a UoT. Mangosuthu Techikon is therefore excluded from this study. Moreover, the study is delimited and does not include traditional and comprehensive Universities in KwaZulu-Natal because situational factors differ in their uniqueness and given their individual complexities. More importantly, the inclusion of any other tertiary Institution will make the study too longitudinal in nature. The study variables, namely, HC, IC and KM, in particular also examine the cultural and social imperatives aligned to these constructs which finds strategic applicability at the merged DUT. Hence, the DUT as a student-centred HE institution was ideally suited as a strategically selected UoT for this study.

1.10 A BRIEF OVERVIEW OF THE LITERATURE REVIEW

Against the problem statement outlined above, it is evident that HE institutions are expected to operate in a technologically advanced global environment by generating, gathering, managing, analysing, developing, assimilating, incorporating and sharing knowledge with various stakeholders. The responsibilities associated with KM are facilitated by IC, which is regarded as the process of detecting, managing and monitoring knowledge resources (Campbell and Rahman, 2010:65). An array of frameworks, authors and researchers have provided rich and valuable insights into how HC can facilitate the successful implementation of IC to enhance KM. However, in the same vein some authors and researchers have highlighted divergent views that could also have inhibited the implementation of KM in a Knowledge-based Economy. These are synthesised in a brief overview of the literature review in this chapter of the study.

1.10.1 The Foundations of Knowledge Management

The foundations of KM and IC frameworks are grounded in the well documented studies of authors such as Itami (1991:63), Saint-Onge (1996:10-11) and Edvinsson (1997:368). The concepts of KM and IC as applied in the manufacturing sector, were researched extensively by Edvinsson and Malone (1997:44), Stewart (1997:47 and 2001:108) and Sveiby (1997a:69, 1997b:103 and 1997c:8). Teece, Pisano and Shuen (1997:523), Bontis (1996:43, 1998:66, 1999:445, and 2001:45) and Sullivan (1998:165) extended the theories and models of KM and IC to include the service sector as well. The principles of KM and IC have also been incorporated into the HE sector and are supported by research conducted by Chatzkel (2000:104), Andriessen (2004:235), Kruss (2008:236) and Shoham and Perry (2009:229). According to Baskerville and Dulipovici (2006:87), the field of KM emerged to assist managers in decision making processes by leveraging organisational knowledge. This implies a thorough knowledge of HC, IC and KM. Nonaka and Takeuchi (1995:20) consider KM as an organisation's primary source of value creation and Ulrich (1998:15) adds that "knowledge is an organisation's only appreciable asset".

1.10.2 Research on Tangible and Non-Tangible Assets in Knowledge-Based Economies

Research conducted on the tangible assets of KM and IC frameworks emphasise the value and importance of fixed assets, such as machinery, buildings and land, and current assets, such as inventory, to the successful development and implementation of KM and IC frameworks (Bozzolan, Favotto and Ricceri, 2003:544; Bruggen, Vergauven and Dao, 2009:238). Studies conducted on KM frameworks exploring the importance of intangible assets, such as future business growth, patents, copyrights, goodwill and intellectual property, are reported in various developing countries, namely, Mexico (Trevinyo-Rodriguez and Bontis, 2007:189-200), Malaysia (Ting and Lean, 2009:588-599), Sri Lanka (Abeysekera and Guthrie, 2005:151-163),

Bangladesh (Khan and Ali, 2010:48-69), Iran (Moslehi, Mohagharl, Badiel and Lucas, 2006:169-180), and India (Kamath, 2008:213-224). In the HE sector, the importance of tangible and intangible assets relating to KM and IC frameworks is also emphasised by researchers such as Allee (2000:23), Cranfield and Taylor (2008:92) and Secundo, Margherita, Elia and Passiante (2010:145). According to Firer (2005:14), tangible and intangible assets enable South African HE institutions to improve service delivery, while simultaneously ensuring knowledge creation and knowledge sharing.

1.10.3 Previous Studies on the Integration of Human Capital, Intellectual Capital and Knowledge Management Frameworks

According to Khalique and Nassir (2012:45), since 2007 various studies have explored the role of HC in the development and implementation of KM frameworks. The assertion by Khalique and Nassir (2012:45) is supported by Abduli (2013:2226) and Mol, Kismihok, Ansari and Dornhöfer (2013:34). Pedrini (2007:349) and Mouton (2010:10) contend that HC is an important change catalyst when organisations implement KM frameworks. Similar research findings are reported by Van Zyl (2014:1668) and Lombard and Kloppers (2015:4). Research conducted by Kotecha (2012:13) revealed that in developing the organisation's HC, employees can be equipped with knowledge, skills and attributes to implement KM frameworks. Diez, Ochoa, Prieto and Santidrian (2010:355) add that HC can assist employees in identifying their contribution in terms of helping the organisation reach its KM goals. With reference to the HE sector, various studies support the integration of HC, IC and KM frameworks, such as research conducted by Letsaka and Maile (2008:2), Kotecha (2012:14) and Madileng (2014:2032).

1.10.4 Research on Knowledge Management and Intellectual Capital Frameworks in the Higher Education Sector

Research on KM, IC frameworks and the contribution of HC in the HE sector has been conducted in various countries since the early 1990s. Well documented studies that emphasise the value of HC, IC and KM in the HE sector are reported in various countries such as Spain (Garcia-Aracil, Mora and Vila, 2004:287-305), Italy (Secundo, Margherita, Elia and Passiante, 2010:140-157), Canada (Rherrad, 2009:160-176), and the United Kingdom (Bezhani, 2010:179-207). In the South African HE context, there is minimal academic research published on the integration of KM, IC frameworks and HC elements (Kok, 2007:2 and 2008:1). The paucity in KM and IC research pertaining to South African HE institutions in comparison to the international milieu is acknowledged when exploring the research of Etzkowitz, Ranga, Benner, Guaranys, Maculan and Kneller (2008:681-695). These researchers conducted an international study in HE institutions of the factors influencing KM in the United States of America, Japan, Sweden and Brazil. Their study concluded that American HE institutions as well as those in Asia, Europe, and Latin America have unanimously confirmed KM as central to their existence in today's Knowledge-based Economy.

The increased international emphasis placed on conducting research in KM and IC frameworks necessitates addressing the lack of empirical research on the development and implementation of HC models in the context of IC for the South African HE sector and in particular at the DUT. However, numerous South African researchers, such as Kraak (2000:81), Tickly (2003:166), Kruss (2008:235), and McLellan (2008:137) have emphasised the anticipated value of integrating KM, IC and HC in the South African HE sector. However, limited research has been conducted on just how HC can be integrated into KM and IC frameworks in the HE sector and specifically its impact on UoTs.

1.10.5 Challenges in Identifying and Measuring the Categories of Intellectual Capital Frameworks

Most IC frameworks have three common categories, namely, HC, Customer or Relationship Capital, and Structural Capital (Moolman 2012:1). Structural capital is concerned with the organisation's capacity to meet market demands (O'Neill, 2005:13). Customer capital relates to relationships that the organisation establishes with customers, suppliers and stakeholders (Niven, 2002:11). HC underpins the knowledge, skills and experience of the organisation's employees (Moolman, 2012:1). According to Kruss (2008:235), the importance of HC is often invariably overlooked due to the difficulties in measuring and determining the value that HC makes towards the financial bottom-line and the strategic initiatives of organisations operating in a dynamic national and international environment. According to O'Neill (2005:14), HE sectors have come under scrutiny regarding financial monitoring, service delivery and developing suitable skills sets. Moolman (2012:2) asserts that South African HE institutions are now expected to scrutinise, report and examine the categories of IC, in order to secure government funding.

1.10.6 Human Capital Concerns

A substantial amount of literature has emerged in the last two decades on the contribution of HC in the effective application of IC for organisations performing and adapting to the challenges of a Knowledge-based Economy. Various authors, such as Bergh and Theron (2003:32), Widén-Wuff, (2007:53) and Armstrong (2010:4) state that HC is the last defence mechanism of competitive advantage that organisations have in the profit-orientated knowledge economy.
From the extensive literature, three distinct themes emerge. Firstly, appropriate HC should be attracted and retained in the organisation (Sidhu, 2009:244). Secondly, an organisation should have policies and procedures in place to retain its HC (Liebowitz, 2009:148). Thirdly, the organisation should maintain its

levels of HC in the wake of environmental change and competition (Avey, Luthans and Jensen, 2009:682). According to O'Dell and Hubert (2011:30-31), the common challenge when attracting, retaining and maintaining human resources is the problem of identifying the relevant HC elements addressing the three themes, while simultaneously integrating HC with the other categories of an IC framework and business level strategies.

Human Capital (HC) challenges pertaining to the HE sector have been reported in various studies, such as those conducted by Sakellaris and Spilimbergo (2000:235) and Selden (2008:35-37). Abel, Dey and Gabe (2012:566) explain that the HE sector is competing with the private sector with regard to attracting and retaining suitable HC to meet the strategic objectives of HE institutions. Research conducted by Botha (2010:205) revealed that the South African HE sector is experiencing difficulty in attracting and retaining employees, due to competition and lack of job satisfaction.

1.10.7 Potential Value of the Study

The benefits of KM in the HE UoT sector is best described by Shoham and Perry (2009:244), who state that "knowledge management offers higher education an infrastructure for planning and managing innovation and change powered by cooperation, collaboration, and transmission of knowledge, as part of the organisations activity, while relying on and using information technology and supporting cooperation". The potential value of the study is two-fold, namely, to contribute to the theoretical formulation of an exploratory HC Framework linked to IC and KM for the DUT and secondly, it is envisaged that this study will provide practical value to the HE sector, specifically UoTs and the DUT in particular.

1.10.7.1 Potential Value of the Study from a Higher Education Academic Perspective

The theoretical contribution focuses on identifying, developing and implementing an integrated conceptual framework that will propose the building blocks of an exploratory HC Framework linked to IC and KM for the DUT. Managing HC linked to IC and KM in the context of a Knowledge-based Economy will be better understood and becomes more valuable to HE managers operating at an executive, tactical and operational level as the interrelatedness and complexity of KM and IC become clearer through the proposed conceptual HC Framework. KM in the HE UoTs sector is still in its infant stage and this study can inform and clarify the development and implementation of a HC Framework linked to IC and KM for HE institutions especially for the DUT as a tertiary institution of higher learning.

This study also contributes to knowledge expansion within the context of KM and IC as applied in the HE UoT sector. The literature reviewed indicated that there is a knowledge gap in the development and implementation of HC frameworks for the HE sector (Teece, 2007:23; Choo and Bontis, 2002:149; Roos, Pike and Ferström, 2005:112). This research serves as a building block for the current study in KM, IC and HC in the South African HE sector operating in a Knowledge-based Economy. The study also highlights academic perspectives and understanding, which serves as a basis for developments in practice at the DUT in a HE UoT context in South Africa. The application of any framework requires a comprehensive understanding for it to have value. By presenting the findings of this study in a manner that enhances understanding, the DUT can make informed choices about KM, IC and HC practices and processes in the HE sector.

1.10.7.2 Expected Practical Value of the Study

Research conducted by Deloitte (2008) found that South African government departments and local authorities are under increasing pressure to strengthen their track-record of policy-making by improving the way policies are implemented (De Beer, 2010:66). The recommendations made by the Deloitte (2008) study suggest that government departments should take a more strategic approach by utilising its workforce to build key capabilities. Against this identified need to improve service delivery, the transformation of HE was initiated to enable greater responsiveness to organisational needs and allowing the South African HE sector to adapt faster to environmental challenges.

According to Pedrini (2007:355), the literature has documented positive relationships between KM, IC and HC. The assertion of Pedrini (2007:355) is shared by Mu, *et al.* (2008:86-87), Diez, *et al.* (2010:356), Khalique and Nassir (2012:39-40), and Abduli (2013:2229). However, Mol, *et al.* (2013:34) state that no empirical research exists specifically relating to HE institutions in South Africa, especially for the UoT sector. By proposing a HC Framework linked to IC and KM for the HE UoT sector, this study anticipates three major contributions, namely:

- This research examines the emerging field of KM and IC, which are limited to abstract concepts, ideas, frameworks and models in the context of the HE UoT sector. As with strategic plans, there may be gaps identified later when formulating a HC Framework linked to IC and KM for the DUT. These gaps could subsequently be refined and loopholes or bottlenecks resolved as the framework unfolds over time and as new paradigms emerge.

- Secondly, the research proposes a HC Framework linked to IC and KM, based on a synthesis of existing literature on HC, IC, as well as KM in order to make theoretical contributions especially relevant to the HE sector in South Africa and is central to the DUT as an entity of the HE UoT sector. Consequently, this study strives to broaden the existing understanding of HC, IC and KM and its relevance to the development of a HC framework from an academic perspective for the South African HE UoT sector.

- Thirdly, because of the practical relevance of finding viable solutions in developing a HC Framework linked to IC and KM for the DUT, it is anticipated that the results of this study could enhance understanding of the power of KM, IC and HC. Hence, this could encourage other HE UoT institutions to consider the formal implementation of a proposed HC framework in order to maximise the performance and contribution of HE institutions operating in a Knowledge-based Economy.

1.11 RESEARCH METHODOLOGY AND DESIGN

This section briefly addresses how the research is conducted and how the data will be collected and analysed. It focuses on the following: the research design undertaken for this study, the target population, data collection method, questionnaire design, sample selection and data analysis.

1.11.1 Secondary Data Collection

Andrew and Halcomb (2009:105) state that secondary data refer to the information collected by individuals or organisations other than the researcher. Mouton (2001:106-110) further points out that secondary data are amenable for statistical analysis. Welman, Kruger and Mitchell (2005:86) are of the opinion

that using secondary data saves time and provides the opportunity to re-analyse existing data and arrive at new conclusions. Secondary data for this study was sourced from text books, journals, the internet, media articles, government publications, periodicals, survey reports, studies conducted by other researchers, as well as a review of other dissertations and theses on the topical theme of this research investigation.

1.11.2 Primary Data

According to Welman, *et al.* (2005:87), primary data is obtained from a direct observation of the phenomenon under investigation or is collected personally. Giddings (2006:197) adds that interviews, personal or telephone, self-administered questionnaires and direct-observation methods are used to collect the primary data. For this study, a close-ended structured quantitative questionnaire (Annexure B) accompanied by a covering letter (Annexure A) was utilised to gather the primary data.

1.11.3 Research Design

Bajpai (2011:108) defines research design as a plan outlining how observations will be made and how the researcher will carry out the research project. Giddings (2006:198) states that the research design provides a framework for the collection and analysis of data and subsequently indicates which research methods are appropriate. For the purpose of this study, a quantitative research paradigm was undertaken. Brannen (2005:177) states that quantitative research refers to the systematic empirical investigation of a problem by means of using statistical, mathematical or numerical data or computation techniques. Creswell (2003:169) asserts that quantitative research generally includes the generation of hypotheses; the development of instruments and methods for measurement, such as the close-ended structured questionnaire; followed by the collection of empirical data; and the modelling and analysis of the data.

1.11.4 Target Population

Welman, *et al.* (2005:52) state that a population is the full set of elements from which a sample is selected. The target population for this study comprised all academic and administrative staff members of the DUT based in KwaZulu-Natal. The source list for the target population at DUT was obtained from the Human Resource Department and comprised two staff lists in alphabetical order, namely, an academic list and an administrative staff list. The total identified target population equated to (N=1874). The breakdown of the target population at DUT, showed that Staff List A comprised 691 academic staff and Staff List B comprised 1183 administrative staff. It should be noted that in most HE institutions, the administrative staff outnumber the academic staff.

1.11.5 SAMPLING TECHNIQUES

Sampling means taking a portion or a smaller number of units of a population as representative or having particular characteristics of that total population (Denscombe, 2008:141). DePoy and Gilson (2008:79) state that a sample comprises of elements or a subset or the population considered for actual inclusion in the study or it can be viewed as a subset of measurements drawn from a population in which the researcher is interested. According to Welman, *et al.* (2005:231), there are two types of sampling methods, namely, probability and non-probability sampling techniques. For this study, the simple random sampling technique as a probability sampling method was used to select the sample from Staff List A (academic staff) and Staff List B (administrative staff) respectively. Moreover, each unit of analysis, i.e. the elements making up the target population in each of the two lists, was only listed once in an alphabetical order. According to Johnson (2003:372), the availability of a sampling frame supports the use of the simple random sampling technique. Daniel (2012:126) concurs with Johnson and states that “simple random sampling gives every element in the target population and each possible sample of a given size, an equal chance of being selected”.

1.11.6 Selection of the Sample

Babbie (2007:102) states that the design of a sample describes the method used to select the sample from the population. Sekaran and Bougie's (2014:258) computed Table (Annexure C) for determining the optimum sample size from a given population was used in this study to select the sample for the quantitative research design. Thus, for this study, for a target population of N=1874, a sample size of n=320 is recommended by Sekaran and Bougie (2014:258). The sample selected, using the simple random sample without replacement, comprised 118 respondents selected from the Academic Staff List A and 202 respondents were selected from Staff List B (Administrative personnel). A more detailed explanation of the actual *modus operandi* of the sample selection and its representivity is highlighted in Chapter 5 under Research Methodology and Design.

1.11.7 Data Collection Method

A close-ended structured questionnaire (Annexure B) was used to collect the data from the selected sample respondents. The researcher hand delivered the questionnaires with a covering letter (Annexure A) addressed to the selected sample respondents using the personal method of data collection. According to Welman, *et al.* (2005:257), this method ensures a high response rate compared to other methods. The selected sample respondents were asked to return the completed questionnaires within two weeks.

1.11.8 Questionnaire Design

Cooper (2001:213) states that a questionnaire is a formalised set of questions for obtaining information from respondents and is regarded as the main means of collecting primary data. According to Coetzee and Rothman (2007:1-2), questionnaires allow the researcher to collect large amounts of information from

a large number of people in a short period of time and in a relatively cost effective way. Fraser and Lawley (2000:88) emphasise that the results of the research can be quantified and analysed more scientifically than other forms of research. When data has been quantified, it can be used to compare and contrast research and may be used to test existing hypotheses and create new theories.

The questionnaire thus comprised the following: a covering letter (Annexure A) assuring respondents of their anonymity and confidentiality of their responses and the structured questionnaire (Annexure B) which was developed taking into consideration the guidelines provided by Welman, *et al.* (2005:258), which included closed-ended questions, conciseness, using a justified sequence and ensuring that the questions were understood by all respondents. The 5-point Likert scale format was used to allow respondents to indicate the extent to which they agreed or disagreed with a series of statements about a given main theme (Saunders, *et al.*, 2009:124).

1.11.9 Pilot Test

According to Sekaran (1992:139), the purpose of a pilot study is to refine the questions in the questionnaire in order to ensure that there is no ambiguity or bias so that the measuring instrument is fine tuned for data collection. For the purpose of this study, 30 homogeneous respondents, who did not form part of the selected sample respondents, were randomly selected to test the questionnaire so that the necessary revisions could be made before the questionnaire was administered to the selected main sample respondents in both lists. Moreover, the responses of the 30 pilot respondents were captured to form a data set. This was then subjected to the Cronbach Co-efficient Alpha Test in order to determine the reliability of the questionnaire. A detailed explanation of the pilot test and the Alpha value is highlighted in Chapter 5 under Research Methodology and Design.

1.11.10 Reliability and Validity

Maree (2009:147) states that reliability refers to the consistency or dependability of a measuring instrument. A measuring instrument that is reliable will produce the same results if a variable is repeatedly measured under almost identical circumstances. Reliability refers to the degree of reliability of a questionnaire or the low variation between the results of different samples of the homogeneous population (Saunders, *et al.*, 2009:167). According to Welman, *et al.* (2005:261), validity measures the degree to which a study succeeds in measuring the intended values and the extent to which differences found reflect the true measures and/or differences amongst the respondents.

1.11.11 Analysis of the Data

The responses to the close-ended structured quantitative questionnaire were captured to form a composite data set. Thereafter, the responses were analysed using the latest version of the Statistical Package for Social Sciences (SPSS) version 21 for Windows. The SPSS also facilitated the use of the appropriate statistical tests for the empirical analysis. The initial data was analysed using descriptive statistics for the demographic variables. The descriptive statistics were used to analyse the composition and characteristics of the sample and the summarised data was presented in numbered figures and tables. According to Welman, *et al.* (2005:145), hypotheses are used to statistically test for significance between two variables, namely, the dependent variable and independent variable. The hypotheses formulated for this study *inter alia* will be to test the tenability of the exploratory framework of HC linked to IC and KM for the DUT, as well as cross tabulations of other variables pertaining to the study. The appropriate statistical tests will be used to analyse the data and test the significance of the hypotheses formulated. This section is discussed in more detail in Chapter 6 of the study under Analysis of the Data and Discussion of the Findings.

1.11.12 Ethical Considerations and Confidentiality

Rubin and Babbie (2005:103) provide a list of key ethical considerations that normally require adherence to when undertaking research.

These include the following (Rubin and Babbie, 2005:103):

- Voluntary nature of participation and the right to withdraw partially or completely from the process;
- Consent and possible deception of participants;
- Maintenance of the confidentiality of data provided by individuals or identifiable participants and their anonymity; and
- Behaviour and objectivity of the researcher.

Finally, a Letter of Informed Consent was also obtained from the DUT's Institutional Research Ethics Committee (IREC) (Annexure D), which reviewed the research proposal with the attached questionnaire and approved it with a reference number for the in-house research investigation at the DUT to commence.

1.12 STRUCTURE OF THE CHAPTERS

Chapter 1 provides an overview of the study. It addresses the problem statement, key objectives, research questions, significance of the study, a brief review of the related literature and the methodological approach to the study.

Chapter 2 describes the role of KM in the Knowledge-based Economy in various forms such as explicit, implicit, tacit, tangible and intangible knowledge. This chapter provides an overview of the concept of knowledge, the types of knowledge and the integration of knowledge in the HE sector. The contribution of the HE sector towards the Knowledge-based Economy is explored from both an international and national perspective.

Chapter 3 provides an overview of the various models for managing IC and HC and the mechanisms by which value is created and extracted. The theoretical constructs further underscore how UoTs perform and adapt to the challenges in a technologically advanced Knowledge-based Economy against the backdrop of HC and IC frameworks in the context of the HE Sector. This chapter in particular identifies the role and importance of the UoT sector and the contribution that UoTs can make towards promoting HC and IC in the technologically advanced Knowledge-based Economy.

Chapter 4 proposes an exploratory HC Framework linked to IC and KM for the HE sector, with particular reference to the DUT. This was developed by the researcher based on an in-depth analysis of the various IC frameworks and the role of HC and against the backdrop of the literature review.

Chapter 5 discusses the research methodology and design. It includes a detailed discussion on the sample selection, the collection of the primary and secondary data, the pilot test and the development of the measuring instrument.

Chapter 6 presents an analysis of the data using SPSS version 21 for Windows and a detailed discussion of the findings. The appropriate statistical analysis, also tests the various hypotheses to explore the tenability of the exploratory HC framework linked to IC and KM formulated, as well as testing other cross tabulated constructs pertaining to the holistic study variables.

Chapter 7 concludes with a summary of the salient findings of the study, the response rate and makes tentative recommendations arising from the empirical analysis. The chapter concludes with directions for future research.

1.13 CONCLUSION

This chapter provided a background and overview to the research problem pertaining to the benefits derived from the brief literature reviewed on the integration of HC and IC frameworks in the South African HE UoT sector. The HC Framework linked to IC and KM for UoTs would prove beneficial for the HE sector to respond successfully to the challenges associated with a Knowledge-based Economy. This chapter also provided a brief review of the theoretical framework in which the study is contextualised. Chapters 2 and 3 respectively provide a detailed literature review of the theoretical concepts underpinning this study.

CHAPTER 2

THE CONCEPTUALISATION OF KNOWLEDGE, MODELS ON KNOWLEDGE MANAGEMENT AND THE RISE OF THE KNOWLEDGE-BASED ECONOMY

2.1 INTRODUCTION

In the current information and knowledge era, knowledge has become a pivotal resource that plays an important role in both human and organisational development to allow organisations to meet various challenges in the Knowledge-based Economy. Prusak (1996:6) states that with regard to the challenges that an organisation faces, "researchers in the area of sustainable competitive advantage have come to the conclusion that the only thing that gives an organisation a competitive edge and that is sustainable, is what the organisation knows, how it uses what it knows, and how fast it can know something new". This need for innovation is reinforced by Giovanni (2005:119-134) who states that organisations which value knowledge as a strategic resource are best suited to attain success, efficiency and a competitive advantage within the present globally connected economic environment. Winston and Poh (2005:334-338) agree with Giovanni (2005:119-134) and emphasise that the volume and quality of investment that an organisation makes in obtaining, recording and managing knowledge have a direct impact on the performance of the organisation.

According to Hislop (2009:23-24), the speed at which organisations are required to gather, generate, disseminate and store new knowledge have accelerated in the last decade. Mani (2009:13) shares Hislop's view (2009:23-24), and adds that organisations are increasingly faced with competition and dynamic, unpredictable environments, which force management to realise that there is a vast and untapped organisational asset, namely, knowledge. Rowden (2000:32) states that "companies must innovate or die, and their ability to learn, adapt and change becomes a core competency for survival. The forces of

technology, globalisation and the emerging Knowledge-based Economy are creating a revolution that is forcing organisations to seek new ways to reinvent themselves". The Higher Education (HE) sector is recognised to be in the knowledge business by creating and disseminating such knowledge and should play a leading role in assisting organisations to adapt to the challenges of the Knowledge-based Economy (Kane, Sandretto and Heath, 2004:283).

The assertion of Rowden (2000:32), Hislop (2009:23-24) and Mani (2009:13) affirm the need for the HE Universities of Technology (UoT) sector, in particular, the Durban University of Technology (DUT), to emphasise the importance of integrating Knowledge Management (KM), Intellectual Capital (IC) and Human Capital (HC) to enable the institution to offer its stakeholders better quality academic programmes and services. Hay (2009:285) states that organisations are now expected to make innovation a permanent mission, in order to leverage different sources of knowledge to respond to customer needs. The assertion by Hay (2009:285-304) calls upon the DUT to provide innovative programmes and service delivery options to students to respond to the changing needs of stakeholders operating in a dynamic Knowledge-based Economy. The importance of original academic programmes are emphasised in the DUT's five-year strategic plan for 2014-2018 and the institution is prioritising knowledge creation and a student-centred approach (DUT Strategic Plan, 2013:7). It is contended by the researcher that for the DUT to achieve these strategic priorities, the institution has to identify, manage and monitor its HC linked to IC and KM.

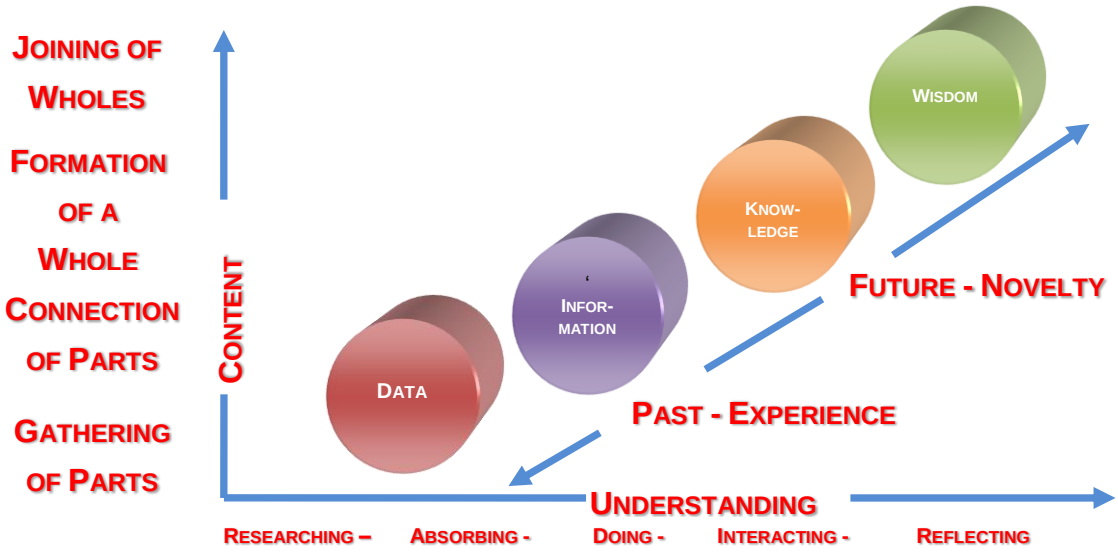
The term knowledge is encapsulated in various forms such as tacit, explicit and embedded knowledge and from this perspective the Knowledge-based Economy is emphasised and linked to the HE UoT sector. Various models for managing KM are also discussed in order to identify the mechanisms by which value is created and extracted in the HE UoT sector. The theoretical constructs further underscore how the DUT performs and adapts to the challenges in a technologically advanced Knowledge-based Economy against the backdrop of

HC and IC frameworks in the context of the HE UoT sector, especially from the DUT perspective.

2.2 CONCEPTUAL CLARIFICATION OF THE TERM KNOWLEDGE IN THE CONTEXT OF THE HIGHER EDUCATION UOT SECTOR

According to Stewart and Ruckdeschel (1998:56-59), organisational information can be divided into four hierarchical components, namely, data, information, knowledge and wisdom. Carnoy, Castells, Cohen and Cardoso (1993:45) regard data as the basic building blocks of information. Antonioli and Mazzanti (2009:146) add that information is data that has been arranged into meaningful relationships to generate new facts. Knowledge, according to Godin (2002:38), may be seen as information that enables the individual to learn and allows a person to draw conclusions from the stored data and information. Horibe (1999:91-93) states that the ultimate accomplishment of knowledge is wisdom, since it can be applied in various practices and organisational situations.

FIGURE 2.1 DATA, INFORMATION, KNOWLEDGE AND WISDOM CONTINUUM



Source: Sobahle, S. (2005:16). Adapted.

Figure 2.1 above illustrates how the terms data, information, knowledge and wisdom are situated as one moves along a continuum depicting content and understanding. Sobahle (2005:17) explains the continuum from an individual perspective and states that data is at the bottom of the continuum followed by information, knowledge and lastly wisdom (Figure 2.1). The progression from data to wisdom illustrates that an individual gains more understanding as they move towards wisdom and that the concepts and relationships to gain that understanding become more connected. Sobahle (2005:18) concludes that although simplistically put, the transition from the one stage to the other is neither precise nor effortless (Figure 2.1). For the purpose of this study, the concepts depicted in Figure 2.1 are further explored and contextualised in the HE UoT context.

2.2.1 The Concepts of Data and Information Clarified

Data is described as a set of discrete, objective facts about events. It is the structured record of transactions, having no meaning and little relevance or purpose when viewed in isolation (Hay, 2009:298). According to Kane, *et al.* (2004:284), data is transformed into information when its creator adds meaning or value to it. Winston and Poh (2005:336) explain that information thus has a certain message connected to it and may influence the receiver's judgement and behaviour. Sobahle (2005:19) states that information is important as it forms the foundation for decision-making in the HE UoT sector, allowing these institutions, such as the DUT, to respond to the challenges of the Knowledge-based Economy.

2.2.2 Knowledge Contextualised in the Higher Education UoT Sector

Knowledge is broader, deeper and richer than data or information and is obtained from individuals or groups of individuals (Muller, 2012:8). Olssen and Peters (2005:315) assert that individual knowledge is an intangible asset that

resides in the human act of knowing, being an accumulation of experience gathered from actions, thinking and conversations over time. Mani (2009:13) adds that knowledge forms a dynamic part of a human's ongoing experience and can never be static in nature. Prusak (1996:7) explains that once knowledge is internalised, this experience provides a historical perspective against which new information can be viewed and evaluated. Knowledge is subsequently defined as "a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluation and incorporating new experiences and information. It originates and is applied in the minds of knowers" (Davenport and Prusak, 2000:5). Kok (2007:1) states that collective knowledge is contained in what employees know and develop over time through experience, as well as their understanding and interactions with colleagues. Stake (1994:236) adds that this knowledge in the HE UoT sector, with reference to the DUT, is regarded as highly valuable since insights and interpretation flowing from it is applied in decision-making and in the creation of new ideas for organisations and the South African economy.

Chiucchi (2008:223) postulates that the inclusion of new data, information and knowledge gives rise to a continuous movement of knowledge, evolving into a lively process of growth, learning and innovation for HE UoT institutions operating in the dynamic Knowledge-based Economy. This dynamic nature of knowledge is a "consequence of action and interaction of people in an institution with information and with each other" (O'Dell and Hubert, 2011:4). Townley (2003:11) cautions that knowledge and information are of limited value, unless purposefully applied within the UoT and its application to the DUT context. Chiucchi (2008:222) agrees with Townley (2003:11), but argues that the outcome or impact of this knowledge creation within the DUT should be evaluated against the outcome of the decisions or actions to which it leads, since not all knowledge can be regarded as value adding. Hence, the researcher contends that it becomes increasingly vital that knowledge in the HE UoT sector, and in particular the DUT, is well managed to ensure increased innovation and improved customer responsiveness.

2.2.3 The Value of Knowledge in the Higher Education UoT Sector

There is an abundance of literature available that emphasises the value of knowledge in the HE UoT sector. Sobahle (2005:19) explains that knowledge is about managing information flows and allowing and encouraging employees to apply their skills, aptitudes, talents, thoughts, insights and creativity, while adding to the wisdom of employees. For Bontis (1999:445-449), knowledge, in the HE UoT context, refers to sound practices of information management and organisational learning. Chiucchi (2008:223) states that knowledge in the HE UoT sector originates and is applied in the minds of knowers and it often becomes embedded, not only in documents, but also in institutional routines, processes, practices and norms that employees apply in the institution.

Goddard (1998:6-7) suggests that UoTs are ideally situated to play a vital role in the Knowledge-based Economy. The opinion of Goddard (1998:6-7) is shared by Deem, Hillyard and Reed (2007:11-12) and Hislop (2009:26). Giovanni (2005:123) adds that UoTs are increasingly exposed to marketplace pressures in a similar way to other businesses. Kanter (2000:15-16) asserts that knowledge allows the institution to respond to market challenges and provide a UoT "with the competitive edge". Godin (2002:39) therefore reinforces the view that knowledge should be embedded in the objectives and values of UoTs. The observation by Godin (2002:39) is entrenched in the DUT's strategic objectives (DUT Strategic Plan, 2013:9). However, Hay (2009:299) emphasises that the objectives of a HE institution are often found to be diffused, because of the multi-facetted nature of these institutions. Daniels, Lauder and Porter (2009:121-122) caution that there is an important difference between merely including knowledge in the objectives of a HE UoT institution and to managing that knowledge effectively.

Olssen and Peters (2005:313) state that the role of the HE UoT sector has evolved significantly since South Africa's democracy in 1994 and is regarded by

the government to be a key driver in the Knowledge-based Economy. HE UoT institutions such as the DUT have been encouraged to develop links with individual and business partners in a series of new venture partnerships to create and manage knowledge (Kok, 2007:1 and Du Pré, 2009:15-17). Du Pré (2010:4-5) observes that the value perceived by society of a UoT, in particular the DUT, depends either on the scientific impact of the knowledge it generates (research), or on its knowledge transfer capabilities (learning), along with the usefulness of the technology it develops. The opinions of Kok (2007:1) and Du Pré (2009:15-17; 2010:4-5) are shared by Dyason, Lategan and Mpako-Ntusi (2010:45-46), who add that UoTs should constantly create, generate and manage knowledge in the Knowledge-based Economy and are charged with the mission of making it available to society. Strategically, the DUT has embraced the concept of knowledge and aims to "prepare new generations with the skills, cultural and scientific literacy, flexibility, and capacity for critical inquiry and moral choice necessary to make their own contribution to society" (DUT Strategic Plan, 2013:8).

2.3 AN OVERVIEW OF THE TYPES OF KNOWLEDGE

Stewart (1997:76) distinguishes between two types of knowledge, namely, tacit (or intangible) and explicit (or tangible) knowledge. The former refers to non-codified and often personal or experience-based knowledge, while the latter refers to codified knowledge, such as that found in documents (Bontis, 2003:11). Researchers such as Caddy (2000:113), Teece (2000:19) and Trautman (2006:104-110) add a third type of knowledge, namely, embedded knowledge. According to Kline (2005:45), KM almost always takes its root in the interaction and relationship between explicit and tacit knowledge. Botha (2001:275) specifies that explicit and tacit knowledge should be seen as a spectrum rather than as definitive points, since, in practice, knowledge is a mixture of tacit and explicit elements rather than being one or the other. A more detailed overview of the types of knowledge, contextualised within the HE UoT sector with reference to the DUT, is presented below.

2.3.1 Tacit Knowledge

Rumizen (2002:8) describes tacit knowledge as follows: “Tacit knowledge is what we do not know that we know. It includes rules of thumb, cultural beliefs, experience, attitudes, values, insight, and intuition. It is hard to express, process, capture or transmit in any systematic or logical manner”. Tacit knowledge is sometimes referred to as know-how and refers to intuitive, hard to define knowledge that is largely experience based (Townley, 2003:11-12). O’Donnell, O’Regan and Coates (2000:191) state that tacit knowledge is often context dependent and personal in nature and, as a result, it is hard to communicate and often deeply rooted in action, commitment and involvement. The observations of O’Donnell, *et al.* (2000:191) are shared by Rajalakshmi and Wahidabanu (2011:365), who add that tacit knowledge is developed and internalised over a long period of time and is found in individual mind sets, which makes tacit knowledge difficult to formalise and express. Manza and Reber (1997:70-71) state that tacit knowledge is the product of interaction between people or between people and their environments. An individual will acquire tacit knowledge only by gathering information, relating it to existing knowledge and accumulating experience (Rajalakshmi and Wahidabanu, 2011:365).

Smith (2001:311) states that within the HE UoT sector, tacit knowledge is the collective mindsets of everyone and comprises the broader level of knowledge in an institution. Wamundila and Ngulube (2011:3) explain that tacit knowledge within a UoT, and specifically the DUT, requires informal learning processes such as storytelling, training and development, mentoring and coaching. Saint-Onge (1996:12) clarifies that this collective mind set of values, principles and ways of doing, acts as a filter to guide employee behaviour and decision-making and is eventually entrenched in organisational culture. However, Smith (2001:311-312) expresses the concern that tacit knowledge is lost through outsourcing, downsizing, mergers, resignations, retirements and terminations. It is suggested by the researcher that the observation by Smith (2001:311-312)

had become evident in the case of the DUT since the merger between Technikon Natal and M L Sultan Technikon in 2002.

The importance of tacit knowledge in the HE UoT sector is reported by various South African researchers, such as Jansen (2003:38), Bunting and Cloete (2004:67) and Botha (2010:203). Lee and Choi (2000:179-181) add that tacit knowledge is also regarded as being the most valuable source of knowledge and is most likely to lead to breakthroughs in the HE UoT sector. According to Manza and Reber (1997:78), UoTs that emphasise tacit knowledge are capable of remaining competitive in the South African HE sector. Sullivan (2000:48-50) supports the views espoused by Manza and Reber (1997:78) and states that the tacit aspects of knowledge are often the most valuable for an institution as it is very difficult for competitors to replicate. The findings of Manza and Reber (1997:78) are further reinforced by research conducted by Onyach-Olaa (2003:105-108), who concluded that a HE UoT institution that failed to recognise the importance of tacit knowledge lacked the flexibility to adapt timeously to the Knowledge-based Economy.

2.3.2 Explicit Knowledge

Nonaka and Takeuchi (1995:62) explain that explicit knowledge can best be described as knowledge that is easily conveyed in formal language and is sometimes referred to as know-how. Widén-Wuff (2007:51-52) describes explicit knowledge as being fairly easy to identify, store and retrieve. According to Rumizen (2002:8), explicit knowledge "encompasses the things we know that we can write down, share with this type of knowledge is easily exchanged amongst individuals and groups within the HE institution", since explicit knowledge may be in the form of manuals, specifications, and formulas, Antoinetti and Antonioli (2011:89-90) suggest that this type of knowledge can be summarised, encoded, articulated in reports, books, words and data, and widely distributed amongst people and employees in the HE institution. The greatest

challenges with explicit knowledge, from a managerial perspective, involve ensuring that employees have access to what they need, that important knowledge is stored, and that the knowledge is reviewed, updated or discarded on a continuous basis (Sveiby, 1994:26; Sullivan, 2000:45; Edvinsson, 2002:23).

Tacit knowledge is acquired by individuals' experiences, knowledge and expertise in a particular area (Choo, 1996:329). According to Rowden (2000:32), the challenge in the HE UoT sector is to articulate and convert tacit knowledge into explicit knowledge. The process of converting tacit knowledge into explicit knowledge is a tedious job, since generating tacit knowledge is dependent upon whether individuals believe that their knowledge is worth expressing, while other employees may intentionally withhold sharing their knowledge with others (Choo, 1996:331; Caddy, 2000:113; Trautman, 2006:105). Ahn and Chang (2004:405) state that the culture of the HE institution also may be a factor that hinders knowledge generation and sharing within the institution. The opinion of Ahn and Chang (2004:405) is shared by Dimitriades (2005:317), Doctor (2008:113) and Rherrad (2009:165). Trautman (2006:106) recommends that knowledge transfer requires groups or individuals at the DUT to work together and share their expertise and knowledge in order for tacit knowledge to be converted into explicit knowledge.

Other authors provide additional recommendations to facilitate the process of converting tacit knowledge into explicit knowledge in the HE UoT sector, such as participative leadership to encourage knowledge sharing (Smith, 2001:311), trust amongst the institution's employees (Rumizen, 2002:8), access to institutional resources (Caddy, 2000:114), established reward and recognition systems (Olssen and Peters, 2005:313) and the presence of comprehensive and relevant training, development, coaching and mentoring programmes (Dimitriades, 2005:318). Smith (2001:311) provides a summary of the use of explicit and tacit knowledge in the workplace, as depicted in Table 2.1.

TABLE 2.1 THE USES OF EXPLICIT AND TACIT KNOWLEDGE

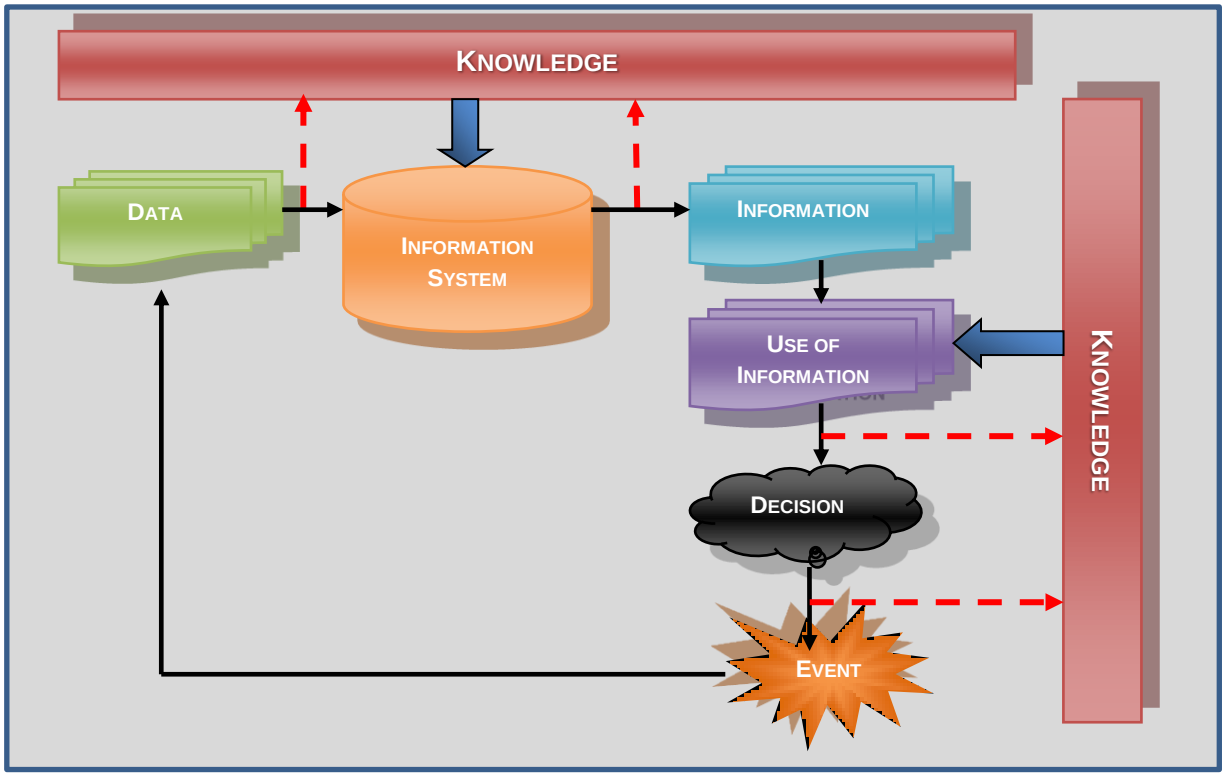
EXPLICIT KNOWLEDGE	TACIT KNOWLEDGE
ACADEMIC KNOWLEDGE OR "KNOW-WHAT" THAT IS DESCRIBED IN FORMAL LANGUAGE, PRINT OR ELECTRONIC MEDIA, OFTEN BASED ON ESTABLISHED WORK PROCESSES	PRACTICAL, ACTION-ORIENTATED KNOWLEDGE OR "KNOW-HOW" BASED ON PRACTICE, ACQUIRED BY PERSONAL EXPERIENCE, SELDOM EXPRESSED OPENLY, OFTEN RESEMBLES INTUITION
WORK PROCESS ORGANISED TASKS, ORCHESTRATED, ASSUMES A PREDICTABLE ENVIRONMENT, LINEAR, REUSE CODIFIED KNOWLEDGE, CREATE KNOWLEDGE OBJECTS	**WORK PRACTICE** SPONTANEOUS, IMPROVISED, WEB-LIKE, RESPONDS TO A CHANGING, UNPREDICTABLE ENVIRONMENT, CHANNELS INDIVIDUAL EXPERTISE, CREATES KNOWLEDGE
LEARN ON THE JOB, TRIAL-AND-ERROR, SELF-DIRECTED IN AREAS OF GREATEST EXPERTISE, MEET WORK GOALS AND OBJECTIVES SET BY ORGANISATION	**LEARN** SUPERVISOR OR TEAM LEADER FACILITATES AND REINFORCES OPENNESS AND TRUST TO INCREASE SHARING OF KNOWLEDGE AND BUSINESS JUDGMENT
TEACH TRAINER DESIGNED USING SYLLABUS, USES FORMATS SELECTED BY ORGANISATION	**TEACH** ONE-ON-ONE, MENTOR, INTERNSHIPS, COACH, ON-THE-JOB TRAINING
TYPE OF THINKING LOGICAL, BASED ON FACTS, USE PROVEN METHODS, PRIMARILY CONVERGENT THINKING	**TYPE OF THINKING** CREATIVE, FLEXIBLE, UNCHARTERED, LEADS TO DIVERGENT THINKING, DEVELOP INSIGHTS
SHARE KNOWLEDGE EXTRACT KNOWLEDGE FROM PERSON, CODE, STORE AND REUSE AS NEEDED FOR CUSTOMERS	**SHARE KNOWLEDGE** ALTRUISITIC SHARING, NETWORKING, FACE-TO-FACE CONTACT, VIDEO-CONFERENCING AND STORYTELLING
MOTIVATION OFTEN BASED ON NEED TO PERFORM TO MEET SPECIFIC GOALS	**MOTIVATION** INSPIRE THROUGH LEADERSHIP, VISION AND FREQUENT PERSONAL CONTACT WITH EMPLOYEES
REWARD TIED TO BUSINESS GOALS, COMPETITIVE WITHIN WORKPLACE, COMPETE FOR SCARCE REWARDS, MAY NOT BE REWARDED FOR INFORMATION SHARING	**REWARD** INCORPORATE INTRINSIC OR NON-MONETARY MOTIVATORS AND REWARDS FOR SHARING INFORMATION DIRECTLY, RECOGNISE CREATIVITY
RELATIONSHIPS MAY BE TOP-DOWN FROM SUPERVISOR TO SUBORDINATE OR TEAM LEADER TO TEAM MEMBERS	**RELATIONSHIPS** OPEN, FRIENDLY, UNSTRUCTURED, BASED ON OPEN, SPONTANEOUS SHARING OF KNOWLEDGE
TECHNOLOGY RELATED TO JOB, BASED ON AVAILABILITY AND COST, INVEST HEAVILY IN INFORMATION TECHNOLOGY	**TECHNOLOGY** TOOL TO SELECT PERSONALISED INFORMATION, INVEST MODERATELY IN THE FRAMEWORK OF TECHNOLOGY
EVALUATION BASED ON TANGIBLE WORK ACCOMPLISHMENTS, NOT NECESSARILY ON CREATIVITY	**EVALUATION** BASED ON DEMONSTRATED PERFORMANCE, ONGOING, SPONTANEOUS EVALUATION

Source: Smith, E.A. (2001:314). Adapted.

As demonstrated by Smith (2001:311) in Table 2.1 above, it is evident that the primary difference between the use of tacit and explicit knowledge in an institution is the distinction between academic knowledge (explicit knowledge) and practical, action orientated knowledge (tacit knowledge). Furthermore in Table 2.1 above, the comparison between tacit and explicit knowledge emphasises the importance of integrating HC, IC and KM into the processes, procedures and systems of a HE institution. At the DUT, explicit knowledge is created and documented in research, publications, institutional policies, procedures and rules (Townley, 2003:11-12). Documenting explicit knowledge allows the DUT to preserve its knowledge, especially if employees leave the institution as a result of retirement, transfers, resignations or terminations (Ahn and Chang, 2004:405). According to Du Pré (2010:5), explicit knowledge at the DUT can be shared either internally (within the institution) and/or externally (via collaborations with other institutions and stakeholders). The DUT is well suited to create, disseminate and manage explicit knowledge, as its environment is a place for sharing and exchanging knowledge amongst its employees, stakeholders and the business community operating in the Knowledge-based Economy (Du Pré, 2009:15). The researcher contends that the challenge for the DUT is to attract, retain and develop the institution's HC linked to IC and KM as illustrated in Table 2.1, in order to maintain the tacit and explicit knowledge requirements of the DUT in the context of an ever-changing Knowledge-based Economy.

Information systems are the preferred manner of articulation, storage and retrieval of data in order to facilitate problem solving in the HE UoT sector operating in the Knowledge-based Economy and this view has been emphasised within the DUT (DUT Annual Report, 2014:14). Manuri and Raja Abdullah (2011:73-75) highlighted the research conducted by Fernandez, Gonzalez and Sabherwal (2004:57-63), who developed a model depicting the relationship between data, information systems and decision-making in the institution as depicted in Figure 2.2 below.

FIGURE 2.2 THE RELATION OF DATA, INFORMATION AND KNOWLEDGE TO EVENTS



Source: Fernandez, I.B., Gonzalez, A. and Sabherwal, R. (2004:57). Adapted.

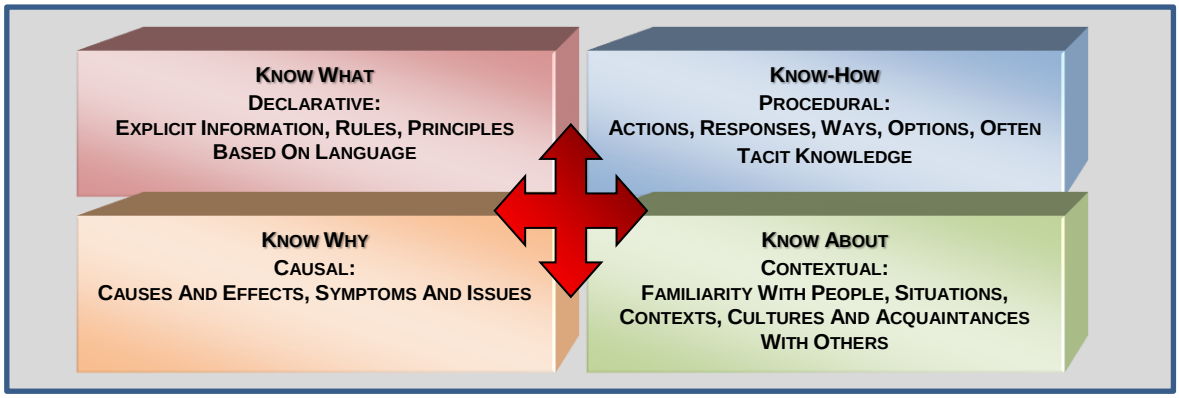
The model depicted in Figure 2.2 above emphasises the importance of integrating information systems with HC, IC and KM to facilitate decision-making at HE UoTs operating in the Knowledge-based Economy (Manuri and Raja Abdullah, 2011:76). The importance of information systems to manage tacit and explicit data in the HE UoT sector is also emphasised by Horibe (1999:91) and Kane, Argote and Levine (2005:64).

2.3.3 Embedded Knowledge

Teece (2000:19) states that embedded knowledge refers to the knowledge that is locked in processes or structure. Kane, *et al.* (2005:64) affirm that embedded knowledge is found in rules, processes, manuals, organisational culture and the

institution's codes of conduct, ethics and products. Blackler (1995:1023) explains that knowledge may be embedded either formally, such as through a management initiative to formalise a certain beneficial routine, or informally as the institution uses and applies the other two types of knowledge, namely, tacit knowledge and explicit knowledge. The viewpoint of Blackler (1995:1023) is shared by Caddy (2000:113), Doctor (2008:114) and Kamath (2008:217). On the other hand, Vorwerk (2004:1-23) summarises four categories of embedded knowledge as shown in Figure 2.3 below. The four categories described by Vorwerk (2004:1-23) indicates that embedded knowledge can be declarative, procedural, causal and contextual. Chen, Zhu and Xie (2004:198) support the opinion of Vorwerk (2004:1-23) and state that embedded knowledge explores the significance of relationships between material resources, technologies, roles, formal procedures and emergent routines. Hence, according to Schiuma, Lerro and Carlucci (2005:162), the analysis of embedded knowledge helps executive management to analyse the capabilities and capacity of the institution's HC, IC and KM in order for the institution to adapt to the challenges of the Knowledge-based Economy.

FIGURE 2.3 FOUR CATEGORIES OF EMBEDDED KNOWLEDGE



Source: Vorwerk, C. (2004:1). Adapted.

According to O'Neill (2005:14), the greatest challenge for HE UoT institutions lies in managing embedded knowledge effectively. Antonioli, Manzalini and Pini

(2011:317) proclaim that while embedded knowledge can exist in explicit sources, for example, a rule can be written in a manual, the knowledge itself is not explicit, since it is often not immediately apparent, while doing something in a particular way, is beneficial to the HE institution. Argote and Ingram (2000:154) assert that in managing embedded knowledge the two most challenging aspects are culture and routines, which can be both difficult to understand and hard to change. Roche (2013:4) agrees with Argote and Ingram (2000:154) and affirms that while formalised routines may be easier to implement, the monitoring and effective use of embedded knowledge remains challenging for UoTs, including the DUT, operating in the dynamic Knowledge-based Economy. The researcher contends that in case of the DUT, since the occurrence of the merger between Technikon Natal and M L Sultan Technikon in 2002, the institutional culture and routines have not been adequately examined to determine their contribution towards attracting, retaining and developing HC linked to IC and KM in order for the institution to generate embedded knowledge in the Knowledge-based Economy.

2.3.4 The Integration of Tacit, Explicit and Embedded Knowledge within the Higher Education UoT Sector

Knowledge in itself will not ensure the success of a HE UoT and in order to optimise the benefits that knowledge can provide to an institution, hence it is therefore necessary to manage knowledge (Bennett, 1998:595; Dimitriades, 2005:318). According to Grant (1997:451), a HE institution such as the DUT can only manage knowledge if the three types of knowledge, namely, tacit, explicit and embedded knowledge, are recognised at individual and organisational levels respectively. Greenhalgh, Robert, Macfarlane, Bate and Kyriakidou (2004:582-585) concur with the viewpoint of Grant (1997:451) and assert that human and organisational development theories are based on the idea that each employee has a certain set of knowledge. The structure of

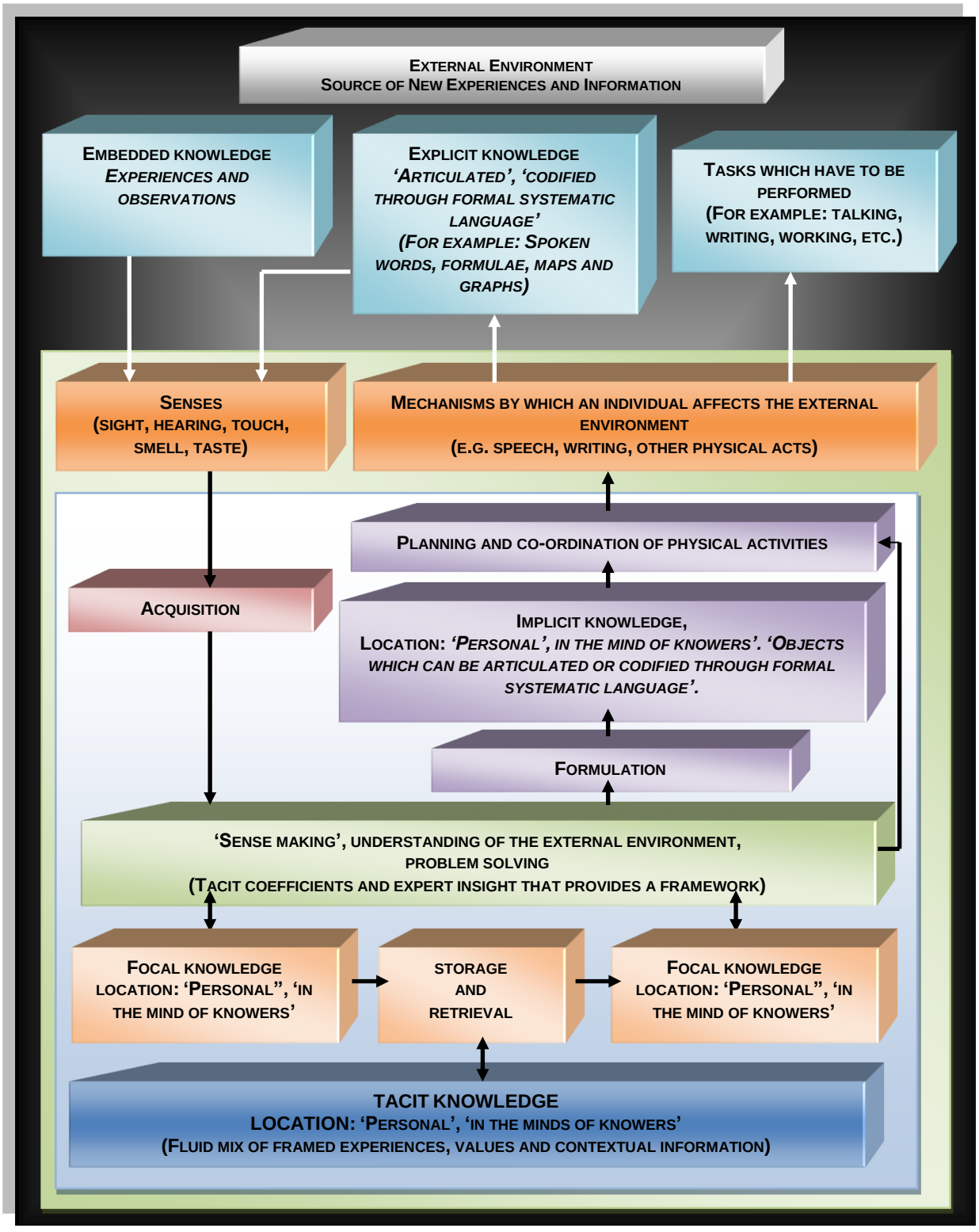
a HE institution should be established and optimised to use employees' knowledge to adapt to the challenges of the Knowledge-based Economy. The DUT can only be as effective as its employees' capacity to create, manage and utilise the information and knowledge generated to achieve institutional goals (Antonioli, Marzucchi and Montressor, 2014:65). Du Plessis and Boon (2004:74-75) emphasise the importance of an integrated approach to knowledge, which is based on recognising the integration between tacit, explicit and embedded knowledge.

Mostert and Snyman (2007:104-127) propose two models to represent an integrated approach to individual and organisational knowledge for the HE sector. The first model, namely, The Model of Individual Knowledge (depicted in Figure 2.4 below), illustrates the relationship and processes between tacit, explicit and embedded knowledge at the individual level. The second model, The Model of Organisational Knowledge (represented in Figure 2.5), depicts the relationship between the three types of knowledge, namely, tacit, explicit and embedded knowledge within an organisation.

The Model of Individual Knowledge (Figure 2.4 below) reinforces the need for a HE institution to recognise personal knowledge and to utilise employees' knowledge, skills and experiences in the planning and co-ordination of tasks and duties. Mostert and Snyman (2007:108) postulate that tacit knowledge, which is described as a fluid mix of framed experiences, values and contextual information, should be incorporated into the explicit knowledge of the HE institution (Figure 2.4).

The Model of Organisational Knowledge (Figure 2.5) presented by Mostert and Snyman (2007:108) identifies the mechanisms that HE institutions can introduce to ensure information acquisition, knowledge storage and retrieval. This model (Figure 2.5) is an extension of The Model of Individual Knowledge (Figure 2.4), since the individual's knowledge contribution to the institution is recognised in the context of structures and processes.

FIGURE 2.4 THE MODEL OF INDIVIDUAL KNOWLEDGE



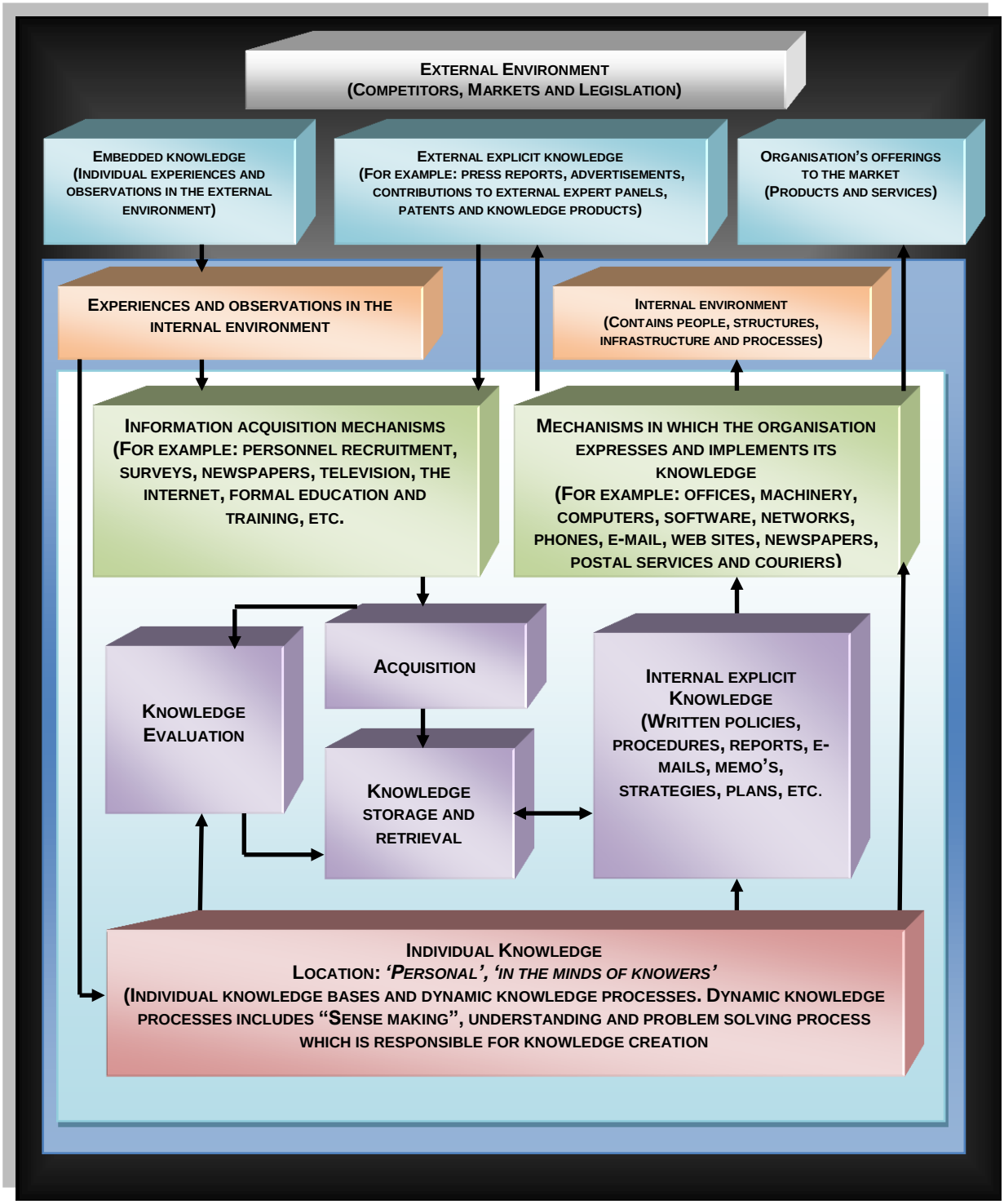
Source: Mostert, J.C. and Snyman, M.M.M. (2007:108). Adapted.

Both of these models proposed by Mostert and Snyman (2007:104-127), reinforce the notion that organisational knowledge in an HE institution is related to individual knowledge on the basis that the behaviour of the institution, as far as knowledge is concerned, relies fundamentally on human cognitive processes. This contention by Mostert and Snyman (2007:104-127) is shared by Grant (1997:452), Dumay (2009:495) and Antonioli, Mancinelli and Mazzanti (2013:978).

At an individual level, Muller (2006:202) reports that HE UoT employees are not encouraged to use embedded knowledge for problem solving and decision making, since institutions are not emphasising the value of information acquisition mechanisms, knowledge storage and retrieval and knowledge evaluation. Individual knowledge and organisational knowledge require a well-balanced approach in terms of institutional strategy, planning, leadership, implementation and evaluation (Muller, 2006:203).

The importance of an integrated approach to knowledge in the HE UoT sector, with specific reference to the DUT, is emphasised by Greenhalgh, *et al.* (2004:583), Onyach-Olaa (2003:109) and Widén-Wuff (2007:51-52). Muller (2006:202) declares that similar to individuals, a HE institution exists within the larger external environment in the Knowledge-based Economy and monitoring the needs of external stakeholders has become important for a UoT to survive. Clark (2001:191) concludes that in order to survive and prosper, a HE UoT needs to have knowledge of the needs of the institution's stakeholders, knowledge of the environment and the ability to apply this knowledge effectively. Various authors concur with the opinion of Clark (2001:191) such as Malhorta (2000:5), Rossouw (2003:42) and Muller (2006:202). Figure 2.5, which is an extension of The Model of Individual Knowledge (Figure 2.4), is presented below and a brief explanation follows.

FIGURE 2.5 THE MODEL OF ORGANISATIONAL KNOWLEDGE



Source: Mostert, J.C. and Snyman, M.M.M. (2007:108). Adapted.

In Figure 2.5 above, the importance of internal explicit knowledge such as policies, procedures and strategic plans is acknowledged, as well as mechanisms in which the organisation expresses and implements its knowledge. Mostert and Snyman (2007:109) conclude that both individual and organisational knowledge are required for an organisation to adapt to the complexities of the Knowledge-based Economy. Dumay (2009:494) concurs with the observation made by Mostert and Snyman (2007:109) and deems individual and organisational knowledge as key strategic factors in the ability of an HE institution to function efficiently and effectively.

In order for the DUT to meet the challenges of the Knowledge-based Economy, the institution will have to rigorously review the importance of HC linked to IC and KM. Hence, the subsequent section examines the rise of the Knowledge-based Economy. The contribution of the HE sector, with special reference to UoTs, is explored from an international and South African perspective to determine the unique role that the HE sector can play towards achieving the imperatives of the Knowledge-based Economy.

2.4 THE RISE OF THE KNOWLEDGE-BASED ECONOMY

Roche (2013:17) reports that the phrase ‘Knowledge-based Economy’ was initially proposed by Peter Drucker in 1969 in his book *The Age of Discontinuity*. Various authors have defined the knowledge-based economy and the following account by Malhorta (2000:5) aptly defines the term: “The Knowledge-based Economy caters to the critical issues of organisational adaptation, survival and competence in the face of increasingly discontinuous environmental change. Essentially, it embodies organisational processes that seek the synergistic combination of data and information processing on information technologies, and the creative and innovative capacity of human beings”.

According to Winston and Poh (2005:336), the source of economic growth and value-added activities increasingly relies on knowledge. A Knowledge-based Economy refers to one that focuses on the production and management of knowledge (Altaher, 2010:265). The Organisation for Economic Co-operation and Development defines a country with a Knowledge-based Economy as one where “the production, diffusion and use of technology and information are keys to economic activity and sustainable growth” (OECD, 1996:3). Such an economy depends on the adaptive and creative thinking skills of individuals to come up with solutions for problems prevalent in their society (Rothwell, 2002:11-14; Rajalakshmi and Wahidabanu, 2011:365). Hoetzlein (2007:14-18) states that this shows that a knowledge-based economy and a knowledge-society are mutually interactive and positively correlated. The former considers knowledge in terms of factors of production, intellectual property, knowledge management, knowledge transfer, the learning economy and the learning organisation (Bozeman and Corley, 2004:599; El-Bannary, 2008:491). The latter regards knowledge in terms of a collective social resource, the division of manual and mental labour, the information society and lifelong learning by the employees of the institution (Bui and Baruch, 2010:221).

The two common denominators of both the Knowledge-Based Economy and Knowledge Society are knowledge and employees (Senge, 2007:45; Marshall, 2009:133). In more recent uses of the term knowledge-based economy researchers are less concerned with forecasting the importance of knowledge, than determining the practical description of key features that assist organisations and countries to operate in the Knowledge-based Economy (Mazutis and Slawinski, 2008:440; Bui and Baruch, 2010:221; Rajalakshmi and Wahidabanu, 2011:366). Countries and organisations that have switched into the new economy are reaping the vast benefits that result from using knowledge to generate both tangible and intangible products and values (O’Neill and Adya, 2007:414). According to Pavan (2013:30), a Knowledge-based Economy gives

the economy of a country a forward thrust and places it at a strategic competitive advantage. The opinion of Pavan (2013:30) is shared by Beugre and Offodile (2001:541) and Alhawaria, Karadshehb, Taletc and Mansoura (2011:54).

According to Rajalakshmi and Wahidabanu (2011:366), the Knowledge-based Economy increases income and revenue for First World countries and allows economies to adapt effectively in order to grow in an increasingly competitive world due to emerging trends, globalisation and international trade. The viewpoint of Rajalakshmi and Wahidabanu (2011:366) is shared by Seyedhoseini, Noori and Hatefi (2009:758) and Bui and Baruch (2010:220). These First World countries and organisations regard knowledge as their greatest asset and invest in research and development, education and training to maintain a competitive advantage in comparison to others (Wickboldt, Bianchin, Lunardi, Granville, Gaspary and Bartolini, 2011:2960). Organisations operating in the Knowledge-based Economy require a highly skilled workforce to adapt to new technological innovations (Bui and Baruch, 2010:220). Therefore, according to Hatefi (2009:759), education, training and development becomes the central focus in the Knowledge-based Economy to ensure that countries and organisations can produce a highly skilled workforce that translate knowledge, skills and expertise into productivity gains and, in turn, boost economic growth and development.

2.4.1 The Contribution of the Higher Education Sector to the Knowledge-Based Economy – An International Perspective

Tomlinson (2010:11) describes the 21st century business environment as a unique business challenge for innovation since changes simultaneously include the development of new markets, improved technology and an array of customer needs and expectations. According to Rherrad (2009:160-176), HE institutions that operate in the 21st century are constantly exposed to changes in

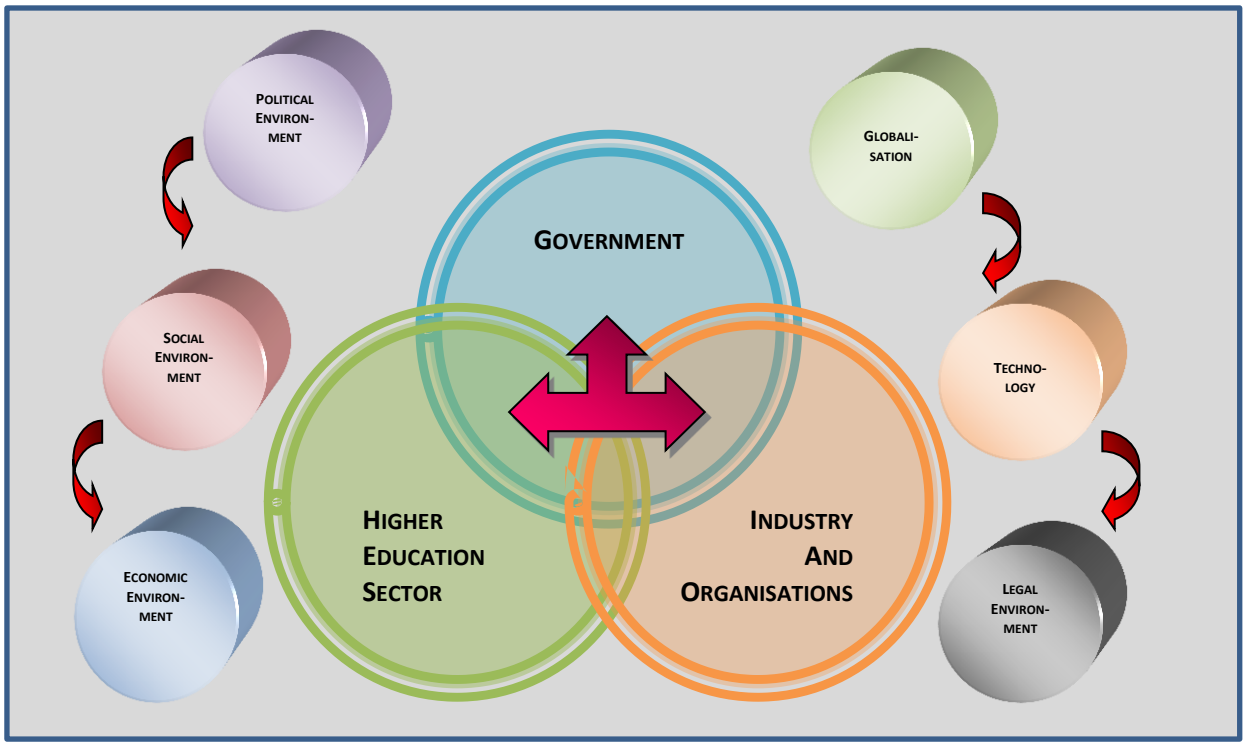
the Knowledge-based Economy and share information management which is crucial for success. Authors in academia describe the emerging information society, age or era by using a variety of expressions such as the 'Third Wave Economy' (Toffler, 1990:9), 'Information Economy' (Carnoy, Castells, Cohen and Cardoso, 1993:3), 'Knowledge Society' (Stehr, 1994:12), and 'Knowledge-based Economy' (OECD, 1996:5). Ahonen (2009:119) highlights that knowledge will be the key to this age and this allows HE institutions to play an important and prominent role in the Knowledge-based Economy.

The HE sector in any country is the primary catalyst of transformation towards sustainable development by increasing people's capacities, knowledge, skills and expertise to transform a country's vision for society into reality (Peters and Besley, 2005:14). Cook (2002:98) declares that HE provides the skills for "learning to know, learning to live together, learning to do and learning to be". According to Owuor (2012:127), economic activities associated with the production and utilisation of information and knowledge has become an engine of economic growth for countries operating in the Knowledge-based Economy. However, in a Knowledge-based Economy, the biggest challenge does not come from natural resources and conditions, but rather from a shortage of highly qualified knowledge workers (Sifuna, 2010:415). Hence, to succeed in the Knowledge-based Economy, HC investment through formal and informal education, training, life-long learning and skill enhancement must be prioritised at both national and organisational levels respectively (Steiner-Khamsi and Waldow, 2012:1-3).

Peters and Besley (2005:13) state that in the Knowledge-based Economy, the HE sector should emphasise public-private partnerships to promote an entrepreneurial culture of ideas and innovative thinking. The view of Peters and Besley (2005:13) is further reinforced by Leydesdorff and Fritsch (2006:1538-1543), who state that three evolutionary functions are required for shaping a

Knowledge-based Economy, namely, the economic wealth generation created by industries and organisations, organised knowledge production offered by the HE sector and normative control exercised by the government as illustrated in Figure 2.6 below. Leydesdorff (2009:165-166) further explains that wealth generation remains institutionally associated with organisations and industry, knowledge production with academia, while control in the public sphere can be associated with government or with management in the private sphere. The assertion of Leydesdorff (2009:165-166) is further supported (Figure 2.6) by various researchers such as Etzkowitz (2008:17-19), Becerra-Fernandez and Sabherwal (2010:104-109) and Abel, Dey and Gabe (2012:564).

FIGURE 2.6 THREE EVOLUTIONARY FUNCTIONS OF THE KNOWLEDGE-BASED ECONOMY

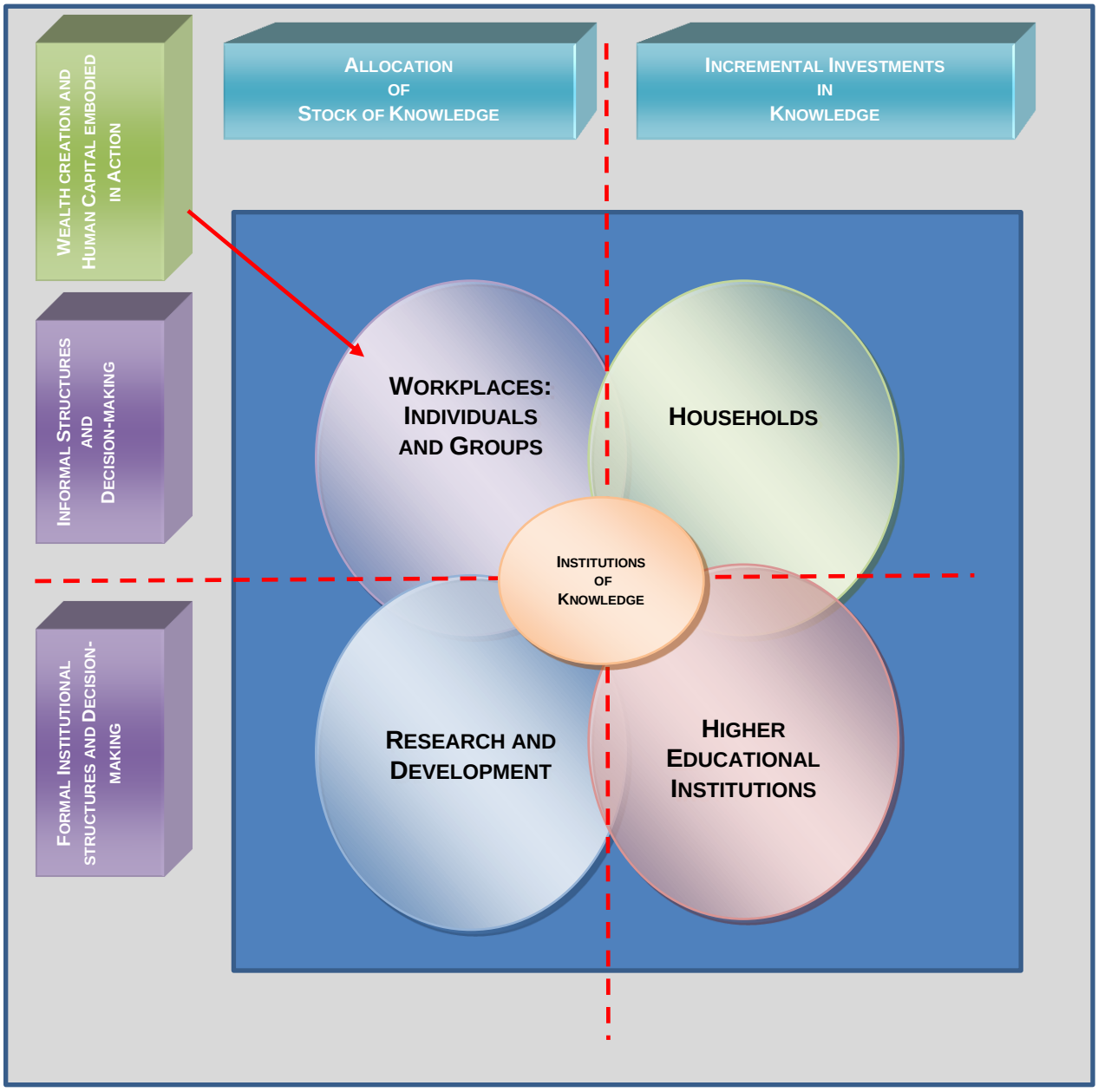


Source: Leydesdorff, L. and Fritsch, M. (2006:1538). Adapted.

The integrated roles of the HE sector, industries and organisations and the government are emphasised in the Triple Helix Model developed by Leydesdorff and Etzkowitz (1998:195-196). In their research, Leydesdorff and Etzkowitz (1998:195-196) used statistical and mathematical equations denoting the roles that HE institutions, organisations and the government play in promoting innovation, new technology and patents in the Knowledge-based Economy at both national and international levels. The Triple Helix Model emphasises the intricate relationship between knowledge creation, the control thereof and the development of new innovative patents (Leydesdorff, 2006:156-164). According to Leydesdorff and Etzkowitz (1998:195-203), an imbalance, or absence, of one the three factors (Figure 2.6) required to shape the Knowledge-based Economy will have a negative impact on the functioning of the other factors.

The important roles of the government, HE institutions and organisations in the Knowledge-based Economy are also emphasised in the Stocks and Flows of Knowledge, Decision-making and Wealth Creation Diagram developed by the Organisation for Economic and Co-operation and Development in 1996 as depicted in Figure 2.7 below (OECD, 1996:12). Figure 2.7 depicts the relationship between informal and formal structures in generating national economic wealth. The role of the HE sector is illustrated in the Stocks and Flows of Knowledge, Decision-making and Wealth Creation Diagram in relation to organisations, research and development and the consumer (households). Furthermore, Figure 2.7 highlights the relationship between formal and informal knowledge in promoting economic development and encourages institutions of knowledge to become the core of the Knowledge-based Economy (OECD, 1996:15). The OECD (1996:13) concludes that wealth creation is only possible if “institutions of knowledge” develop their HC and invest in knowledge creation.

FIGURE 2.7 THE STOCKS AND FLOWS OF KNOWLEDGE, DECISION-MAKING AND WEALTH CREATION



Source: OECD, (1996:15). Adapted.

The importance of a three-tier relationship between government, industry and the HE sector is further emphasised in the Lisbon Strategy launched by The European Union (EU) at the turn of the millennium, as a policy response to the

challenges of globalisation (Tomlinson, 2010:20). According to Odhiambo (2011:300), the multi-dimensional character of the Lisbon strategy calls for comprehensive government approaches in which life-long learning and competence development should be integral elements of a wider government policy. The Lisbon Strategy also emphasises the importance of economic development and performance, employment promotion, quality of work and social inclusion (Magal and Word, 2009:105). Kamath (2008:219-220) explains that given the current socio-economic circumstances in the context of globalisation, countries around the world need to achieve a better qualified labour force for the restructuring, innovation and transition to the Knowledge-based Economy. Bunting and Cloete (2004:18) add that to achieve such a qualified labour force, the important contribution of the HE sector focusing on work-based education and training has become vital to the government and organisations.

Based upon the international emphasis on the important role of the HE sector in the Knowledge-based Economy, Du Plessis and Boon (2004:76) reinforce the view that it is therefore necessary to explicitly implement KM processes in the South African HE UoT sector to coordinate and integrate knowledge deposits. The important contribution of the South African HE UoT sector towards the Knowledge-based Economy is explored below.

2.4.2 The Envisaged Contribution of the South African Higher Education Sector to the Knowledge-Based Economy

The past two decades have seen the economies of leading countries increasingly evolving into knowledge-based economies, relying less on traditional resources such as capital and labour for wealth creation and growth (Leonard and Swap, 2005:16). Peters and Besley (2005:45) state that it is generally accepted that the creation of new knowledge, innovation and technological change is dependent upon the ability of the HE system of a country to drive economic progress. Malhorta (2000:7) asserts that economic

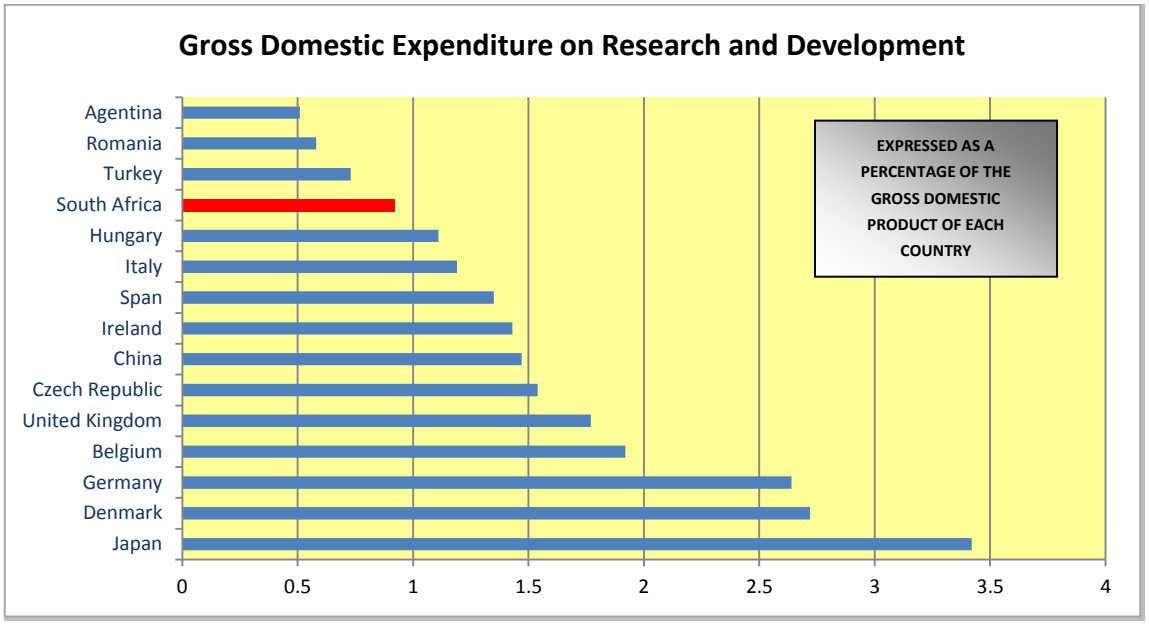
activities based on new knowledge that is driven by the HE system stimulate economic growth, provide higher wages and greater employment opportunities as well as enhance a country's competitiveness within the global environment. According to Huidor and Cooper (2010:144), these positive economic trends, that are prevalent in many developed countries, strongly depend on new technological investments and innovations, high-technology industries, emphasis on HE, research and development to contribute to developing a highly skilled workforce that responds to the challenges of globalisation.

2.4.2.1 South Africa's Gross Domestic Expenditure on Research and Development

Dimitriades (2005:315) states that the globalisation of technology presents new opportunities for development in developing countries. Therefore, focused government interventions in this regard are required. The viewpoints of Dimitriades (2005:315) are shared by El-Bannary (2008:490), who amplifies that in order for developing countries to build their potential as knowledge-based economies, investments in HC, HE systems, a highly skilled labour force and information and technological infrastructures are essential. While innovation is identified as a driver for economic growth and productivity, the capacity to innovate remains low in most African countries (Biseth, 2009:246). Gross domestic expenditure on Research and Development, as a percentage of the Gross Domestic Product (here after referred to as GDP) is one of the most important indicators of a country's potential for innovation and growth (Mouton, 2010:13). Gross domestic expenditure on Research and Development reflects the intensity of Research and Development performance in a country. The norm for the Gross domestic expenditure on Research and Development in the European Union was 3% of GDP (Blankley and Booyens, 2010:373). South Africa's Gross domestic expenditure on Research and Development as a percentage of GDP (highlighted by Figure 2.8) amounted to only 0.92% in the 2008/2009 financial year (Blankley and Booyens, 2010:375). The South African Government reported that this was predominantly due to operating in a

resource-based economy and that it “has a long way to go to achieve the status of a knowledge-based economy” (DST, 2007:5).

FIGURE 2.8 **A COMPARISON BETWEEN SOUTH AFRICA AND OTHER COUNTRIES WITH REGARD TO GROSS DOMESTIC EXPENDITURE ON RESEARCH AND DEVELOPMENT**



Source: Blankley, W.O. & Booyens, I. (2010:374). Adapted.

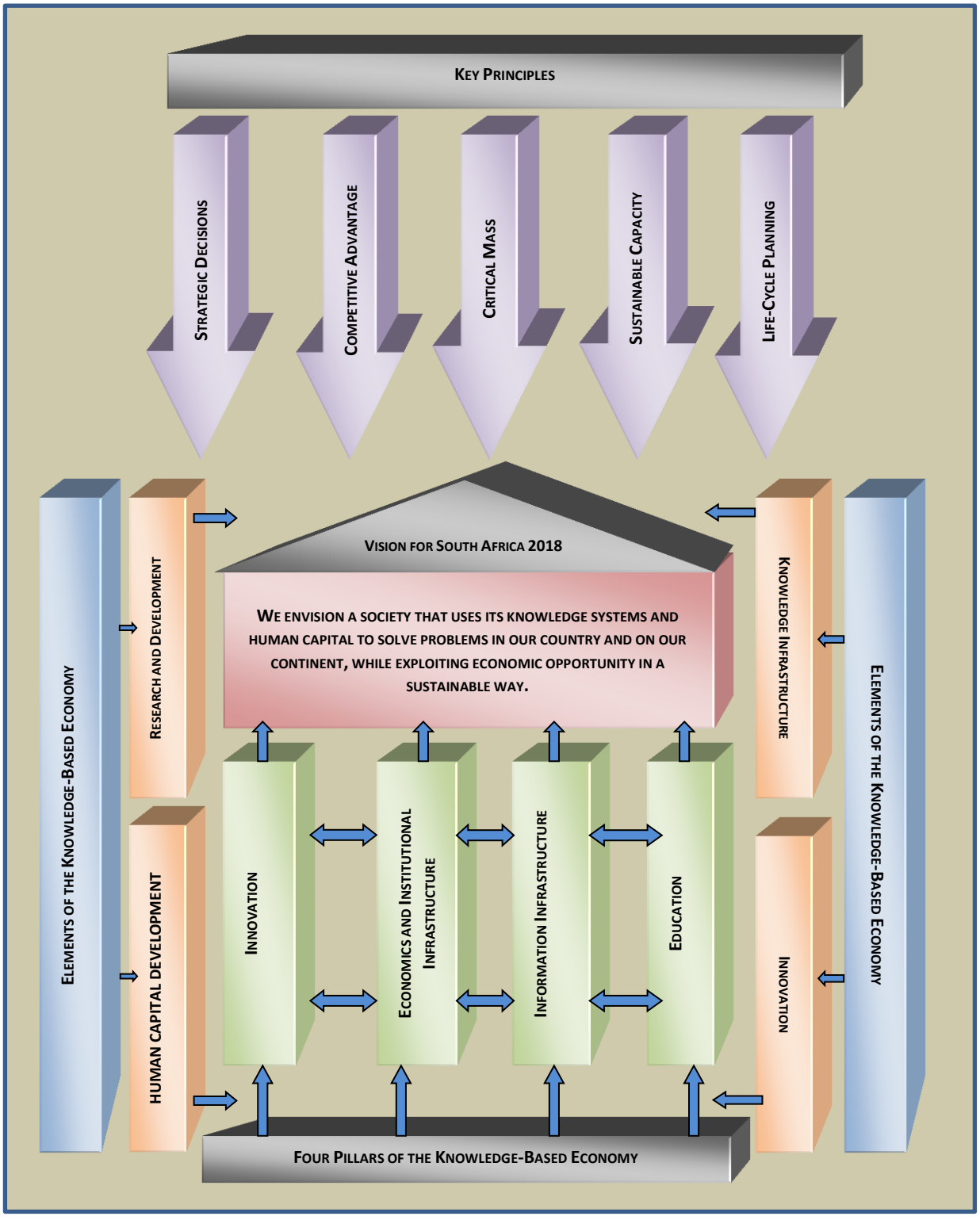
Blankley and Booyens (2010:373) state that the South African HE sector, and specifically the UoT sector, are earmarked to play a significant role in the next ten years to support the research and development gap of the country. Asmal (2009:2) believes that the UoT sector is ideally positioned to identify industry-driven research and development areas, which are linked to HC, technological infrastructure and social and economic development. The opinion of Asmal (2009:2) is supported by Case, Marshall and Grayson (2013:2), Monyooe (2013:106) and Ndlovu (2014:2043).

2.4.2.2 The 10-Year Innovation Plan for South Africa

Du Toit (2000:93) states that in order to counteract the resource-based economy perspective, South Africa's prospects for improved competitiveness and economic growth rely, to a great extent, on science and technology. The government's broad developmental mandate can ultimately be achieved only if South Africa takes concrete steps on the road to becoming a Knowledge-based Economy, in which science and technology, information and learning move to the centre of economic activity (Du Pré, 2004:2). Consequently, the Department of Science and Technology was tasked, in 2007, by the government to develop a 10-year plan for South Africa (as illustrated in Figure 2.9) to improve the country's economic growth by means of education, training and research (Kok, 2008:13).

The Department of Science and Technology (DST, 2007:13) identifies four interconnected pillars on which the Knowledge-based Economy rests, namely, innovation; economics and institutional infrastructure; information infrastructure; and education. These are depicted in Figure 2.9 below. These four pillars are supported by four key elements (i.e. human capital development, research and development, knowledge infrastructure and innovation) to achieve South Africa's 2018 Vision to develop from a resource-based economy to a Knowledge-based Economy. The Department of Science and Technology (Figure 2.9) states that increased investment in these four pillars will have an impact on South Africa's ability to respond to international challenges (DST, 2007:13).

FIGURE 2.9 THE 10-YEAR INNOVATION PLAN FOR SOUTH AFRICA: MOVING TOWARDS A KNOWLEDGE-BASED ECONOMY



Source: Department of Science of Technology (DST) (2007:13). Adapted.

The Department of Science and Technology's 10-Year Innovation Plan is supported by various authors such as Auguado and Malik (2009:204), Biseth (2009:248), Buehler, Gere, Dallavis and Haviland (2009:411), Botha (2010:209) and Du Pré, (2010:38). Bitzer and Botha (2011:176) envisage that the 10-Year Innovation Plan will assist South African organisations to address the major problem of obtaining suitably qualified employees and addressing skills shortages. This assertion by Bitzer and Botha (2011:176) is shared by Etzkowitz (2003:67) and Peters and Besley (2005:46-49).

Kruss (2008:235) explains that transformation towards a Knowledge-based Economy will necessarily shift the proportion and growth of national income derived from knowledge-based industries, the percentage of the workforce employed in knowledge-based jobs and the ratio of organisations using technology to innovate. However, South Africa has a long way to go in this regard, as reported by Mouton (2010:14), who states that, according to the World Bank's 2006 Knowledge-based Economy Index, South Africa ranked 58th out of 132 countries, down from 52nd in 1995.

The Department of Science and Technology (DST, 2007:14-17) developed various indicators and measures to guide the innovation process of South Africa towards the Knowledge-based Economy. The Indicators and Measures towards Innovation for South Africa competing in the Knowledge-based Economy are presented in Table 2.2 below. In order to meet these objectives (Table 2.2), each South African HE institution and in particular UoTs, has to contribute actively towards the national initiative by promoting innovation and meeting the challenges of the Knowledge-based Economy (DST, 2007:19).

TABLE 2.2 INDICATORS AND MEASURES TOWARD INNOVATION FOR SOUTH AFRICA COMPETING IN THE KNOWLEDGE-BASED ECONOMY

INDICATORS	MEASURES	2018
SA POSITIONED AS A KNOWLEDGE-BASED ECONOMY	ECONOMIC GROWTH ATTRIBUTABLE TO TECHNICAL PROGRESS (10% IN 2002)	30%
	NATIONAL INCOME DERIVED FROM KNOWLEDGE-BASED INDUSTRIES	>50%
	PROPORTION OF WORKFORCE EMPLOYED IN KNOWLEDGE-BASED JOBS	>50%
	PROPORTION OF FIRMS USING TECHNOLOGY TO INNOVATE	>50%
	GERD/GDP (0.87 IN 2004; SHORT TERM 2008 TARGET WAS 1%)	2%
	GLOBAL SHARE OF RESEARCH OUTPUTS (0.5% IN 2002)	1%
	HIGH- AND MEDIUM-TECH EXPORTS / SERVICES AS A PERCENTAGE OF ALL EXPORTS / SERVICES (30% IN 2002)	55%
	NUMBER OF SOUTH AFRICAN ORIGINATED US PATENTS (100 IN 2002)	250
RESEARCH AND TECHNOLOGY ENABLERS	MATRICULATES WITH UNIVERSITY EXEMPTION IN MATHEMATICS AND SCIENCE (3.4% IN 2002)	9%
	SCIENCE, ENGINEERING AND TECHNICAL STUDENTS AS PERCENTAGE OF ALL TERTIARY STUDENTS	30%
	NUMBER OF PHD GRADUATES PER YEAR (963 IN 2002)	2 200
	GROSS AVAILABILITY OF SCIENCE, ENGINEERING AND TECHNICAL GRADUATES TO THE ECONOMY (235 438 IN 2002)	450 000
	NUMBER OF FULL-TIME EQUIVALENT RESEARCHERS (WAS 8 708 IN 2002)	20 000
	TOTAL RESEARCHERS PER 1000 PEOPLE EMPLOYED	5%
HUMAN CAPITAL DEVELOPMENT	RESEARCH CHAIRS AT UNIVERSITIES AND RESEARCH INSTITUTIONS ACROSS THE COUNTRY (58 WERE IN PLACE IN 2006)	210
	NUMBER OF PHDS PRODUCES PER YEAR IN ALL SCIENCE, ENGINEERING AND TECHNICAL DISCIPLINES	6 000
	AN OPTIMAL RATIO OF TECHNICIANS TO RESEARCHERS	5:1
	GLOBAL SHARE OF RESEARCH PUBLICATIONS (2006: 0.5 PERCENT)	2.5%
	PATENT COOPERATION TREATY INTERNATIONAL APPLICATIONS ORIGINATING IN SOUTH AFRICA (2004:418)	2 100
	PATENT APPLICATIONS AT THE SOUTH AFRICAN PATENT OFFICE (2002: 4 721)	24 000

Source: Department of Science and Technology (DST) (2007:14). Adapted.

2.4.2.3 The Contribution of the Higher Education UoT Sector towards the 10-Year Innovation Plan of the Department of Science and Technology

According to The Department of Science and Technology (DST, 2007:11), HE UoTs can play a significant role in ensuring that the Ten-Year Innovation Plan is realised. All HE UoT institutions, including the DUT, should assist organisations, industries and the government to identify, achieve and monitor strategic decisions allowing South Africa to convert ideas into economic growth (Kruss, 2008:236). Secondly, the HE UoT sector can increase the competitive advantage of South Africa by identifying the need for key research activities in a critical mass to ensure the highest possible socio-economic returns (Du Pré, 2010:28). Furthermore, the HE UoT sector should emphasise sustainable capacity within the HE sector, industries and organisations to maintain the Knowledge-based Economy (DST, 2007:16). Lastly, the HE UoT sector should contribute towards the South African research and development infrastructure over the long term and become involved in research life-cycle planning (Kruss, 2008:236).

Blankley and Booyens (2010:374) explain that the contribution of South Africa's HE UoT sector is critical to assist the country to compete in the Knowledge-based Economy and to achieve the targets of the Department of Science and Technology (Table 2.2). Blankley and Booyens (2010:374-377) point out that South Africa was ranked 38th out of 50 countries in the world on the Institute for Scientific Information citations during the period 1999 to 2009, while the total researchers per thousand in the total employment for the period 2000-2008 averaged only 1.4 percent. Thus, every South African HE institution, including the UoT sector, will have to play its part in knowledge creation and increased research output for the country (Freeman and Soete, 2009:588).

Higher Education South Africa (HESA, 2009:5-9) acknowledges the need for the HE sector, in particular UoTs, to play a crucial role in addressing the skills shortages in South Africa, while contributing to the Knowledge-based Economy. According to HESA (2009:5-9), the function of a UoT "is above all, to be the organ of that fine adjustment between real life and the growing knowledge of life, an adjustment which forms the secret of civilisation and allows previously disadvantaged population groups access to Higher Education". Higher Education South Africa (HESA, 2014:3) reports that South Africa has 23 public HE Institutions and, in 2012, a total of 953 373 students were enrolled of which 273 282 were studying towards Science, Engineering and Technology and 282 299 pursued studies in the fields of Business and Management (Annexure E).

From the data in Annexure E, it is also evident that eleven of these HE institutions are generally regarded as Traditional Universities, six as Universities of Technology (formerly known as Technikons) and six as Comprehensive Universities (established as a result of mergers between traditional universities and former Technikons). Two new public universities, Sol Plaatje University in the Northern Cape Province and the University of Mpumalanga in the Mpumalanga Province were established as legal entities in 2013 to provide further access to students for HE, in the wake of the South African Knowledge-based Economy (DHET, 2014:5). Annexure F shows the graduation rate by major field of study per institution in 2012, which emphasises the fields of Science, Engineering and Technology and Business and Management. These various study fields offered by HE institutions in South Africa further emphasise the importance of the HE sector to educate, prepare and equip graduates to contribute towards the South African Knowledge-based Economy.

Various authors highlight the unique market position that UoTs fulfil. According to Jordaan and Wiese (2010:540), UoTs deliver a very unique function in the HE sector, which is based on combining theoretical knowledge and practical

application. Engelbrecht, Mafumo and Waghid (2009:221) are of the opinion that UoTs aim to meet the learning needs and aspirations of individuals through the development of their intellectual abilities and aptitudes throughout their lives. Huidor and Cooper (2010:148) state that UoTs address the development needs of society and provide the labour market, in a knowledge-driven and knowledge-dependent society, with the ever changing high-level competencies and expertise necessary for the growth and prosperity of a modern economy. Jordaan and Wiese (2010:540) add that UoTs contribute to the socialisation of enlightened, responsible and constructively critical citizens and should participate in the creation, sharing and evaluation of knowledge.

Letsaka and Maile (2008:2) state that knowledge in the HE UoT sector is obtained by research interactions with internal and external stakeholders. Blankley and Booyens (2010:374) add that since 2006 knowledge creation has received greater emphasis in HE UoTs, as the South African Government is expecting UoTs to contribute actively towards the Knowledge-based Economy. Bunting and Cloete (2004:11) note that academics in the UoT sector are now expected to obtain higher qualifications to equip them to develop and transfer knowledge more efficiently and effectively. The challenge in the UoT sector is that these institutions are still perceived as primarily undergraduate HE institutions and a post-graduate research culture has not yet been fully embraced and fostered by all employees (Crous, 2004:399; Abel and Deitz, 2011:2; Wilson-Strydom and Fongwa, 2012:11). Hence, the importance and values associated with instilling a research ethos to sustain KM necessitates a buy in by all DUT employees for the future survival of the HE UoT sector in South Africa.

Engelbrecht, *et al.* (2009:220) state that in view of the envisaged goals for the HE sector, the South African HE UoT sector has to rethink the manner in which these institutions have been contributing towards the South African Knowledge-based Economy. According to Bitzer and Botha (2011:145), the emphasis for the UoT sector has shifted towards ensuring that graduates achieve a set of knowledge and skills aimed towards creating, managing, recording, transferring and maintaining knowledge resources in the view of the ever-changing economic environment. The assertion of Bitzer and Botha (2011:145) is supported by Gere, Buehler, Dallavis and Haviland (2009:840) and Huidor and Cooper (2010:146). Higher Education UoTs, and in particular the DUT, have to ensure that in order to focus on the needs of South Africa, UoTs have to function as knowledge-based institutions integrating tacit, explicit and embedded knowledge, while embracing the challenges and opportunities of the Knowledge-based Economy (Frick and Frick, 2010:123). The DUT can make significant contributions towards the South African Knowledge-based Economy and should incorporate KM as an integral part of the institution's strategic intent, policy development and objectives (James, Ralfe, Van Laren and Ngcobo, 2006:686).

2.5 KNOWLEDGE MANAGEMENT

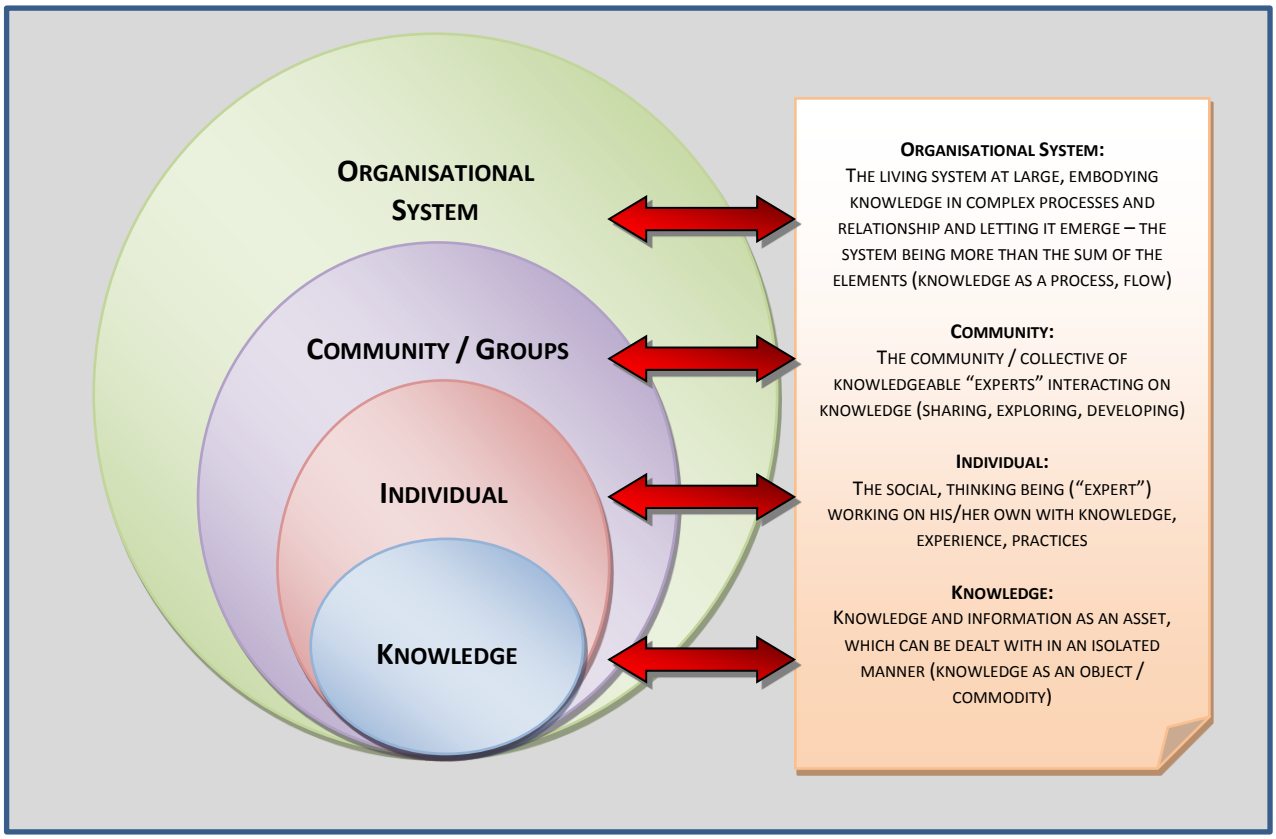
This section relates to KM in the HE sector in terms of the conceptual clarification, including the history of KM and the stages of implementing KM in the HE UoT sector. This is followed by a review of KM models, enablers and drivers that contribute towards managing knowledge in the HE UoT sector with specific reference to the DUT.

2.5.1 The Conceptual Clarification of Knowledge Management

Knowledge Management (KM) is a concept that was developed in the 1990s when Davenport (1994:14) stressed that: “knowledge management is the process of capturing, distributing and effectively using knowledge”. This definition has the virtue of being uncomplicated, simple and concise. In 1998, the Gartner Group created a second definition of KM, which is perhaps the most frequently cited one, and which states “Knowledge management is a discipline that promotes an integrated approac h to identifying, capturing, evaluating, retrieving and sharing all of an enterprise’s information assets. These assets may include databases, documents, policies, procedures and previously un-captured expertise and experience of individual workers” (Duhon, 1998:9).

According to James (2012:1), KM involves the management of all the organisational processes and functions, such as human resources, finance, operations, information technology, communications and planning that can have an impact on the leverage of different sources of knowledge to respond to customer needs. The opinion of James (2012:1) is shared by Pavan (2013:27), who states that the literature presents numerous examples of expanding the conceptual clarification of KM as illustrated in Figure 2.10 and the concept has been extended to include individual and organisational learning; the development of individual and organisational competencies; and the mapping, codification and sharing of organisational information. The expansion of the conceptual clarification of KM is depicted in Figure 2.10 below.

FIGURE 2.10 THE EXPANSION OF THE CONCEPTUAL CLARIFICATION OF KNOWLEDGE MANAGEMENT



Source: Pavan, A. (2013:26-27). Adapted.

The development of the concept of KM has resulted in the needs of organisations shifting from knowledge creation to an integrated systems approach combining all knowledge resources (Jordaan and Wiese, 2010:541). Therefore, the HE UoT sector is expected to respond to these changing organisational needs to equip South African graduates in adapting to the challenges of the Knowledge-based Economy (Du Pré, 2010:27). According to Bitzer and Botha (2011:143), HE UoTs, into which category the DUT falls, have to move from predominantly collegially networked institutions towards the creation of a shared, extensive, global knowledge base in order to meet the national and international challenges of South African organisations. Various

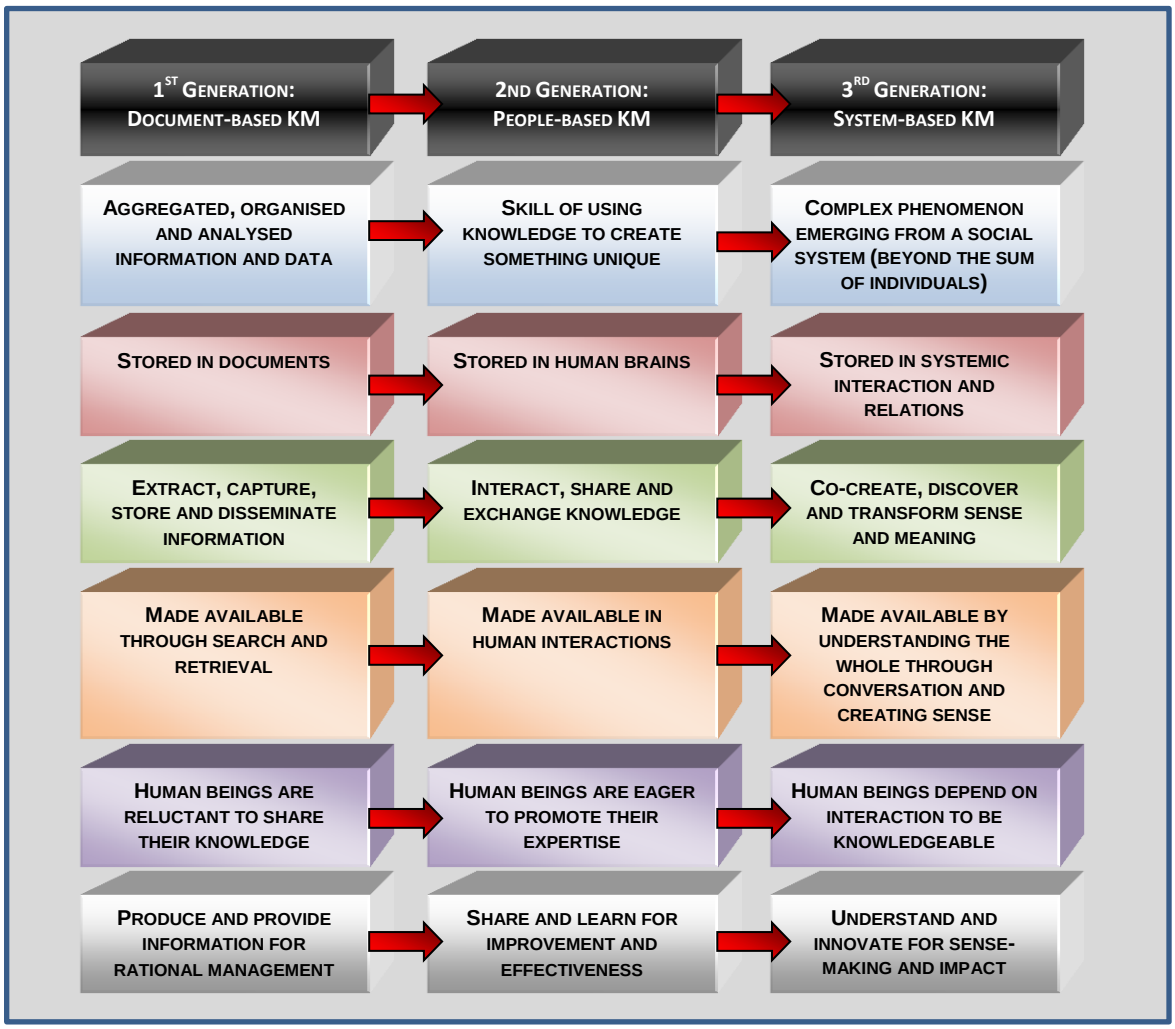
perspectives of KM have been explored and it becomes evident that KM requires constant revision, adaptation and expansion due to the changes experienced in the Knowledge-based Economy. Consequently, the DUT has to become more pro-active with regard to managing KM to enable the institution to become responsive to the evolving South African Knowledge-based Economy (Bitzer and Botha, 2011:103).

2.5.2 Perspectives of Knowledge Management

Although the conceptual clarification of KM is restricted to the 1990s, the development of the concept dates back to the 1970s. Baskerville and Dulipovici (2006:87) refer to Everett Rogers' work in the late 1970s that contributed to the understanding of how knowledge is produced, used, and disseminated within organisations. According to Liebowitz (2009:13), by the mid-1980s, the importance of knowledge as a competitive asset was apparent, even though most organisations still lacked strategies and methods for managing it.

McLellan (2008:133) reports that during the 1980s, the phrase 'Knowledge Management' entered the lexicon in earnest. The recognition of the growing importance of organisational knowledge was accompanied by concerns over how to deal with exponential increases in the amount of available knowledge and increasingly complex products and processes (Antonioli, Mazzanti and Paolo, 2011:67-70). Wessels, Grobbelaar and McGee (2003:75-90) state that the 1980s also saw the development of systems for managing knowledge that relied on work done in artificial intelligence and expert systems. Ting and Lean (2009:592) add that during this era, concepts such as knowledge acquisition, knowledge engineering, knowledge-based systems and knowledge management systems were developed to assist organisations in deepening the understandings of KM and its commensurate challenges. Since 2004, the concept of KM has evolved to include tacit, explicit, embedded knowledge, information technology, organisational management and human resources (Hoetzlein, 2007:34).

FIGURE 2.11 THE THREE GENERATIONS OF KNOWLEDGE MANAGEMENT



Source: Pettersson, U. (2009:1736-1741). Adapted.

Experts in academia have distinguished amongst three generations of KM as depicted in Figure 2.11 above (Allee, 2009:25). The First Generation of KM is described as the documents-based stage and entails how employees access and control information in an organisation (Fitz-enz, 2010:102). The Second Generation of KM focuses on people-based interventions and the role that the organisation plays in enabling its employees to learn how to access, process,

store and retrieve information to contribute towards the Knowledge-based Economy (Itami, Kusunoki and Numagami, 2010:11-13). The Second Generations of KM (Figure 2.11) gave rise to the terms knowledge organisation and learning organisation in the context of KM and emphasises the importance of HC as an enabler for KM in the Knowledge-based Economy (Guthrie and Lee, 2010:14). The importance of combining the First and the Second Generation of KM is supported by Allee (2009:25-29), Du Pré (2009:14) and Hislop (2013:12-17). The Third Generation of KM is described as the systems-based period of KM, which emphasises the integration between knowledge documents and sources, employees and organisational systems (Storey and Kahn, 2010:399). Guthrie and Lee (2010:17) emphasise that the three generations of KM should not be viewed as separate stages, since different organisations will experience interrelated and distinct periods during the organisation's existence.

Three generations of KM (Figure 2.11) have placed more emphasis on South African HE UoTs to become more responsive to the evolving KM needs of organisations and customers (Rajender and Kumar, 2012:3). Figure 2.11 depicts the importance of balancing documents, people and systems to ensure that the HE UoT sector moves from developing and managing knowledge in an isolated approach towards an integrated, customer-centred KM approach (Pettersson, 2009:1738). The DUT acknowledges the importance of information systems to enhance education and service delivery (DUT Annual Report, 2014:5). However, it is contended by the researcher that the DUT has not yet managed to achieve a balance between information systems, people and the recording and management of documents that allows the institution to embrace the challenges of the Knowledge-based Economy.

2.5.3 The Stages in Developing Knowledge Management in the Higher Education UoT Sector

Evans (2003:72-75) presents five stages in developing KM in the HE UoT sector, as highlighted in Table 2.3 below, and states that a HE UoT should become knowledge-centric. The view of Evans (2003:72-75) is shared by various researchers such as Singh and Kant (2008:143), Onyancha and Ocholla (2009:3), Pettersson (2009:1738) and Milovanović (2011:35-36). The knowledge-centric stage (Table 2.3) entails integrating KM into the institution's mission and culture, while realising that the value of knowledge is regarded as an integral part of the institution's market capitalisation (Russ, 2010:14-15).

TABLE 2.3 STAGES IN DEVELOPING KNOWLEDGE MANAGEMENT

STAGE	DESCRIPTION	CHARACTERISTICS
1	KNOWLEDGE-CHAOTIC	• UNAWARE OF THE CONCEPT • NO INFORMATION PROCESSES • NO INFORMATION SHARING
2	KNOWLEDGE-AWARENESS	• AWARENESS OF KM NEEDS • SOME KM PROCESSES • TECHNOLOGY IN PLACE TO SUPPORT KM • SHARING INFORMATION IS ENCOURAGED
3	KNOWLEDGE-ENABLED	• BENEFITS OF KM IS CLEAR • STANDARDS ARE ADOPTED • ISSUES RELATING TO CULTURE AND TECHNOLOGY ARE EMPHASISED
4	KNOWLEDGE-MANAGED	• INTEGRATED FRAMEWORKS • BENEFIT OF KM IS REALISED • ISSUES / CHALLENGES IN THE PREVIOUS STAGE ARE OVERCOME
5	KNOWLEDGE-CENTRIC	• KM PART OF THE MISSION • KNOWLEDGE-VALUE RECOGNISED IN MARKET CAPITALISATION • KM INTEGRATED INTO CULTURE

Source: Evans, C.H. (2003:72-75). Adapted.

However, various South African authors warn that HE UoTs are not yet emphasising the knowledge-centric stage (Table 2.3) in the development of KM, since the focus varies between the knowledge-awareness and knowledge enabled stages (Botha, 2001:276; April, Bosma and Deglon, 2003:168; Altbach,

2004:14; Botha, Kourie and Snyman, 2008:14-16). HE UoTs need to become dependent on the tacit and explicit knowledge of its employees in order to grow and survive in a dynamic Knowledge-based Economy and to achieve a knowledge-centric phase (Du Toit, 2000:190). Singh and Kant (2008:143) add that HE UoTs and their employees need to recognise and respond to the changing role of HE UoTs in society. Botha, Kourie and Snyman (2008:15) argue that although HE institutions are quick to include KM buzz words into the mission and strategic intent of the institution, in order to achieve a truly knowledge-centric stage, the institution needs to ensure that KM is embraced by the employees of the institution as well.

The researcher acknowledges that at the DUT a knowledge-awareness and knowledge-enabled phase will not be easily embraced by the institution to respond proactively to the immediate challenges of the Knowledge-based Economy. The transition for the DUT to move towards the knowledge-centric development stage as depicted in Table 2.3 will entail revisiting best practices with regard to KM models focusing on the HE UoT sector to initially become more responsive and thereafter adapt to the needs of a Knowledge-based Economy.

2.5.4 An Overview of Knowledge Management Models applicable to the Higher Education Sector

The literature reviewed reveals a variety of KM models to allow a practical perspective on the planning, implementation and evaluation of KM in a variety of organisations (Bennet, 2004:11; Chong, 2006:249; Pettersson, 2009:1740). According to Finestone and Snyman (2005:134), when reviewing the various KM models, it becomes evident that the models provide certain underlying principles, which allow organisations to organise the different activities and functions, that are needed both inside and outside the organisation to implement KM. The observation made by Finestone and Snyman (2005:134) is

supported by Cranfield and Taylor (2008:91), Botha (2010:204) and Pasher and Ronen (2011:34-35).

According to Altaher (2010:267), the epistemological approach to which a researcher prescribes influences the manner in which a KM model is developed. Sifuna (2010:421) makes a distinction between three epistemologies that may guide research with regard to knowledge, namely, the cognitivist approach, the connectionist approach and the autopoietic approach. Altaher (2010:268) refers to Herbert A. Simon's (1982:63-69) work on cognitive psychology and artificial intelligence, which is generally regarded as the cornerstones of the cognitivist approach to KM. Shakir (2009:312) explains that this approach to KM assumes that organisations are open systems, which develop knowledge by formulating representations of the external environment. The cognitivist approach proposes that the more data and information organisations can gather, the closer the representation will be between the internal and external environment with regard to developing a KM model (Auguado and Malik, 2009:206).

The connectionist approach, developed by Zander and Kogut (1995:76-92), regards information processing as the basic activity of the organisation (Leydesdorff and Fritsch, 2006:1543). According to the connectionist epistemology, the organisation still represents the external environment, but the process of representation of reality is different (Mazutis and Slawinski, 2008:442). Slonimsky and Shalem (2005:84-85) suggest that this approach emphasises the importance of the organisation being regarded "as a social community specialising in the speed and efficiency in the creation and transfer of knowledge". Abduli (2013:2233) adds that the work of Zander and Kogut (1995:76-92) became the building blocks of "the knowledge-based view of organisational strategy" in that the researchers emphasised the strategic importance of knowledge as a source of competitive advantage to an organisation. The connectionist approach espouses that knowledge is held by

individuals and is also embedded in the organisational principles by which employees cooperate and function within the organisation (Holsapple and Luo, 1996:18-19). McLellan (2008:139-140) notes that in this approach the ability of the organisation to innovate, replicate, document and transfer knowledge determines the organisation's rate of growth and deters imitations by competitors.

Muhamad (2009:23-25) explains that autopoiesis is embedded in the tradition of the systems theory that postulates that an entity consists of both an open and closed system. Hernes (2008:34) states that an autopoietic system is a unity whose organisation is defined by "a particular network of production processes of elements, not by the components themselves or their static relations". According to Bui and Baruch (2010:220), the autopoietic approach is often regarded as limited in its application to reality. The autopoietic approach to KM emphasises that communication is the enabler to create and transfer knowledge within social networks or groups within the organisation (Moshe and Morris, 1996:25).

Since the 1990s, the application of the three epistemologies of KM, which are described above, has also been transferred to the HE sector to direct research in this environment when developing and implementing KM models in the wake of the Knowledge-based Economy (Bui and Baruch, 2010:220; Steiner-Khamsi and Waldow, 2012:34-37). Against the backdrop of the three epistemologies of KM described above, various researchers have recommended that when HE institutions select a KM model for implementation, three distinct characteristics should be considered. Firstly, the KM models are able to realise a complete approach to KM and takes into account people, processes, the institution as a whole and technological dimensions (Winston and Poh, 2005:335; Acemoglu, 2010:19-20; Campbell and Henning, 2010:181; Abel and Deitz, 2012:681). Secondly, the selected KM models should be aligned to the vision of the HE sector (Du Plessis and Boon, 2004:78; Tomlinson, 2010:4). Thirdly, all the KM

models should be implemented and tested by researchers regarding the reliability and validity thereof in the HE sector (Freeman and Soete, 2009:586). The KM models selected by the researcher incorporated these recommended characteristics. Table 2.4 below summarises the selected KM models, which are contextualised within the HE UoT sector. In Table 2.4, a further distinction is also made between the descriptive and prescriptive nature of the selected KM models. Scott (2010:4) explains that the descriptive models try to characterise the nature of KM experiences in organisations, whereas prescriptive models present methodologies to follow in conducting KM.

TABLE 2.4 SUMMARY OF THE SELECTED KNOWLEDGE MANAGEMENT MODELS BY VARIOUS AUTHORS

RESEARCHER(S)	MODEL	KNOWLEDGE MANAGEMENT APPROACH	CATEGORY
VON KROGH AND ROOS (DEVELOPED 1995)	MODEL OF ORGANISATIONAL EPISTEMOLOGY	COGNITIVIST APPROACH	PRESCRIPTIVE
NONAKA AND TAKEUCHI (DEVELOPED 1995)	SECI MODEL	COMBINATION BETWEEN CONNECTIONIST APPROACH AND AUTOPOEITIC APPROACH	PRESCRIPTIVE
CHOO (DEVELOPED 1998)	SENSE-MAKING KNOWLEDGE MANAGEMENT MODEL	CONNECTIONIST APPROACH	DESCRIPTIVE
WIIG (DEVELOPED 1993)	KNOWLEDGE MANAGEMENT MODEL	COMBINATION BETWEEN COGNITIVIST APPROACH AND AUTOPOEITIC APPROACH	DESCRIPTIVE

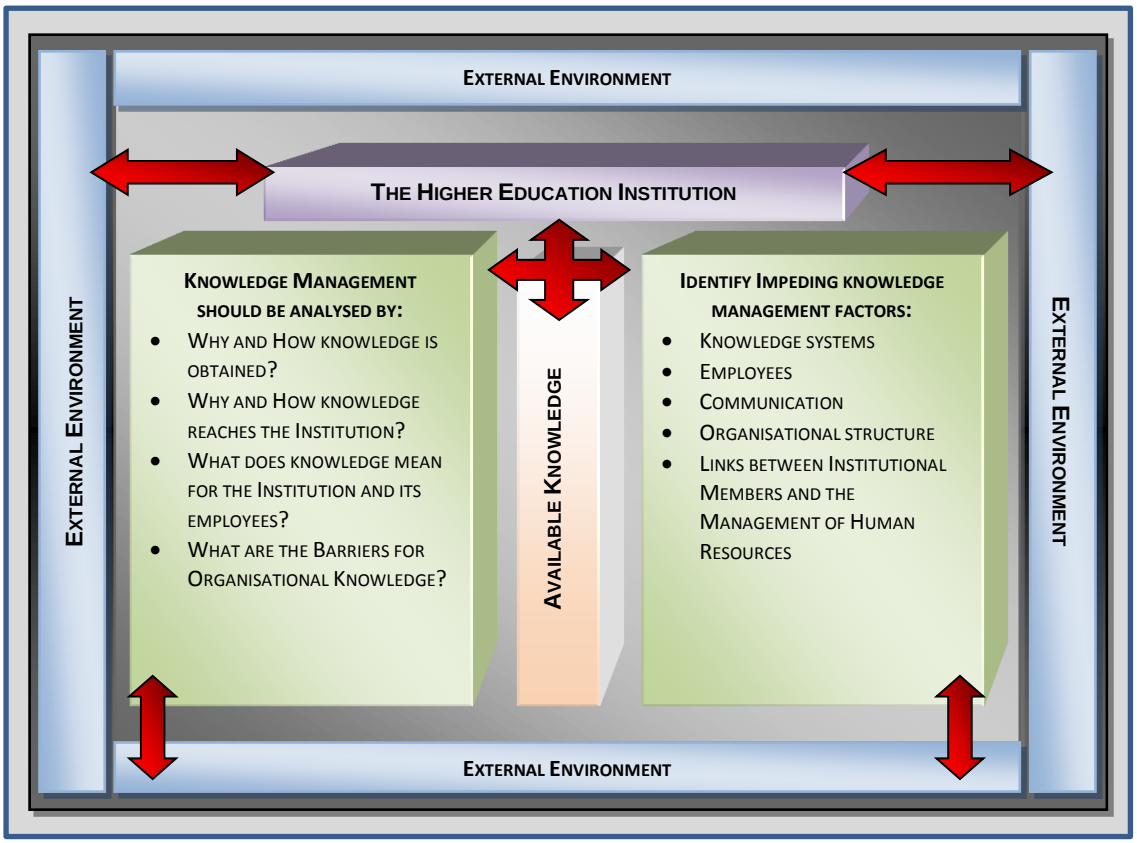
Source: Self-generated citing the researchers and their KM models.

2.5.4.1 The Knowledge Management Model of Von Krogh and Roos

Von Krogh and Roos' Model of Organisational Epistemology as depicted in Figure 2.12 is the first documented model that distinguished between individual knowledge and social knowledge in the context of KM (Pettersson, 2009:1740).

Von Krogh and Roos adopt the cognitivist approach to their Model of Organisational Epistemology (Figure 2.12), since they believe that knowledge resides both in the individuals employed in the institution and within the institution as an entity (Leydesdorff and Fritsch, 2006:1543; Dalkir, 2013:115). According to Barnes and Milton (2015:71), the model regards organisational knowledge as a system with self-organisation characteristics, where the information coming from the external environment is apparent to the employees.

FIGURE 2.12 VON KROGH AND ROOS' MODEL OF ORGANISATIONAL EPISTEMOLOGY



Source: Cristea, D.S. and Căpatînă, A. (2009:356). Adapted.

Bennet and Bennet (2014:15) explain that based on Von Krogh and Roos' model, the HE institution gathers information from its environment (both internal and external) and presents this information to employees to use in problem solving and decision-making. The explanation offered by Bennet and Bennet

(2014:15) is supported by Bauer and Erdogan (2010:87-88), Stankosky (2011:109) and Steiner-Khamsi and Waldow (2012:124). Saint-Onge and Armstrong (2004:28) conclude that the Von Krogh and Roos' model as shown in Figure 2.12 emphasises that knowledge is a system in which people use information created by the internal and external institutional environments to create logical results.

According to Wheatley (2006:86), Von Krogh and Roos identify four aspects in the Model of Organisational Epistemology (Figure 2.12) that HE institutions should explore when introducing and managing KM in the Knowledge-based Economy. Firstly, the model (Figure 2.12) indicates that a HE institution should determine why and how knowledge is obtained by the employees of the institution (Tomlinson, 2010:15). The second aspect that Von Krogh and Roos' Model of Organisational Epistemology (Figure 2.12) emphasise is why and how knowledge reaches the HE institution (Tan and Rao, 2013:93). Strohmeier (2007:23) reports that, for centuries, knowledge was regarded as the cornerstone of the HE sector. According to Stumpf (2010:3), this focus point has also become the foundation of the South African HE UoT sector. The importance of knowledge is emphasised in the DUT strategic objectives (DUT Annual Report, 2014:3). In the HE UoT sector, knowledge reaches institutions in a number of ways, such as exchange programmes between national and international institutions, research publications, government legislation and partnerships with external stakeholders (Strohmeier, 2007:23). In the case of the DUT, the institution has established partnerships both at a national and international level to facilitate knowledge sharing (DUT Annual Report, 2014:11-12).

Sousa and Van Dierendonck (2010:233) refer to the third aspect of Von Krogh and Roos' Model (Figure 2.12), namely, what is the meaning of knowledge for the HE institution and its employees? Various South African researchers regard this aspect of the Model (Figure 2.12) as the most challenging one to explore,

since it involves subjective perceptions of both employees and management at HE UoT institutions (Snyman and Kruger, 2004:11; Slonimsky and Shalem, 2005:90; Mostert and Snyman, 2007:109). Cloete, Bailey, Pillay, Bunting and Maassen (2011:13) state that, in the UoT sector, the challenges associated with mergers are often regarded as more important by the institution's employees and management, than the value of knowledge *per se*.

The observation of Cloete, *et al.* (2011:13) also relate to the fourth aspect of Von Krogh and Roos' Model (Figure 2.12), namely to determine the barriers for organisational KM that an HE institution can encounter. Various barriers have been identified by researchers, such as institutional communication (Wheatley, 2006:26), leadership styles (Saint-Onge and Armstrong, 2004:19), institutional culture (Chang and Hsieh, 2011:3), insufficient information technology (Mouton, 2010:2) and resistance to change (Bui and Baruch, 2010:219). In the South African HE UoT sector, mergers have brought about various additional barriers to KM, such as multi-campus management, insufficient resources, challenges with staff retention and inconsistent executive leadership (Abrahams, Burke, Gray and Rens, 2008:4; Kruger and Johnson, 2011:268).

Von Krogh and Roos' Model (Figure 2.12) also identifies five factors that can affect the proper application of knowledge systems in a HE UoT institution, namely, employees, communication, organisational structure, links between organisational members and the management of human resources (Abel and Deitz, 2012:668). Altaher (2010:268) explains that these five factors could impede the successful management of KM. King, Kruger and Pretorius (2007:296) note that the factors identified by Von Krogh and Roos (Figure 2.12) could also hinder the HE UoT institution's innovation efforts, competitive advantage and other institutional goals. For example, if individuals do not perceive knowledge to be a crucial competence of the institution, then the institution will have trouble developing knowledge-based competencies amongst its employees (Altbach, 2004:9). These constraints can be addressed

if HE UoTs put knowledge enablers in place that will stimulate the development of individual knowledge, group sharing of knowledge and promote the organisational retention of valuable knowledge-based content (Kok, 2007:2; Amaral, 2008:88).

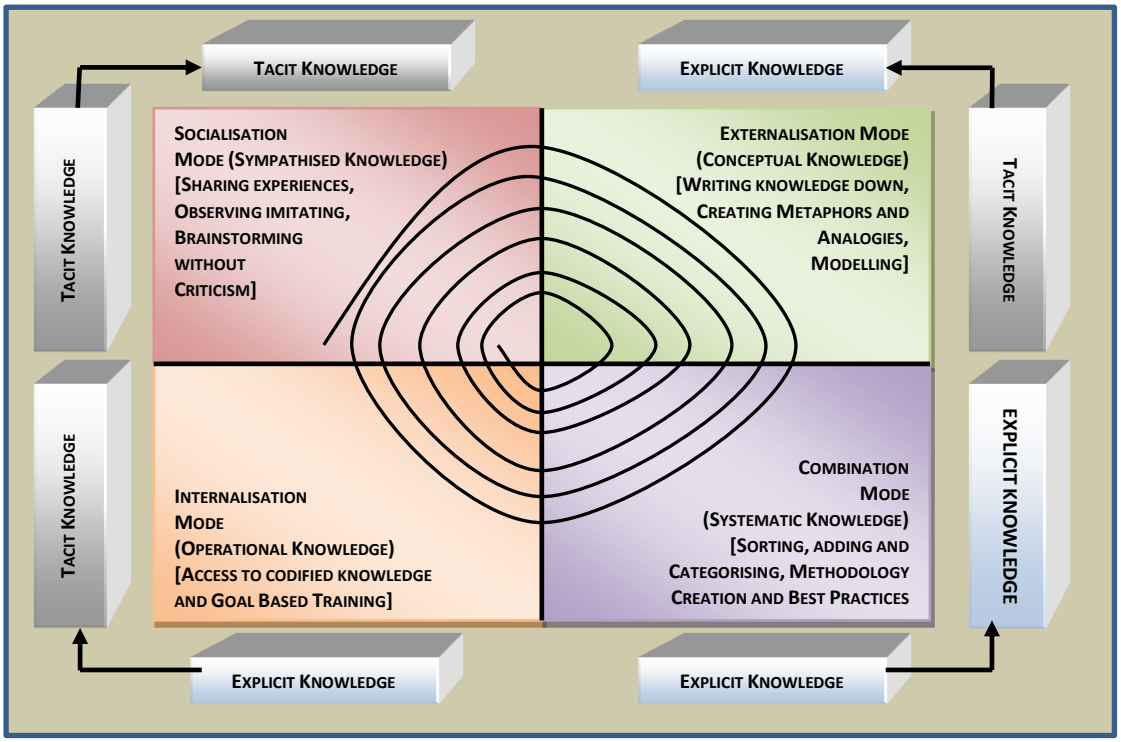
2.5.4.2 The Seci Model of Nonaka and Takeuchi

Nonaka and Takeuchi (1995) conducted research in Japanese companies and their findings revealed that organisational success was dependent upon knowledge creation, which was often most successfully accomplished by means of socialisation in the workplace (Nkambule, 2014:1999). Moffet and McAdam (2006:228) note that knowledge creation is about "continuous transfer, combination and conversion of the different types of knowledge, as users practice, interact and learn". According to Nonaka and Takeuchi (1995:45), knowledge creation can either be tacit or explicit and takes place between individuals or groups of individuals. Wilson (2002:144) states that Nonaka and Takeuchi perceived continuous knowledge creation to be the source of constant innovation, which enabled a sustained competitive advantage for an organisation in a Knowledge-based Economy. Milovanović (2011:34) states that Nonaka and Takeuchi combined the connectionist and autopoietic approaches to KM and placed emphasis on the creative interaction of explicit and tacit knowledge as a social process within the organisation.

Moffet and McAdam (2006:228) further identify the need to distinguish between knowledge and knowing and suggest that knowledge creation is a product of the interplay between them. Pan and Leidner (2003:77) regard the shift between the possession of knowledge and the act of knowing as the driving force in knowledge creation. Hall and Andriani (2003:148) affirm that knowledge sharing and knowledge creation are linked, since knowledge is created through practice, collaboration, interaction and education. Guthrie and

Lee (2010:13) state that knowledge creation is supported by relevant information and data, which can improve decisions and serve as building blocks in the creation of new knowledge. Nonaka and Takeuchi (1995:66) identify the four modes of knowledge conversion as organisational knowledge activities, namely, (1) the Socialisation Mode; (2) the Externalisation Mode; (3) the Combination Mode; and (4) the Internalisation Mode as depicted in Figure 2.13 below and which is known as the SECI model (Rice and Rice, 2005:677).

FIGURE 2.13 THE SECI MODEL OF NONAKA AND TAKEUCHI



Source: Nonaka, I. & Takeuchi, H. (1995:66). Adapted.

During the Socialisation Mode of knowledge conversion (Figure 2.13), employees in a HE UoT share experiences and thereby create a common tacit knowledge such as perspectives, beliefs and viewpoints (Acemoglu and Robinson, 2013:178). Ahn and Chang (2004:409) add that the Socialisation Mode is also referred to as sympathised knowledge, since employees often obtain knowledge by informally engaging with colleagues. Biseth (2009:249)

explains that informal activities promote common understanding and build mutual trust in the HE institution. The Socialisation Mode (Figure 2.13) can also be associated with transferring tacit knowledge relating to technical skills by means of observation, imitation, experimentation and joint execution in an institution (Storey and Kahn, 2010:400). Roche (2013:78) highlights that the Socialisation Mode (Figure 2.13) encourages open channels of communication and co-operation amongst employees in a UoT context.

During the Externalisation Mode of the SECI model (Figure 2.13), tacit knowledge is converted into explicit knowledge and employees in the HE UoT are able to articulate their knowledge and know-how (Biseth, 2009:250). Amaral, Fulton and Larsen (2003:281) describe this mode as conceptual knowledge and add that once externalised, knowledge is tangible and permanent for all employees to use at the UoT. Externalisation allows for knowledge that can be shared more easily with others and leveraged throughout the institution (Chong, 2006:247). According to Roche (2013:79), the institution should archive, update and be able to retrieve information, as and when required, in order to enable employees, groups and departments to function effectively in the Knowledge-based Economy. Ahonen (2009:120) concludes that this mode encourages innovation and creative thinking and an HE environment should be created in a manner where employees are encouraged to participate in developing new concepts, ideas and improve on existing processes and procedures. In the case of the DUT, employees express concerns that they are inundated with day-to-day tasks and often do not regard participation in new projects as a necessity, since it entails little recognition or reward (Chetty and Wallis, 2009:4).

Roche (2013:80) describes the Combination Mode of the SECI model (Figure 2.13) as a process of assembling existing explicit knowledge held by individuals in the HE institution into a knowledge system often referred to as systematic

knowledge. Mosco and McKercher (2007:91) explain that during this mode, no new knowledge is created *per se*, but a new combination or representation of existing knowledge is presented by means of using information technology such as databases. The Combination Mode (Figure 2.13) is also a process of exchanging, sorting, adding and disseminating explicit knowledge amongst the employees of the institution (Andreeva, 2009:464). Antoinetti and Antonioli (2011:91) regard the Combination Mode as a starting point for research on the formal and informal knowledge deposits of a UoT. At the DUT, a concerted effort has been made to develop systematic knowledge regarding processes and procedures (Du Pré, 2009:3).

The Internalisation Mode of the SECI Model (Figure 2.13) includes the process of transferring explicit knowledge relating to know-how and technical skills into tacit knowledge (Olssen and Peters, 2005:312). Antoinetti and Antonioli (2011:92) state that during this mode, employees in the UoT can refer to recorded manuals and documentation, which will become their reference point to address and solve problems. Gere, *et al.* (2009:840) emphasise the importance of training and development during internalisation, since it equips employees with new knowledge which they can convert and apply in the context of their jobs and the institution. Kane, *et al.* (2004:299) argue that if the Internalisation Mode (Figure 2.13) is managed effectively, it can enable employees in a HE institution, like the DUT, to buy into the positive changes associated with incorporating new knowledge into their jobs.

Andreeva (2009:464) reports that the applicability of the SECI model (Figure 2.13), in the context of the HE sector, has been linked to culture, both institutional and national. Research findings by Fey and Denison (2003:698), Ang and Massingham (2007:17) and King (2007:230) revealed that culture should not merely be regarded as an element in KM models, but may act as a limiting factor at HE institutions. Therefore, King (2007:230) warns that management should take precautionary steps to minimise the negative impact

that institutional culture may have on the implementation of KM within HE UoTs, especially in view of post mergers.

Furthermore, Moleke (2005:67) explains that an understanding of the different forms of knowledge conversion provides a critical interpretation of how both tacit and explicit knowledge interact within UoTs. Roche (2013:78) adds that although the SECI model (Figure 2.13) does not explain all the stages involved in managing knowledge, it allows UoTs, like the DUT, to reflect on their practices to ensure that all forms of knowledge conversion are being adequately supported and developed. The organisational conditions and managerial tools required at each stage of the SECI model is depicted in Table 2.5 below, which shows how UoTs can leverage this as a best practice guideline. Andreeva (2009:464) contends that at HE institutions where the conditions and tools presented in Table 2.5 below are not fully incorporated, the institution will find it challenging to manage knowledge.

TABLE 2.5 CONDITIONS AND TOOLS FOR THE SECI STAGES

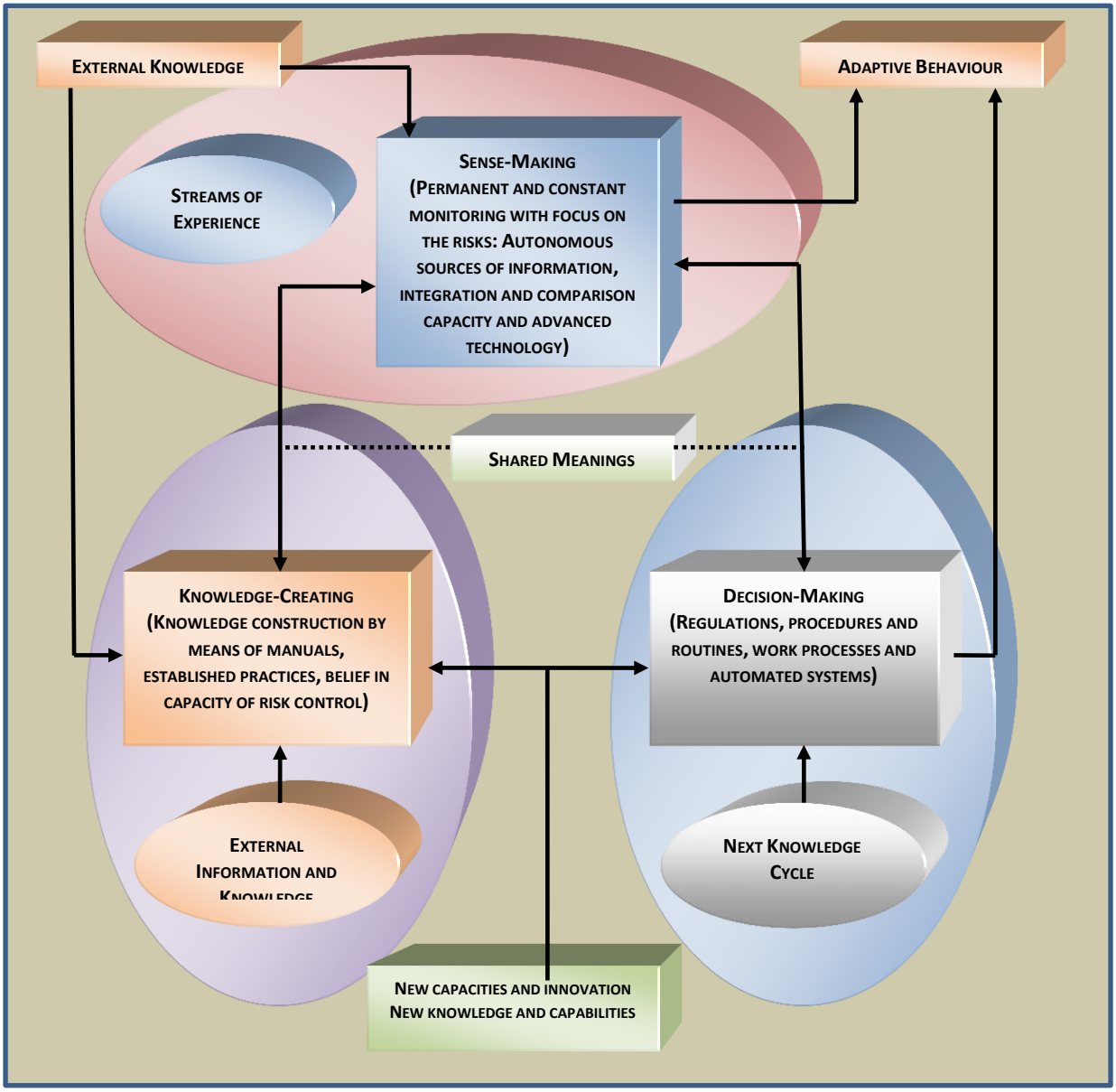
STAGE OF SECI	SOCIAL / ORGANISATIONAL CONDITIONS	MANAGERIAL TOOLS
SOCIALISATION	• INDIVIDUALS ARE WILLING TO SHARE KNOWLEDGE BOTH INTERNALLY AND EXTERNALLY • HIGH LEVEL OF EMPLOYEE COMMITMENT AND LOYALTY • CO-OPERATION BETWEEN EMPLOYEES (RATHER THAN COMPETITION)	• JOB DESIGN ALLOWS SHARING OF EXPERIENCES, OBSERVATION AND IMITATION • MENTORING • COACHING
EXTERNALISATION	• HIGH GROUP COMMITMENT • LITTLE EXTERNAL CONTROL	• WIDE USAGE OF METAPHORS, ANALOGIES, MODELS AND SPECIFIC TERMINOLOGY IN EXPLANATIONS • OPEN DIALOGUE OF EMPLOYEES WITH EACH OTHER AND MANAGERS • COMMUNITIES OF PRACTICE
COMBINATION	• NO INTER-DEPARTMENTAL RIVALRY • HIGH LEVELS OF EMPLOYEE COMMITMENT	• PURPOSEFUL OVERLAP OF FUNCTIONAL RESPONSIBILITIES (REDUNDANCY) • FREE ACCESS TO CORPORATE INFORMATION • CONSULTATIVE DECISION-MAKING
INTERNALISATION	• LITTLE FEAR OF MISTAKES	• POLICIES THAT ALLOW INTENSIVE / FREQUENT LEARNING AND DOING • ROTATION BETWEEN FUNCTIONS • GENERALISED JOB DESCRIPTIONS

Source: Andreeva, T. (2009:464). Adapted.

2.5.4.3 Choo's Sense-Making Knowledge Management Model

Chun Wei Choo developed the Sense-making KM Model (Figure 2.14), which focused on three principal ways of strategic information use in an organisation, namely, sense-making, knowledge-creation and decision-making (Chen, Wu and Yang, 2006:116). The Sense-making KM model of Choo is depicted in Figure 2.14 below.

FIGURE 2.14 THE SENSE-MAKING KNOWLEDGE MANAGEMENT MODEL OF CHOO



Source: Choo, C.W. (1998:18-15). Adapted.

With reference to Figure 2.14, in each phase, sense-making, knowledge creation and decision-making, have an outside stimulus or trigger (Bennet and Bennet, 2014:15). During the sense-making stage, employees at a UoT attempt to make sense of the information flowing in from the external environment, for example, if new legislation is enacted for the HE sector (Doctor, 2008:123). Kane, *et al.* (2005:65) state that employees' priorities at the UoT are used to filter the information and shape an individua's interpretations based on their previous experiences. Chiucchi (2008:224) regards organisational sense-making as an important contributor to reduce ambiguity in messages about the HE environment. Antonioli, *et al.* (2011:318) note that this stage also develops shared meaning amongst employees at a UoT and encourages collective and purposeful action to take place, while adapting to change.

In the South African HE sector, change has been a driving force at most institutions, especially at the DUT, due to external and internal challenges (Nkambule, 2014:2011). Various external challenges are impacting on the UoT sector, such as access to the higher education sector; the quality of programmes offered; government funding; curriculum renewal; and student action (April, *et al*., 2003:169; Manuri and Raja Abdullah, 2011:75). Internal challenges are also experienced at UoTs (especially at the DUT), such as problems with staff retention, financial constraints, lack of staff motivation and job dissatisfaction (Botha, *et al.*, 2008:14; Chetty and Wallis, 2009:3). Altaher (2010:265-266) concludes that sense-making in a UoT requires open channels of communication and directed leadership, which will ensure that employees at the institution can comprehend the information from the external environment and the effect it will have on their jobs.

Beerkens and Derwende (2006:65) explain that knowledge creation may be regarded as the transformation of personal knowledge between individuals through dialogue, discourse, sharing and storytelling. According to Altaher

(2010:266), this phase of Choo's Sense-making KM Model (Figure 2.14) is directed by a knowledge vision of comparing the current situation at the institution to a future, desired situation. Bergiel, Bergiel and Balsmeier (2008:102) state that knowledge creation increases the potential choices in decision-making by providing new knowledge and new competencies to employees. The result allows the UoT to develop innovative strategies that stimulates the institution to make informed, rational decisions *vis-à-vis* the challenges of the Knowledge-based Economy.

According to Biseth (2009:249), Choo (1998:34) draws from the ideas of Nonaka and Takeuchi (1995:44) and believes that employees will respond based on the triggers of environmental factors. Changes in the environmental factors will impact on employees' perceptions of the institution and their working environment (Guthrie and Lee, 2010:14). Employees' responses are influenced by limited knowledge and skills; fear of the unknown; the availability of personal information; and knowledge and the values and norms held by the individual, which may differ from those of the institution (Peters and Besley, 2005:46; HESA, 2009:5; Bitzer and Botha, 2011:175). In the case of the DUT, the merger necessitated employees from both Technikon Natal and M L Sultan Technikon to create new knowledge to contextualise the changes that the merger brought about (Du Pré, 2010:38).

During the Decision-making phase of Choo's Sense-making KM Model (Figure 2.14), the institution may implement processes and procedures, routines and automated systems to facilitate sense-making and knowledge-creation, which can lead to goal-directed adaptive behaviour amongst employees (Pavan, 2013:30). Aghill (2010:23) explains that the decision-making phase of the model (Figure 2.14) is driven by the search for alternatives that are satisfactory for the UoT and not necessarily a solution to a problem. The Sense-making and Knowledge-Creation phases enable the Decision-making phase and allow

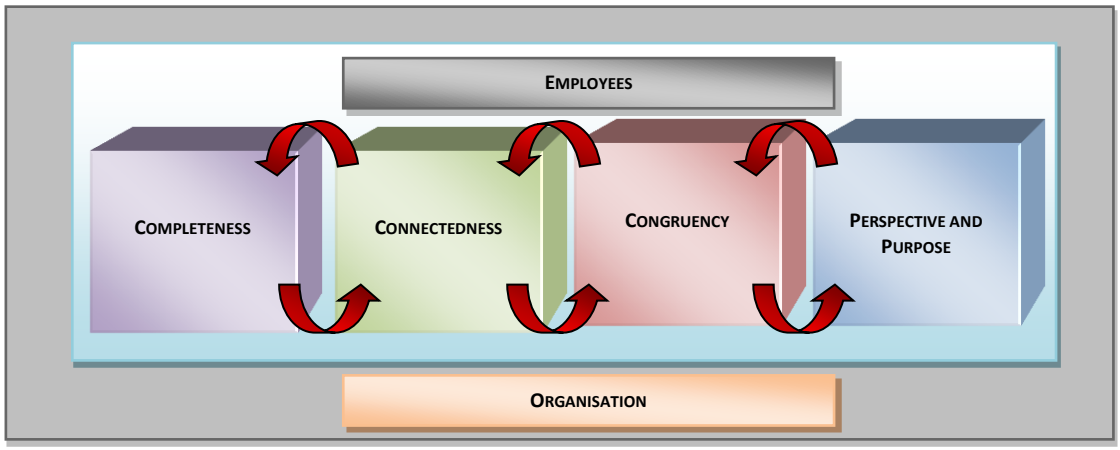
the institution and employees to respond to environmental changes (Alhawaria, *et al.* 2011:55). Various authors emphasise the importance of HE institutions as sense-making communities and proclaim that utilising the model (Figure 2.14), it can enable an institution to function in the dynamic Knowledge-based Economy (Choo, 2007:87; Gilpin and Murphy, 2008:56). The modern HE sector is regarded as part of an open system where communication, shared beliefs, values and assumptions are encouraged (Stankosky, 2011:109). The challenge for HE UoTs is to engage employees as active participants in the development of sense-making communities (Schiuma, *et al.*, 2005:163). In a study conducted by Chetty (2010:114-119), respondents at the DUT reported that they were not actively participating in the DUT sense-making community, since knowledge creation was not adequately supported by automated systems, especially information systems relating to Human Resource Management (here after referred to as HRM).

2.5.4.4 Wiig's Knowledge Management Model

Karl Wiig developed the KM model in 1993 and proposed that in order for knowledge to be useful and valuable, it must be organised (Wiig, 1997a:3). Easterbury-Smith and Lyles (2011:9) regard Wiig's KM Model (Figure 2.15) below to be the first initiative that emphasises the value of information technology as a means of gathering, sorting and presenting knowledge in an organisation. Wiig (1997b:402) further emphasises that knowledge should be organised differently depending on what the knowledge will be used for. Wiig's KM Model (Figure 2.15) comprises Four Dimensions that individuals can use to access and retrieve different knowledge to complete tasks. Thereafter, Wiig identifies Five Degrees of Internalisation as shown in Table 2.6, and lastly a Hierarchy of Knowledge Forms as illustrated in Figure 2.16 is presented.

The Four Dimensions that Wiig (1997a:4) identified are completeness, connectedness, congruency, and perspective and purpose (as depicted in Figure 2.15). Wiig (1999:159) states that completeness refers to how much relevant knowledge is available from a given source (either explicit or tacit) that employees can access. Sveiby (1994:54) explains that connectedness (Figure 2.15) refers to the well-defined relations between the different knowledge bases, for example, databases. Swart and Kinnie (2003:68) add that a knowledge-base is regarded as congruent (Figure 2.15) when all the facts, concepts, perspectives, values, judgements and relational links are consistent. Strohmeier (2007:34) describes perspective and purpose (Figure 2.15) as the natural selection that an employee uses to access knowledge.

FIGURE 2.15 WIIG'S FOUR DIMENSIONS OF KNOWLEDGE



Source: Wiig, C.K. (1997a:4). Adapted.

Quintas, Lefrere and Jones (1997:388) explain that the Four Dimensions of Knowledge as depicted in Figure 2.15, have been incorporated into the HE UoT sector to support quality, efficiency, relevance, sustainability and effectiveness. Davenport (2013:98) clarifies that if employees have access to complete knowledge sources that are connected and congruent, they will be able to

select and retrieve information that can assist them to make purposeful decisions. HE UoT institutions that have incorporated the Four Dimensions of Knowledge (Figure 2.15) are able to integrate public and shared knowledge within the working environment to develop personal knowledge amongst employees (Daniel, 1996:65; Wiig, 2012:103). Entwistle and Peterson (2004:414) state that if UoTs incorporate the Four Dimensions of Knowledge as illustrated in Figure 2.15, into the strategic and operational plans of the institution, the value of information system will be acknowledged by both employees and management. Although information technology is emphasised at DUT, it is perceived by employees as only useful in the academic context and not as a source of personal development. The DUT is devoting greater attention to teaching and learning activities and finding ways to support students, than emphasising information technology related needs of employees.

TABLE 2.6 WIIG'S FIVE DEGREES OF INTERNALISATION

LEVEL	TYPE	DESCRIPTION
1	NOVICE	BARELY AWARE OF NOT AWARE OF THE KNOWLEDGE AND HOW IT CAN BE USED
2	BEGINNER	KNOWS THAT THE KNOWLEDGE EXISTS AND WHERE TO GET IT BUT CANNOT REASON WITH IT
3	COMPETENT	KNOWS ABOUT THE KNOWLEDGE, CAN USE AND REASON WITH THE KNOWLEDGE GIVEN EXTERNAL KNOWLEDGE BASES SUCH AS DOCUMENTS AND PEOPLE TO HELP
4	EXPERT	KNOWS THE KNOWLEDGE, HOLDS THE KNOWLEDGE IN MEMORY, UNDERSTANDS WHERE IT APPLIES, REASONS WITH IT WITHOUT ANY OUTSIDE HELP
5	MASTER	INTERNALISES THE KNOWLEDGE FULLY, HAS A DEEP UNDERSTANDING WITH FULL INTEGRATION INTO VALUES, JUDGEMENTS AND CONSEQUENCES OF USING THE KNOWLEDGE

Source: Wiig, C.K. (1999:163). Adapted.

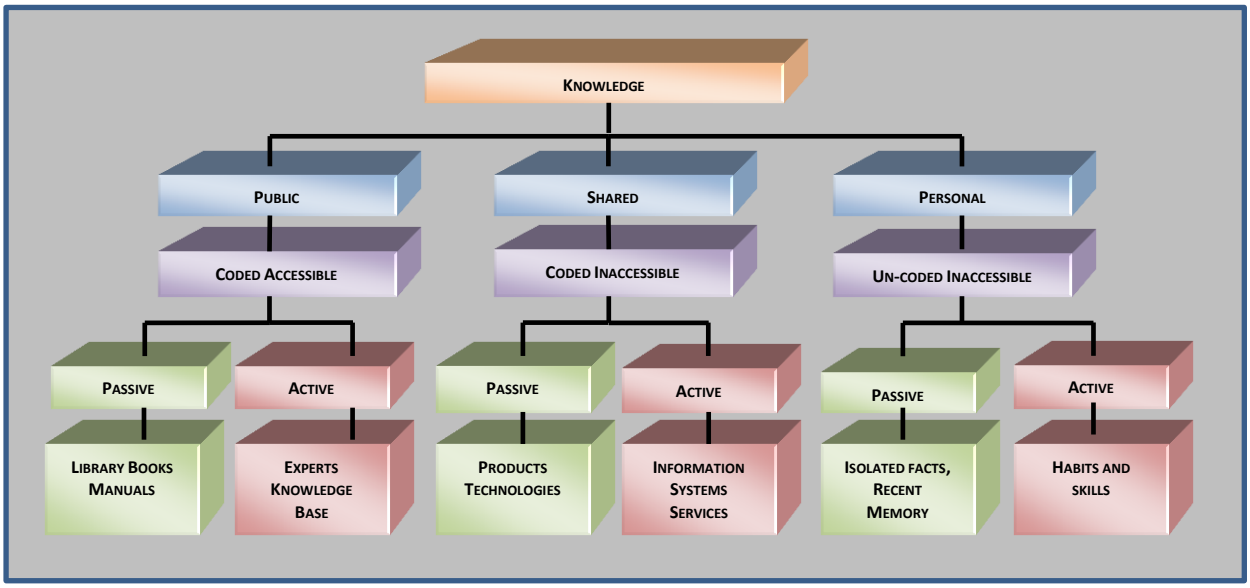
The Five Degrees of Internalisation, shown in Table 2.6 above, is the second component of Wiig's (1999:163) KM model and attempts to define different levels of internationalisation of knowledge. The levels of internalisation span

the classifications of novice, beginner, competent, expert and master. According to Entwistle and Peterson (2004:414), the Five Degrees of Internalisation (Table 2.6) will enable HE UoT institutions to identify formal and informal learning settings and new ways of developing key competencies within the institution. The opinion of Entwistle and Peterson (2004:414) is supported by Bozeman and Corley (2004:603), Etzkowitz (2008:131), Hernes (2008:102) and Wilson-Strydom and Fongwa (2012:13). In the HE UoT sector, the Five Degrees of Internalisation (Table 2.6) could be incorporated into formal and informal training and development activities to ensure that employees are exposed to relevant knowledge to equip them to perform their tasks and duties efficiently and effectively (Abeysekera, 2008:731).

Awad (2010:92) contends that although training and development is emphasised in the HE context, most UoTs fail to consider that the Five Degrees of Internalisation are crucial if the institution wants to ensure a return on investment. Braunerhjeim, Zoltan, Audretsch and Carlsson (2010:121) agree with Awad (2010:92) and add that the HE sector is guilty of offering training and development programmes on the basis of one size fits all. The DUT offers extensive training and development as a source of knowledge creation, but fails to match employees' existing skills and knowledge levels with the difficulty level of the course content of the training programmes (Chetty, 2010:167).

The final part of Wiig's KM Model as depicted in Figure 2.16 below, is the Hierarchy of Knowledge Forms, which highlights the various modes of knowledge available to employees in a HE institution. The challenge for a UoT is to ensure that employees have access to Public, Shared and Personal knowledge to assist in decision-making (Braunerhjeim *et al.*, 2010:122). Davenport (2013:98) concludes that Wiig's (1999:165) KM model (Figure 2.16) identifies the value of combining individual and organisational knowledge with information technology and ensuring that sufficient training and development is offered to equip employees to access the various modes of knowledge.

FIGURE 2.16 WIIG'S HIERARCHY OF KNOWLEDGE FORMS



Source: Wiig, C.K. (1999:165). Adapted.

2.5.4.5 The Contribution of Knowledge Management Models to the Higher Education UoT Sector

Onyancha and Ocholla (2009:4) state that UoTs are now competing in the HE sector to attract students, secure funding and increase the recognition of the institution. In order for UoTs to remain competitive, possibly even to survive, these institutions will have to convert themselves into information-based organisations (Nonaka, Von Krogh and Ichijo, 2000:16). Brewer and Brewer (2010:331) caution that UoTs will have to change old habits and acquire new ones and the more successful HE institutions have been more difficult and painful as the process of change is apt to be. Sheer, Jost and Gungoz (2007:3) suggest that KM in the HE UoT sector has become an integral part of the system, which requires holistic commitment from all faculties, departments and stakeholders of the institution. Sifuna (2010:419) agrees with Sheer, *et al.* (2007:3) and adds that KM in HE UoT institutions should provide a set of

designs for linking people, processes and technologies that can promote policies and practices that help people share and manage knowledge. Brown, Herbert, Van der Merwe and Van Dyk (2008:5) propose that implementing the various KM models at a UoT (and in particular the DUT), assists the institution to adapt to the challenges and changes associated with the Knowledge-based Economy.

Deem, *et al.* (2007:103) emphasise the importance of selecting suitable KM models for the service-delivery function of HE sector and states that HE UoT institutions are in a unique position in that their customer base spans over four generations, namely, Baby Boomers, Generation X, Generation Y and Generation Z. According to Lytras, Pouloudi and Poulymenakou (2002:43), each of these generations has different expectations in terms of knowledge creation and knowledge management. Lytras, *et al.* (2002:44) further explain that students realise that having a good qualification adds value to their prospects and is a passport to a better job. The academic staff, charged with the production and transmission of knowledge, is the core of the HE institution along with the students who are recipients of that knowledge and often engage in its production as well (Mailore, 2014:1). Steyn (2004:156) affirms that the HE sector is a substantial industry, with a significant impact on the national economy and that implementing KM models in the UoT sector will enable these institutions to contribute actively towards the South African Knowledge-based economy.

Various authors have identified benefits associated with implementing KM models in the HE UoT sector, such as improving student accessibility towards learning (Garrison and Kanuka, 2004:98); developing an action plan to improve teaching processes (Sifuna, 2010:419); providing research based education (Gere, *et al*., 2009:834); and assisting institutional employees with new skills, knowledge and expertise (Hislop, 2009:74). KM models can also fulfil the increased demand for new strategies that will assist the institution to meet

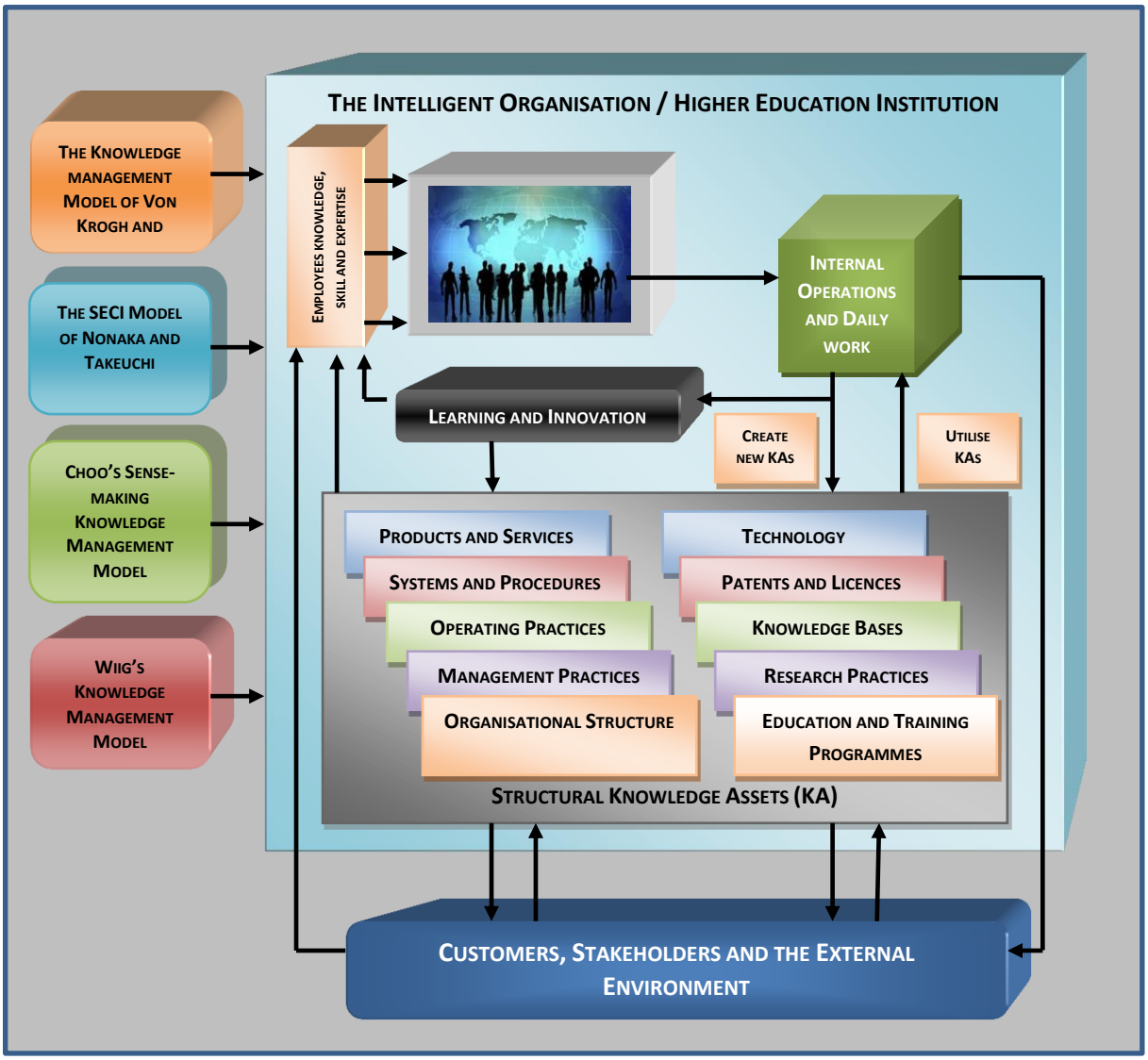
external and internal demands and retain experienced staff (Itami, *et al.*, 2010:12).

Despite the benefits associated with KM models, researchers report various constraints when implementing KM models in the HE sector, such as a shortage of awareness and learning about KM (Yeh, 2005:21), a lack of financial support from the government when implementing KM applications and systems (Cranfield and Taylor, 2008:93) and a scarcity of appropriate technology used for implementing KM in practice (Cranfield and Taylor, 2008:93). Petrides and Nodine (2002:132) also warn about a lack of top management support and shortage of resources and expertise. Heterick (2000:64) also states that often HE institutions meet resistance from employees on adopting new systems, resulting in a lack of commitment for training and development initiatives to develop new skills and knowledge. Cranfield and Taylor (2008:93) believe that these constraints often result in HE UoT institutions only embarking on KM initiates as short term objectives or solutions due to a lack of commitment and understanding from both employees and management.

According to Petrides and Guiney (2002:1710), HE UoTs can no longer hide behind excuses to avoid or postpone the implementation of KM. Pettersson (2009:1739) postulates that a vast array of KM models has been developed to equip HE institutions to make the transition from an educational environment to a KM environment. UoTs need to select the most appropriate model to facilitate the implementation of KM in the institution (Yeh, 2005:22). Brewer and Brewer (2010:332) identify the need of HE UoTs (such as the DUT) to take on the role of an intelligent organisation by recognising the value of people, knowledge (tacit, explicit and embedded), processes, procedures and information technology. Braunerhjeim, *et al.* (2010:120) explain that an intelligent organisation refers to an institution that embraces organisational learning and KM.

The term intelligent organisation is represented in Figure 2.17, which depicts the important relationship of knowledge assets, employees and the external business environment in the context of the HE UoT sector (Wiig, 1997a:4).

FIGURE 2.17 THE INTELLIGENT ORGANISATION / INSTITUTION



Source: Wiig, K.M. (1997a:4). Adapted.

Various authors endorse the need for UoTs to become knowledge orientated and maintain a learning culture in terms of its systems, beliefs, attitudes, values, behavioural norms and meanings (Scott, 2009:5 and Bhorat, Mayet and Visser, 2010:103). Biseth (2009:248) states that KM models will enable UoTs (such as the DUT) to respond to change by being adaptive and creating an institutional environment that is pro-active towards organisational improvement. Alhawaria, *et al.* (2011:55) assert that implementing KM models will assist UoTs like the DUT to maintain learning structures and become responsive to learners by emphasising knowledge creation and providing opportunities for knowledge to be practically applied.

Yeh (2005:22) emphasises that the successful implementation of KM models is dependent upon enablers and drivers at a HE institution. In this regard, Trautman (2006:12) and Altaher (2010:267) concur with Yeh (2005:22). Milton (2010:61-65) highlights that enablers "are those internal organisational factors that support the implementation of KM models". Moffet and McAdam (2006:231) add that drivers are usually associated with external organisational factors that necessitate the institution to respond to change by implementing KM to compete in the Knowledge-based Economy.

2.6 CONCLUSION

This chapter provides an overview of the concept of knowledge, the types of knowledge and the integration of knowledge in the HE sector. The contribution of the HE sector towards the Knowledge-based Economy is explored at both an international and national level. A conceptual clarification of KM is provided, which distinguishes between knowledge, the individual, the community and the organisational system. This is followed by the perspectives of KM that explains the three generations of KM. These three generations of KM present the transition from document-based KM to people-based KM, followed by a system-based KM. The stages in developing KM in the HE UoT sector is then presented, followed by an overview of the KM models applicable to the HE

sector. The contribution that the various KM models can make towards the successful adaptation of HE institutions is also explored. Arising from the theoretical exposition and the various models depicted in this chapter, it is necessary for the DUT to adapt to the challenges of the Knowledge-based Economy. Hence, the DUT requires a holistic integrated KM approach that incorporates IC and HC to ensure that the institution meets the expectation of its customers, stakeholders and the external environment. The next chapter highlights the best practices related to KM, IC and HC in the HE sector.

CHAPTER 3

BEST PRACTICES RELATED TO KNOWLEDGE MANAGEMENT AND MODELS ON KNOWLEDGE MANAGEMENT, INTELLECTUAL CAPITAL AND HUMAN CAPITAL IN THE HIGHER EDUCATION SECTOR

3.1 INTRODUCTION

Constant changes as a result of globalisation and the increasing use of technology already impact on most organisations in that their advantage in terms of knowledge and expertise is often their only competitive edge. Therefore, market-oriented innovation, transparent and quality assuring structures to produce and sell customised goods and services are essential preconditions for sustainable growth and future competitiveness (Kotecha, 2012:19). The challenges experienced by corporate organisations have necessitated the Higher Education (HE) sector to revisit their contribution to the Knowledge-based Economy. The HE sector is tasked with fulfilling a three-fold function, namely, to equip students with relevant knowledge and skills to contribute towards society and the economy; to provide innovative knowledge by means of conducting continuous research and to ensure that the institution's employees; are able to adapt and deliver in these changing circumstances (Franken and Baganza, 2006:22-24).

HE institutions are now expected to embrace and implement the challenges associated with the Knowledge-based Economy. For these institutions, the pace of change has historically been slower than the private sector. However, Rennie and Morrison (2013:39) postulate that HE institutions can no longer afford to disregard the importance of integrating Knowledge Management (KM), Intellectual Capital (IC) and Human Capital (HC) in order to provide relevant academic programmes to society. According to Soogwan and Zoltan (2010:254), HE institutions are now expected to make the transition from an

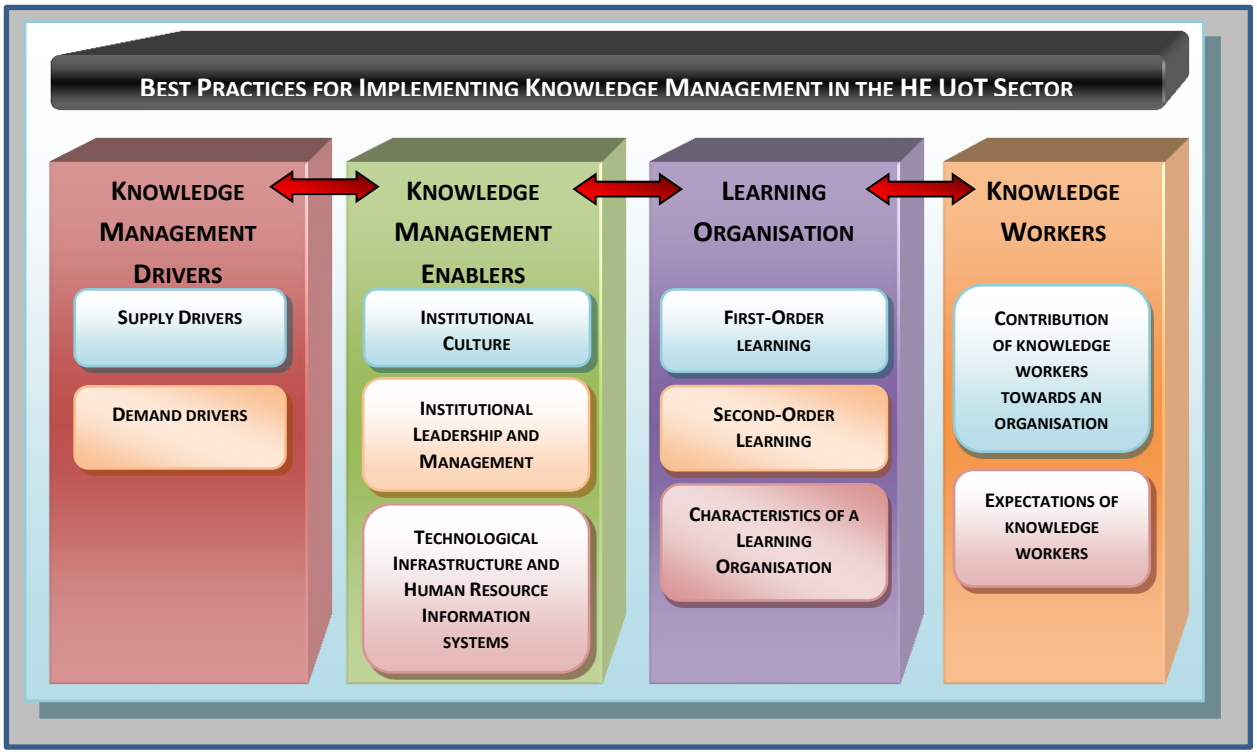
academic fortress to competing at both national and international levels to attract students, funding and experienced employees.

The expectations placed on the HE sector to adapt to globalisation and competition is also affecting the HE University of Technology (UoT) sector in South Africa. In the previous chapter, the emerging trends of the Knowledge-based Economy and the expectations placed on the HE UoT sector have highlighted that an integrated approach is required for institutions to adapt to change. This chapter identifies the best practices that can guide the UoT sector during this transition, while recognising the value of incorporating IC and HC to allow UoTs and the Durban University of Technology (DUT) specifically to adapt to the Knowledge-based Economy.

3.2 BEST PRACTICES WHEN IMPLEMENTING KNOWLEDGE MANAGEMENT IN THE HIGHER EDUCATION UOT SECTOR

Keengwe and Agamba (2015:19) suggest that when HE UoTs implement KM in the wake of a constantly changing Knowledge-based Economy, the uniqueness of the HE sector in comparison to traditional business models should be emphasised. Recent research suggests that HE UoTs ought to develop more individual adaptation strategies in order to become more competitive and effective when implementing KM (Finestone and Snyman, 2005:131-132; Kim, 2006:364). To be able to cope with the competitive situation, UoTs need to identify KM drivers and develop KM enablers, study the principles of a learning organisation and identify the contribution of knowledge workers (Van de Ven, 2005:369). Figure 3.1 below depicts a summary of the various best practices identified in the literature reviewed and is followed by a discussion on each with reference to the HE UoT sector and the DUT in particular.

FIGURE 3.1 BEST PRACTICES FOR IMPLEMENTING KNOWLEDGE MANAGEMENT IN THE HIGHER EDUCATION UOT SECTOR



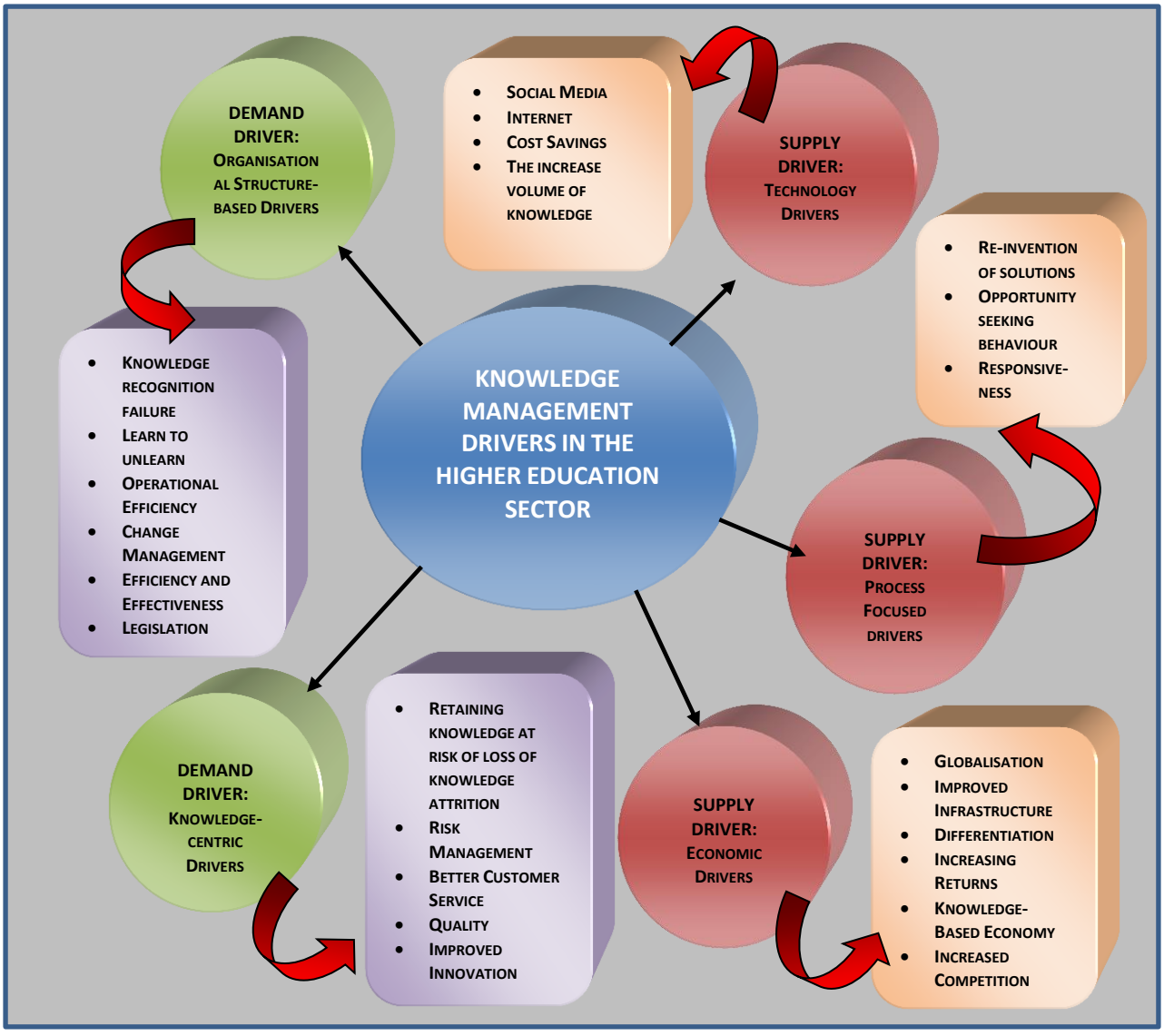
Source: Self-generated; (2015). Adapted.

3.2.1 Knowledge Management Drivers

The term 'knowledge management drivers' was first proposed by Arthur Anderson and the American Productivity and Quality Centre (APQC) when they developed KM assessment tools in 1996 (Wu, Wu, Li and Huang, 2011:4389). Du Plessis (2005:195) describes a KM driver as an external factor or market force that necessitate KM interventions. Rennie and Morrison (2013:38) state that recent technological advances have facilitated the development and adoption of specialised knowledge, which has led to the adoption of specialised KM tools and technologies. According to Easterbury-Smith and Lyles (2011:19), new technologies have presented organisations and employees with an unprecedented ability to access, store, search, organise, share information and communicate with others. Wickboldt, Bianchin, Lunardi, Granville, Gaspary and Bartolini (2011:2961) explain that technological KM drivers have also

resulted in organisations and employees developing expectations that students from HE institutions are well equipped with knowledge, skills and expertise to access, design and use the various KM technologies. According to Senge (2008:14), KM drivers are grouped into demand drivers and supply drivers. Tehrani (2012:2) uses this distinction identified by Senge (2008:14) and has identified KM supply and demand drivers for the HE sector as illustrated in Figure 3.2 below.

FIGURE 3.2 KNOWLEDGE MANAGEMENT DRIVERS IN THE HIGHER EDUCATION SECTOR



Source: Tehrani, M.M. (2012:2). Adapted.

3.2.1.1 Knowledge Management Supply Drivers

As depicted in Figure 3.2, supply drivers are divided into technology, process focused and economic drivers. On the supply side (Figure 3.2), recent advances in communication technologies, including the increased adoption of the internet, have allowed for the development of communication and knowledge sharing applications specially adopted for KM functions (Milton, 2010:103). Calvaleri (2008:476) states that economic supply drivers, such as globalisation and increased competition, have increased the need for HE institutions to introduce KM. Buchanan (2008:54) adds that stakeholders are becoming increasingly selective when choosing a UoT institution, since they are expecting these academic institutions to also offer differentiation and improved infrastructure. Baumard and Starbuck (2006:11) explain that process-focused supply drivers, such as constant re-innovation of solutions and responsiveness to competition, necessitate that UoTs such as the DUT adapt their academic programmes and ensure that employees are continuously creating, accessing and maintaining new knowledge to assist organisations. According to Fullen and Scott (2009:23), supply drivers relating to technology, such as the internet and social media, have identified new opportunities for UoTs and specifically the DUT, to reach a larger customer-base by means of online classrooms and technologically enhanced academic support structures. Rajalakshmi and Wahidabanu (2011:365) add that KM supply drivers are forcing HE institutions to “adapt or perish”. Seyedhoseini, Noori and Hatefi (2009:758) warn that HE institutions are no longer perceived by stakeholders as academic fortresses, but as knowledge-based, service-orientated organisations that should play an active role in the Knowledge-based Economy.

3.2.1.2 Knowledge Management Demand Drivers

Tehrani (2012:2) distinguishes between two KM demand drivers, namely, organisational structure and knowledge-centric drivers (Figure 3.2). On the

demand side there are several structural, demographic and economic factors which have driven the heightened interest in the field of KM in the HE sector (Seyede, 2011:265). Shoham and Perry (2009:232) state that HE institutions are experiencing structural organisational drivers, such as change management and state legislation, which have resulted in the need for HE UoT institutions, with specific reference to the DUT, to approach change pro-actively and to implement KM to add value to the Knowledge-based Economy. Soogwan and Zoltan (2010:254) add that for most UoTs, change is a slow and a tedious process, since various institutional structures have developed over many decades. However, according to Smith (2008:441), the HE UoT sector (as with the DUT) can no longer afford to stand on the periphery of change and merely observe, since the Knowledge-based Economy underpins the primary role of the HE sector, namely, knowledge creation.

Ang and Massingham (2007:16) regard HC as the most important knowledge-centric demand driver, since HE institutions have realised that employees are the primary asset in a service organisation. Higher education UoTs have begun to recognise that retaining their employees' knowledge will be increasingly important as the HE sector grapples with how best to institutionalise the knowledge of their employees, given the current level of employee turnover (Kotecha, 2012:19). The opinion of Ang and Massingham (2007:16) is supported by Calvaleri (2008:475) and Andreeva (2009:465). Acemoglu and Robinson (2013:179) assert that attracting, retaining and developing HC will enable HE UoT institutions such as the DUT to offer better service delivery and quality education.

In the South African HE UoT sector, with specific reference to the DUT, KM drivers have become increasingly important in the last decade. The South African government has restructured the HE landscape to enable greater access, equality and new and innovative teaching and learning techniques,

which in turn has necessitated the importance of knowledge creation, sharing and implementation. The DUT, like all other HE institutions, is expected to take a leading role in the South African Knowledge-based Economy by recognising supply and demand KM drivers (Figure 3.2) and developing institutional enablers to ensure the successful implementation thereof.

3.2.2 Knowledge Management Enablers

Chong (2006:247) asserts that if KM is a critical determinant of a HE institution's success, then it is extremely important that a KM programme identifes critical performance indicators or success factors to gauge its performance. KM enablers refer to the key factors that determine the effectiveness of executing KM within the institution, which are the driving force that solidify KM (Yu, Kim and Kim, 2007:43). In order to ensure the success of KM, Call (2005:27) affirms that it is crucial to be able to acquire the key enablers in order to make it possible to effectively utilise an institution's limited resources; reduce the use of manpower, material and time; and still be able to achieve the expected results. Chauvel and Despres (2002:216) define KM enablers as structural or functional conditions in an institution that are responsible, at some level, for the success or failure of a KM initiative. Wong (2005:268) views KM enablers as those activities and practices that should be addressed in order to ensure the successful implementation of KM.

Chong (2006:248) further points out, that although KM experts such as Davenport, Prusak, Stewart and Sveiby have developed the basic concepts and ideas of KM since the late 1990s, the research stream of KM is still emerging and developing in the UoT context. The observation made by Chong (2006:248) is also supported by Call (2005:28) and King (2008a:42). Hernes (2004:204) concludes that since KM involves almost every field of business, such as management theory, marketing, management information systems and

human resource management, the proposed success factors are fragmented and diversified. In this regard, Kim (2006:363), Milovanović (2011:37), Muller (2012:46-47) and Rennie and Morrison (2013:104-105) concur with Hernes (2004:204). Various researchers, such as Lee and Choi (2000:181), Wong (2005:268), Chong (2006:247), King (2008a:40) and Bishop, Bouchlaghem, Glass and Matsumoto (2008:17), have identified KM enablers or critical success factors that contribute towards the successful implementation of KM. A summary of the enablers identified by these researchers are provided in Table 3.1 below.

TABLE 3.1 KNOWLEDGE MANAGEMENT ENABLERS

KNOWLEDGE MANAGEMENT ENABLERS				
AUTHORS (CHRONO-LOGICAL)	STRATEGY AND LEADERSHIP	ORGANISATIONAL CULTURE	PEOPLE	INFORMATION TECHNOLOGY
LEE AND CHOI (2000:181)	• ORGANISATION STRUCTURE	• COLLABORATION • TRUST • LEARNING	• PEOPLE SKILLS • DEVELOPMENT	• INFORMATION TECHNOLOGY
OLTRA (2005:73)	• STRATEGY MOTIVATION	• EMBEDDED CULTURE	• HRM PRACTICES • PARTICIPATIVE MANAGEMENT	• INFORMATION TECHNOLOGY
WONG (2005:268)	• MANAGEMENT LEADERSHIP • MANAGEMENT STRATEGY	• CULTURE	• MOTIVATION • TRAINING • STRATEGIC HRM	• INFORMATION TECHNOLOGY
CHONG (2006:248)	• MANAGEMENT COMMITMENT	• KNOWLEDGE FRIENDLY CULTURE	• TRAINING • INVOLVEMENT • TEAM WORK • EMPOWERMENT	• INFORMATION TECHNOLOGY
YEH, LAI AND HO (2006:799)	• TOP MANAGEMENT SUPPORT	• PARTICIPATIVE CULTURE	• TRAINING • LEARNING ORIENTATION • REWARDS	• INFORMATION TECHNOLOGY
YU, *ET AL.* (2007:43)	• LEADERSHIP STYLE	• SHARING CULTURE	• TEAM ACTIVITY • LEARNING CHANNELS • INCENTIVES	• INFORMATION TECHNOLOGY
KING (2008A:40)	• MANAGEMENT PLANNING	• NATIONAL CULTURE • ORGANISATIONAL CULTURE • ORGANISATIONAL CLIMATE	• TEAM CLIMATE	• INFORMATION TECHNOLOGY

Source: Self-generated, (2015) with authors' viewpoints. Adapted.

The four main KM enablers, as identified in the literature review and represented in Table 3.1 above, are strategy and leadership; organisational culture; people; and information technology. In the context of the HE sector, these four KM enablers have been explored by various researchers, such as Metaxiosis and Psarras (2003:353-378) and Ponnuswamy and Manohar (2014:1-16). In the South African HE context, Botha (2010:203-204) identifies three enablers to facilitate KM implementation in a HE UoT sector: Firstly, institutional culture; secondly, institutional leadership and management; and thirdly, technological infrastructure and Human Resource Information Systems. The research findings by Botha (2010:203-204) are supported by Altbach (2004:5), Amaral (2008:89), Botha, Kourie and Snyman (2008:87), De Beer (2010:68) and De Beer (2012:3). Each of the three enablers as espoused by Botha (2010:203-204) are explored further to conceptualise the relevance of the literature and to adapt the guidelines on the implementation of KM for the DUT within the HE sector.

3.2.2.1 Institutional Culture

The most commonly accepted definition of culture is the one identified by Edgar Shein (1985:9), as, “A pattern of basic assumptions – invented, discovered, or developed by a group as it learns to cope with its problems of external adaptation and internal integration – that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those processes”. Tierney (1988:4) emphasises the importance of developing an organisational culture in a HE institution to support the implementation of KM. The assertion made by Tierney (1988:4) is supported by Ashkanasy, Wilderom and Peterson (2000:35); Wilson (2001:354) and Deem; Hillyard and Reed (2007:34-35).

The literature reviewed, provides numerous models on organisational culture and how it supports the implementation of KM in the HE sector, as shown in Table 3.2 below. The various models on organisational culture comprise different building blocks or cultural elements to support the implementation of KM in both private and public HE institutions and also finds applicability to the DUT. The most popular elements to construct the various models on organisational culture are identified in Table 3.2 below in order to provide a cross reference between the various organisational or institutional cultural models and the elements used to construct these models.

TABLE 3.2 CROSS REFERENCED SUMMARY OF MODELS ON INSTITUTIONAL CULTURE AND INSTITUTIONAL CULTURAL ELEMENTS TO ENABLE THE IMPLEMENTATION OF KNOWLEDGE MANAGEMENT MODELS IN THE HIGHER EDUCATION SECTOR

	MODELS ON INSTITUTIONAL CULTURE AS AN ENABLER FOR THE IMPLEMENTATION OF KNOWLEDGE MANAGEMENT MODELS IN THE HIGHER EDUCATION SECTOR								
INSTITUTIONAL CULTURAL ELEMENTS (LISTED ALPHABETICALLY)	THE DYNAMIC MODEL OF CULTURE BY ASHKANASY, WILDEROM AND PETERSON (2000:250).	THE CIRCULAR MODEL OF CULTURE BY GROESCHL AND DOHERTY (2000:15).	THE LEVELS OF CULTURE MODEL BY SCHEIN (1999:45-57).	HOFSTEDE'S LEVELS OF ORGANISATIONAL CULTURE (AS CITED BY MAULL, BROWN AND CLIFFE, 2001:302-304).	THE CULTURAL WEB OF AN ORGANISATION BY JOHNSON AND SCHOLES (1998:14-16).	THE MODEL OF HOW CULTURE WORKS BY COOKE AND SZUMAL (2000:151).	A MODEL OF ORGANISATIONAL CULTURE BY MARTINS (1989: 92).	THE ORGANISATIONAL MODEL BY SCHULTZ (1995:24).	THE MODEL OF ORGANISATIONAL CULTURE AND CLIMATE BY RAFAELI AND WORLINE (2000:71-84).
ACCEPTABLE NORMS	✓	✓		✓	✓	✓	✓		✓
BEHAVIOUR MODELLING		✓	✓			✓	✓	✓	
INSTITUTIONAL BELIEFS	✓		✓			✓	✓		✓
INSTITUTIONAL RITUALS		✓			✓	✓	✓		✓
INSTITUTIONAL SYMBOLS	✓		✓	✓	✓	✓			✓
INSTITUTIONAL TRADITIONS	✓	✓				✓	✓		
INSTITUTIONAL VALUES	✓	✓	✓	✓	✓	✓	✓		✓
PHYSICAL WORK ARRANGEMENTS				✓	✓			✓	✓
ROLE MODELS OR HEROES				✓		✓		✓	
STORIES SHARED					✓	✓	✓		

Source: Self-generated; (2015). Adapted.

In Table 3.2 above, the most common institutional cultural elements to support the implementation of KM are cross-referenced with nine models on institutional culture. The most dominant institutional cultural element (Table 3.2) that contributes towards the implementation of KM in the HE sector is institutional values; followed in descending ranking order by acceptable norms; institutional symbols; behaviour modelling; institutional beliefs; institutional rituals; physical work arrangements; institutional traditions; role models or heroes; and stories shared.

Martins and Terblanche (2003:65) state that the institutional culture within South African HE institutions has developed over many years and has been shaped by the political environment of the country. According to Renzl (2007:49), institutional culture is the "personality" of the HE institution and in the South African UoT sector, with reference to the DUT, the imperative of KM should be embraced in the institution's culture by emphasising the importance of KM in the various cultural elements of the institution. In 1997, the Department of Education commenced with the process of merging South African HE institutions either on a forced or voluntary basis (Martins, Martins and Terblanche, 2004:85). The merger of Technikon Natal and M L Sultan Technikon was the first of these forced mergers in 2002 (Khumalo, Mngadi and Bot, 2004:12). However, the DUT is still experiencing problems associated with institutional culture as a result of the forced merger between Technikon Natal and M L Sultan Technikon in 2002. Hence, the need exists to understand the necessity and contribution of KM to embrace the unique institutional culture that has emerged post-merger at the DUT.

Skodwin (1999:72) conducted a comparative study between HE institutions that were forced to merge as opposed to those that merged voluntarily. A study conducted by Skodwin (1999:76) revealed that the international trend to initiate forced mergers in HE sectors as opposed to voluntarily mergers in South Africa had resulted in various problems, such as, *inter alia*, difficulty of employees associating with the new institutional culture; the loss of employee loyalty;

lowered morale; and challenges in attracting and retaining suitably qualified employees. Various researchers such as Colbert and Kwon (2000:487), Denhardt and Denhardt (2002:551) and De Kluyver (2012:90-91) concur with the findings of Skodwin (1999:76). Chmielewska-Muciek and Sitko-Lutek (2013:1365-1370) conducted a study in the HE context focusing on the impact of culture on the success of implementing KM at institutions that were forced to merge. Their research findings revealed that at institutions where culture was combined into the merger process, change was embraced quicker. Chmielewska-Muciek and Sitko-Lutek (2013:1365) further cite various authors, who concurred that culture was a dominant factor as a KM enabler. These are summarised in Table 3.3 below and are self-explanatory.

TABLE 3.3 FEATURES OF INSTITUTIONAL CULTURE SUPPORTING KNOWLEDGE MANAGEMENT IN THE HIGHER EDUCATION SECTOR

AUTHOR	FEATURES OF INSTITUTIONAL CULTURE SUPPORTING KM IN THE HE SECTOR
H. OBORA (2003)	EQUAL TREATMENT OF ORGANISATIONAL BENEFICIARIES; BELIEF IN THE ABILITY TO INFLUENCE THE ENVIRONMENT; MONITORING OF THE ENVIRONMENT AND CREATING A MUTUAL VISION; OPENNESS, HONESTY AND FULL ENGAGEMENT IN EFFICIENT COMMUNICATION; PERCEIVING EMPLOYEES AS INDIVIDUALS WILLING TO LEARN
B. MIKULA (2007)	CREATING A SHARED VISION OF THE FUTURE; COMPREHENSIVE THINKING AND INTEGRATING SYSTEMS; GAINING DISTINCTIVE KNOWLEDGE; UNLIMITED ACCESS TO SOURCES OF INFORMATION AND KNOWLEDGE; EMPHASISE A HIGH LEVEL OF PROFESSIONAL COMPETENCIES FOR EMPLOYEES; CREATE A SPIRIT OF CO-OPERATION AND TRUST; ENCOURAGE CREATIVITY; EMPHASISE CUSTOMER SATISFACTION; ENCOURAGE DIFFERENCE OF OPINIONS; FOCUS ON THE FUTURE
D.A. GARLIN, A.G. EDMONDSON AND F. GINO (2009)	CREATE A FAVOURABLE ENVIRONMENT; IMPLEMENT PRECISE PROCESSES, PROCEDURES AND PRACTICES OF LEARNING AS WELL AS STRENGTHENING OF LEADERSHIP
M. CZERSKA (2001)	ENCOURAGE PROPER DECISION-MAKING; ADJUSTING THE PROCESS OF ORGANISATIONAL LEARNING TO REQUIREMENTS RESULTING FROM ADAPTED STRATEGIES OF ACTION; PARTICIPATION IN PLANNING THE ORGANISATION'S STRATEGIES AND POLICIES; USING INFORMATION TO FAMILIARISE EMPLOYEES WITH THE MOST IMPORTANT ISSUES OF THE ORGANISATION; A VERY HIGH LEVEL OF INTERNAL EXCHANGE OF KNOWLEDGE AND EXPERIENCES; KNOWLEDGE EXCHANGE WITH PEOPLE OR STAKEHOLDERS IN THE EXTERNAL ENVIRONMENT
A. GLIŃSKA-NEWEŚ (2007)	CREATING HONEST AND TRANSPARENT COMMUNICATION CHANNELS; EMPHASIS OF HIDDEN AND PERSONALISED KNOWLEDGE; STIMULATING EMPLOYEE AMBITIONS AND CREATIVITY; CREATING TEAMS OR GROUPS CONNECTED WITH KNOWLEDGE MANAGEMENT; ESTABLISH A MOTIVATION SYSTEM TO ENCOURAGE CREATIVITY
W. ZHENG, B. YANG AND G.N. MCLEAN (2010)	ENCOURAGE EMPLOYEES TO TAKE RISKS; ACCEPTANCE OF NEW IDEAS, WAYS, METHODS AND OPERATIONS; FREE TRANSFER OF INFORMATION; ACCESS TO KNOWLEDGE SOURCES AND RESOURCES; GOOD IDEAS ARE SUPPORTED BY EXECUTIVE MANAGEMENT; INVOLVEMENT FROM ALL EMPLOYEES

Source: Chmielewska-Muciek, D. and Sitko-Lutek, A. (2013:1365). Adapted.

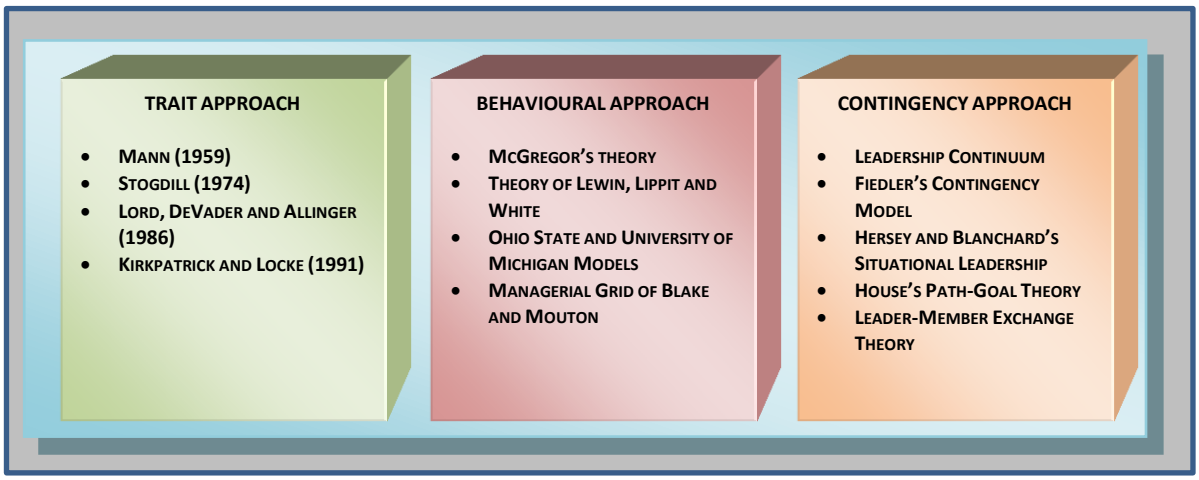
Jansen (2002:24) states that “a merger has the greatest impact on the culture of a HE institution”. Culture concerns the internalisation of a set of values, feelings, attitudes, expectations and the mindsets of the people within an institution (Jansen, 2002:25). Heterick (2000:64) states that the clashes of culture between merged institutions can present many problems that are difficult to address due to the complexity of organisational culture. Skodwin (1999:73) further explains that organisational culture exists at two levels, the first being the values shared by the people working in the organisation and the second being, the values of the organisation irrespective of membership changes. During a merger, the former level impacts significantly on the new merged unit, department, faculty or even the entire institution. Even when institutions are structurally similar, two culturally different institutions could result in conflict during the period following the merger (Jansen, Habib, Gibbon and Parekh, 2001:35).

Jansen (2002:20) asserts that when two HE institutions are forced to merge, there are often animosities amongst the employees. Employees often suffer from the “us versus them” syndrome and this problem can only be addressed by bringing in new blood to develop a new institutional culture that embraces change (HESA, 2009:6). In the case of the DUT, some employees are still struggling with the us-versus-them syndrome although the two institutions merged in 2002 (Chetty, 2010:171). In order for the DUT to implement KM in the context of a Knowledge-based Economy, the institution needs to recognise, integrate and emphasise the institutional cultural elements identified in Table 2.3. Jansen (2002:21) concludes that failing to recognise culture as an enabler for the implementation of KM at HE institutions operating in the Knowledge-based Economy, often results in KM initiatives being regarded as “quick fixes that will pass, which are not regarded as being serious”.

3.2.2.2 Institutional Leadership and Management

The second category of KM enablers is Institutional Leadership and Management that is identified in Figure 3.1 and supported by Botha (2010:203-204). In the 1950's, renowned leadership theorist, Stogdill, identified the first leadership definition as "the process of influencing the activities of an organised group in efforts towards goal setting and goal achievement" (Stogdill, 1974:11). Gerber, Nel and Van Dyk (1996:106) define leadership as an interpersonal process through which a leader directs the activities of individuals or groups towards the purposeful pursuance of given objectives within a particular situation by means of communication. According to Carrel, Elbert, Hatfield, Grobler, Marx and Van der Schyf (1998:230-238), various authors provide different definitions of the concept of leadership based on various leadership theories, which are generally divided into trait, behavioural and contingency theories as illustrated in Figure 3.3 below. Colbert and Kwon (2000:488) agree with Carrel, *et al.* (1998:230-238), but add that in the HE context, it is important to integrate different traditional leadership theories, while combining the characteristics of both management and leadership due to the unique nature of HE institutions.

FIGURE 3.3 A SUMMARY OF LEADERSHIP THEORIES



Source: Carrell, M.R., Elbert, N.F., Hatfield, R.D., Grobler, P.A., Marx, M. & Van der Schyf, S. (1998:230-238). Adapted.

Various authors distinguish between leadership and management, such as De Kluyver (2012:187); Radcliffe (2012:19); and Carpenter, Bauer, Erdogan and Short (2013:104). These authors recognise distinct behavioural differences between leadership and management within the HE sector. Rowden (2000:32) states that "management comprises of coordinating organisational resources effectively and efficiently by means of planning, organising, staffing, leading or directing and controlling the organisation to accomplish various goals". Bauer and Erdogen (2010:77) regard leadership as guiding employees to reach their potential. Colbert and Kwon (2000:492) highlight the comparative differences between leadership and management behaviours by the identified authors as depicted in Table 3.4 below.

TABLE 3.4 LEADERSHIP VERSUS MANAGEMENT DESCRIPTIONS

SOURCE	LEADERSHIP BEHAVIOURS	MANAGEMENT BEHAVIOURS
EICHER (1998); DE KLUYVER (2012)	GUIDING OTHERS AND THE ORGANISATION, PERSONALLY DEVELOPING OTHERS, PROMOTING OPPORTUNITIES FOR GROWTH, EMBRACING UNCERTAINTY, COMMUNICATING ORGANISATIONAL DIRECTION, DEVELOPING KEY RELATIONSHIPS, INSPIRING OTHERS	ADMINISTERING RULES AND POLICIES, DEMONSTRATING AND CLARIFYING EXPECTATIONS, SETTING STANDARDS OF PERFORMANCE, IMPROVING OPERATIONS, MAINTAINING FOCUS ON PRESENT NEEDS, DIRECTING OPERATIONS, DEVELOPING THE ORGANISATION, REINFORCING PERFORMANCE
KOTTER (1990); RADCLIFFE (2012)	COPING WITH CHANGE, SETTING A DIRECTION, ALIGNING PEOPLE, MOTIVATING AND INSPIRING	COPING WITH COMPLEXITY, PLANNING AND BUDGETING, ORGANISING AND STAFFING, CONTROLLING AND PROBLEM SOLVING
BENNIS AND NANUS (1985)	INNOVATIVE, ORIGINAL THINKING, DEVELOPS, FOCUSES ON PEOPLE, INSPIRES TRUST, LONG-RANGE PERSPECTIVE, ORIGINATES, CHALLENGING, DOES THE RIGHT THING	ADMINISTERS, COPIES, MAINTAINS, FOCUSES ON SYSTEMS AND STRUCTURE, RELIES ON CONTROL, SHORT-RANGE VIEW, IMITATES, ACCEPTS STATUS QUO, DOES THINGS RIGHT
ZALEZNIK (1977); CARPENTER, BAUER, ERDOGAN AND SHORT (2013)	ADOPTS A PERSONAL AND ACTIVE ATTITUDE TOWARDS GOALS, IS PRO-ACTIVE, DEVELOPS FRESH IDEAS, EXPLORES NEW OPTIONS, DEVELOPS EXCITEMENT IN OTHERS, ACCEPTS HIGH LEVELS OF RISKS, SEEKS OUT OPPORTUNITIES, IS CONCERNED WITH IDEAS, RELATES TO PEOPLE IN INTUITIVE WAYS, FOCUSES ON WHAT EVENTS MEAN TO PEOPLE, ATTRACTS STRONG FEELINGS OF IDENTITY, IS ABLE TO INTENSIFY INDIVIDUAL MOTIVATION	ADOPTS AN IMPERSONAL / PASSIVE ATTITUDE TOWARDS GOALS, REACTIVE, EMPHASIS ON RATIONALITY AND CONTROL, FOCUSES ON STRATEGIES AND DECISION MAKING, PLANNING, REWARDING, PUNISHMENTS, EMPHASIS ON ACCEPTABLE COMPROMISES, LIMITS CHOICES, OPERATES USING SURVIVAL INSTINCTS, TOLERATES MUNDANE AND PRACTICAL WORK, RELATE TO PEOPLE ACCORDING TO THE OTHER PERSON'S ROLE, FOCUSES ON HOW THINGS GET DONE, COMMUNICATES TO SUBORDINATES INDIRECTLY, USES INCONCLUSIVE SIGNALS WHEN COMMUNICATING

Source: Colbert, A.E. & Kwon, I.G. (2000:492). Adapted.

Eicher (1998:69) draws an important distinction between traditional organisations and the HE sector (Table 3.4). According to Eicher (1998:70), management and leadership in traditional businesses and industries face the challenge of getting the best from highly creative, knowledge-producing employees, but none of the employees have the same sense of personal gratification and entrenched independence that the HE sector and academics possess. Gilbert (1996:2), as cited by Colbert and Kwon (2000:502), summarises the distinctive setting of the HE sector as follows: “The idea of a university as a collegial organisation implies that universities are particular kinds of organisations, whose members expect to have a voice in the governance and management of their corporate activities. A cognate idea is that of ‘universitas’, the original meaning of which, for institutions of higher learning, was that of a community devoted to scholarship and wisdom”.

Meyer and Herscovitch (2001:305) report that, historically, universities embraced a congenial model of leadership and management, which assumed that people are friendly, good natured and hospitable towards each other in the workplace. According to Muller (2006:200), traditional universities moved from a congenial model to a collegial model that emphasised shared mutual interrelated decisions that are made together and responsibility is communal. Fullan and Scott (2009:23-24) share the opinion of Muller (2006:200) and add that a collegiate approach to leadership and management in a HE institution is characterised by a process of shared decision-making by a collegial group in relation to academic matters. Meyer and Herscovitch (2001:305) identify two more distinct characteristics of the collegial model of institutional leadership and management, namely, “mutual support in upholding the academic integrity of members of the group and the conservation of a realm of special knowledge and practice”. Meyer and Allen (1997:16) also support the idea of collegial leadership and management, but state that in the HE sector, staff autonomy dissolves the various approaches of institutional command and control to a lesser or greater extent, which requires that HE institutions need to balance

leadership and management. The opinion of Meyer and Allen (1997:16) is also supported by Goddard (1998:7) and Meyer and Botha (2000:16).

According to Serenko, Bontis and Hardie (2007:612), in the last few decades, the collegial governance and management system was dismantled in part because of globalisation and the need for HE institutions to become publicly accountable. Acemoglu, Golosov and Tsyvinski (2011:1010) report that HE institutions are increasingly becoming difficult places to govern, manage and lead. The HE sector operates in volatile environments and therefore have to constantly embrace change and adapt to the emerging trends and dynamics of the Knowledge-based Economy (Kruger and Johnson, 2011:276). Snyman and Kruger (2004:8) state that since the HE sectors are much more resistant to change, the importance of institutional leadership and management to assist HE institutions to adapt to the challenges of the Knowledge-based Economy is crucial. This trend has revolutionised not only the operations of the HE institutions of the past, but has also recreated a new university and management identity that recognises the importance of institutional leadership and management to enable KM drivers (Muller, 2006:201).

Various researchers such as Ryan and Walsh (2004:623); Ryu, Kim, Chaudhury and Roa (2005:249); and Salojarvi, Faru and Sveiby (2005:110) have conducted studies on the contribution of institutional leadership and management aligned to KM in the HE sector. Table 3.5 below represents cross references between institutional leadership and management models and the various elements contained in these models to enable the implementation of KM in the HE sector. The most popular institutional leadership and management elements identified in the various models as highlighted in Table 3.5 are communication, followed by change management and practices to increase institutional performance. The elements that are least emphasised are external awareness, accountability, stakeholder engagement and proactive planning. Table 3.5 below includes these concepts and is self-explanatory as

seen in the context of leadership and management models, and hence the implementation of KM models in the HE sector and the DUT, which is central to this study.

TABLE 3.5 CROSS REFERENCE BETWEEN INSTITUTIONAL LEADERSHIP AND MANAGEMENT MODELS AND ELEMENTS TO ENABLE THE IMPLEMENTATION OF KNOWLEDGE MANAGEMENT MODELS IN THE HIGHER EDUCATION SECTOR

	MODELS ON INSTITUTIONAL LEADERSHIP AND MANAGEMENT AS ENABLERS FOR THE IMPLEMENTATION OF KNOWLEDGE MANAGEMENT IN THE HIGHER EDUCATION SECTOR							
LEADERSHIP AND MANAGEMENT ELEMENTS (LISTED ALPHABETICALLY)	ALDER KOTEN FRAMEWORK: THE LEADERSHIP SUCCESS MODEL (CITED IN MARTINS, MARTINS AND TERBLANCHE (2004:86)	EMERGENT LEADERSHIP MODEL BY NONAKA AND KONNO (1998:45)	COGNITIVE STYLES LEADERSHIP DEVELOPMENT MODEL BY KOZHEVNIKOV (2007:470)	THE SERVICE LEADERSHIP COMPETENCY MODEL BY POLITIS (2001:359)	THE ADOPTED PROJECT MANAGEMENT LEADERSHIP MODEL (CITED IN DETIENNE, DRYER, HOOPES AND HARRIS, 2004:34)	COMPLEXITY LEADERSHIP THEORY BY UHL-BIEN, MARION AND MCKELVEY (2007:312)	STRATEGIC LEADERSHIP AND ORGANISATIONAL LEARNING MODEL BY VERA AND CROSSAN (2004:229)	A MESO-LEVEL MODEL OF LEADERSHIP DYNAMICS BY BLIGH, PEARCE AND KOHLES (2003:298)
ACCOUNTABILITY	✓		✓	✓	✓		✓	
BOOSTING PERFORMANCE PRACTICES		✓		✓	✓	✓	✓	✓
CHANGE MANAGEMENT	✓	✓			✓	✓	✓	✓
COMMUNICATION	✓	✓	✓	✓	✓	✓	✓	✓
CONTINUOUS IMPROVEMENT		✓		✓	✓	✓	✓	
DEVELOP OTHERS	✓		✓			✓	✓	✓
DEVELOP A SUSTAINABLE BUSINESS MODEL		✓		✓	✓		✓	
EDUCATION AND KNOWLEDGE	✓	✓	✓			✓	✓	
EXTERNAL AWARENESS			✓		✓		✓	
HUMAN CAPITAL				✓	✓	✓	✓	✓
PRO-ACTIVE PLANNING	✓			✓	✓	✓		
SKILLS AND COMPETENCIES	✓		✓	✓		✓		✓
STAKEHOLDER ENGAGEMENT		✓		✓			✓	✓
STRATEGIC THINKING		✓			✓	✓	✓	✓
VALUE DRIVEN DELIVERY		✓		✓	✓		✓	✓

Source: Self-generated, (2015) as highlighted by various authors. Adapted.

In the South African context, the Higher Education Act 101 of 1997, as amended, provides for the establishment of the following structures for each Public Higher Education Institution, namely, council, senate, institutional forum and student representative council (Muller, 2006:202). Jordaan and Wiese (2010:539) explain that whereas academics were responsible for the governance of the university as a community of scholars through the senate, the Higher Education Act (1997) clearly stipulates that "council of a public higher education institution must govern the public higher education institution, subject to this Act, any other law and the institutional statute". As a result, the traditional collegial governance model has now given way to managerialism, with Council as the key governing body (Du Pré, 2010:5).

According to Amaral, Fulton and Larsen (2003:281), the restructuring of the South African HE UoT landscape has posed additional governance and leadership challenges for institutions. Crous (2004:391) adds to the observation of Amaral, *et al.* (2003:281) and affirm that mergers in the South African HE UoT sector such as the DUT, brought about leadership and management challenges associated with multi-campus institutions often characterised by different academic cultures and institutional traditions. Jansen (2003:37) states that the HE UoT sector is faced with the dilemma of ensuring an appropriate balance between their academic priorities and the demands placed on them by the expectations of policy makers. One of the biggest challenges for institutional leadership and management is determining and leading institutional strategies for change, viability and excellence while committing to local and national needs in the context of the Knowledge-based Economy (Amaral, Jones and Karseth, 2002:18; Maassen and Olsen, 2007:18). Amaral (2008:82) states that this entails ensuring that the institution's vision and aspirations are balanced with the interests of policy makers and the public. Paradeise, Reale, Bleiklie and Ferlie (2009:17) also emphasise the importance of institutional leadership and management in building an understanding within and outside the institution and aligning the interests of all participants.

3.2.2.3 Technological Infrastructure and Human Resource Information Systems

The third KM enabler, which is identified in Figure 3.1, is Technological Infrastructure and Human Resource Information Systems (here after referred to as HRIS). Becerra-Fernandez and Sabherwal (2010:6) define technological infrastructure as "all the things that combine to facilitate the flow of information and knowledge in support of the myriad tasks and actions and decisions that comprise organisational activity". Information technology or digital technology is at the heart of the emerging Knowledge-based Economy and is the visible face of the knowledge age (Gabe, Abel, Ross and Stolarick, 2012:1190). Abel and Deitz (2012:668) observe that with the convergence of information and communication technologies, the vision of perfect competition is becoming a reality. Acemoglu and Robinson (2013:178) assert that as a result of easily accessible information, new markets have opened up resulting in increased productivity, reduced costs and one which emphasises e-commerce as an integral part of KM.

The economic landscape underwent radical changes throughout the 1990s with increased globalisation, information technology, technological breakthroughs and increased competition, which also resulted in new challenges for the HE sector (Amaral, 2008:82). According to Karisson and Zoltan (2002:64), an information age university is an institution that nurtures KM and IC in order to meet the needs of organisations, industries and government. Gumede (2012:129) states that the HE sector should revisit the core business approaches that organisations follow in order to be competitive in today's technologically-dependent business world. Karisson and Zoltan (2002:64) add that the HE sector should learn, adapt and apply the KM best practices used in organisations. According to Tehrani (2012:1), information technology and technological infrastructure are recognised as critical enablers for the successful implementation of KM within organisations operating in the Knowledge-based Economy. Hence, various models have been developed by

researchers on technological infrastructure as an enabler to implement KM models in the HE sector. As shown in Table 3.6 below, a summarised cross-reference between the various technological infrastructure models and the infrastructure enablers are identified by various researchers to promote the implementation of KM in the HE sector.

TABLE 3.6 CROSS REFERENCE BETWEEN MODELS ON TECHNOLOGICAL INFRASTRUCTURE AND INFRASTRUCTURE ELEMENTS TO ENABLE THE IMPLEMENTATION OF KNOWLEDGE MANAGEMENT MODELS IN THE HIGHER EDUCATION SECTOR

	Models on Technological Infrastructure as Enablers for the Implementation of Knowledge Management Models in the Higher Education Sector							
Infrastructure Elements (Listed Alphabetically)	The Knowledge Value Chain Model by Young (2000:788)	The Strategic Alignment Model by Henderson and Venkatraman (1999:477)	The Spiral Model of Nonaka and Takeuchi (1995:102-110)	The Knowledge Management Infrastructure Model by Javadein, Ramazani and Keshavarzi (2013:541-549)	The Technical Reference Model by The Open Group (cited in Osterwalder, Pigneur and Tucci, 2005:6-8)	Technological Infrastructure Model by Moshe and Morris (1996:21-58)	The E-Business Knowledge Management Model by Pateli and Giaglis (2004:302-314)	The Computer Support of Organisational Infrastructure Model by Holsapple and Luo (1996:13-24)
Business Applications	✓	✓					✓	✓
Communications Infrastructure	✓	✓	✓				✓	✓
Database Management			✓		✓	✓		✓
Knowledge Creation	✓		✓	✓	✓		✓	
Knowledge Dissemination	✓	✓	✓	✓			✓	
Knowledge Infrastructure Processes	✓	✓	✓	✓	✓	✓	✓	
Network services		✓		✓		✓		✓
Hardware			✓	✓		✓	✓	✓
Risk Management		✓		✓	✓	✓		✓
Security of processes	✓			✓	✓		✓	✓
Service delivery monitoring		✓	✓		✓		✓	✓
Software Management		✓	✓	✓		✓	✓	✓
Training and Development		✓				✓	✓	✓
Human resource Information System					✓		✓	✓

Source: Self-generated; (2015). Adapted.

The two most popular enablers are knowledge infrastructure processes and software management, while the least popular enabler is HRIS. Despite the lack of recognising HRIS (Table 3.6) as a critical enabler at HE institutions implementing KM, various authors such as Lippert and Swiercz (2005:345); Soogwan and Zoltan (2010:244); and Acemoglu, Gancia and Zilibotti (2012:577) postulate the valuable contribution that HRIS makes towards an institution.

3.2.2.3.1 The Value of Human Resource Information Systems to enable Knowledge Management in the Higher Education Sector

Fullan and Scott (2009:23) state that although HRIS is often regarded as a less significant enabler (Table 3.6 above), the extensive benefits associated with a well-developed, monitored and maintained HRIS, as a contributing factor towards KM, should never be underestimated. Seyede (2011:267) states that KM is often regarded as an institutional-wide initiative which requires new approaches and strategies for creating, recording and managing knowledge, such as network services and databases (Table 3.6). Rajender and Kumar (2012:5) contend that the challenge comes with recording Human Resource Management (here after referred to as HRM) related knowledge, skills and expertise to determine the knowledge values associated with existing employees at the HE institution. Seyede (2011:267) further underscores the importance of HRIS being the operational link between the strategic institutional vision and HRM implementations.

Strohmeier (2007:21) defines HRIS as “a system which seeks to merge the activities associated with human resource management and information technology into one common database through the use of enterprise resource planning software”. Ball (2001:679) adds that HRIS is an integrated information system that provides a single, centralised view of the data relating to HRM within the HE institution. According to Rajender and Kumar (2012:5), HRIS is

used to gather, store and analyse information regarding an institution's human resources and aims to provide overall management, reporting and analysis of employee information. Stroh and Caligiuri (1998:2) state that "HRIS is not simply computer hardware and associated Human resource-related software, since it includes people, forms, policies, procedures and data". Bedell, Floyd, Nicols and Ellis (2007:51) recognise the important contribution of HRIS to KM and state that it is a systematic process for gathering, storing, maintaining, retrieving and revising human resource data in the HE sector. The opinion of Bedell, *et al.* (2007:51) is shared by Kamath (2008:218) and Easterbury-Smith and Lyles (2011:102-103).

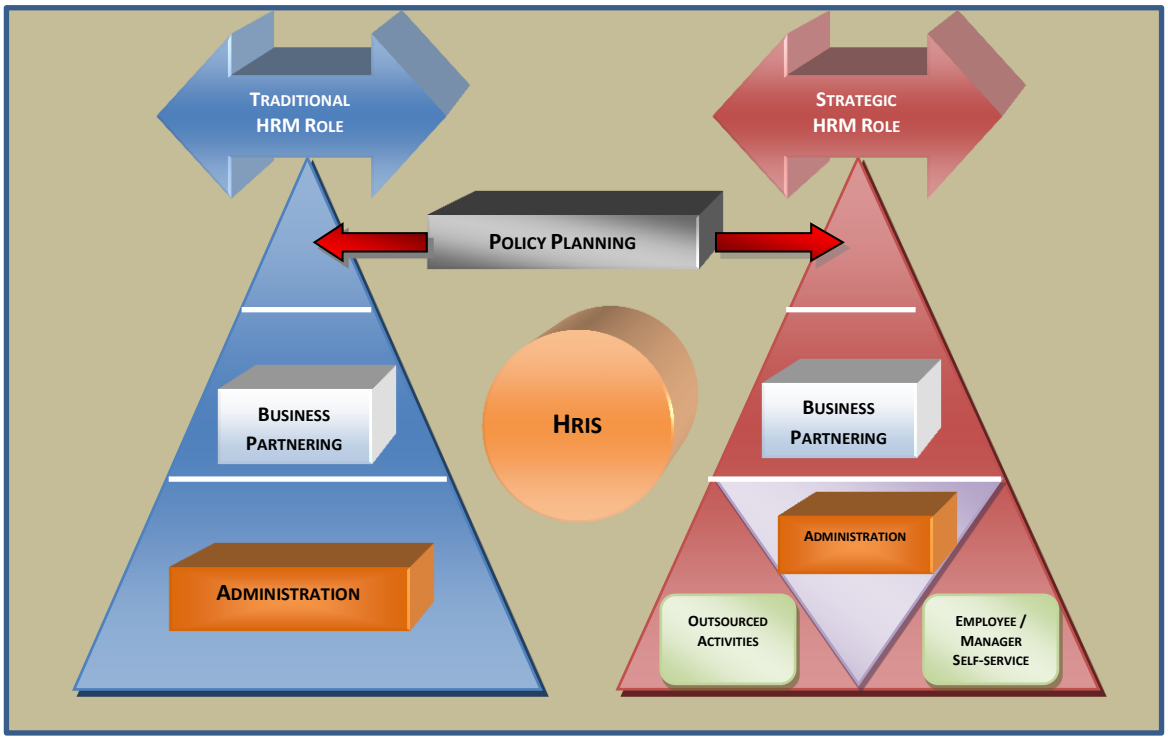
According to Hosie (1995:32), HRIS allows for strategic, tactical and operational decision-making. Horibe (1999:12) contends that HRIS provides a service and customer perspective since it allows the institution to generate timely and accurate employee information. Kruger and Johnson (2011:277) state that HRIS allows the HE institution to collect appropriate data and to convert the data into information and knowledge for improved timeliness, quality decision-making and compliance with mandatory legal requirements. Radcliffe (2012:20) regards HRIS as "a tool to streamline and enhance the efficiency and effectiveness of Human resource administrative functions". The opinion of Radcliffe (2012:20) is shared by Franken and Baganza (2006:22), Fullen and Scott (2009:24) and Rajender and Kumar (2012:4).

3.2.2.3.2 The Contribution of Human Resource Information Systems to the Function and Role of the Human Resource Management Department at Higher Education Institutions

Lengnick-Hall and Moritz (2003:367) assert that the increasing role of technology has changed the focus and contribution of all HE institutional departments and in particular the HRM department. Acemoglu and Robinson

(2013:179) confirm that during the 1990s, the HE sector realised that innovative and creative employees, who hold the key to organisational knowledge, provide a sustainable competitive advantage. As an institutional department, the traditional HRM function has now become strategic in its importance and is focussed on attracting, retaining and engaging talent (Becerra-Fernandez and Sabherwal, 2010:9). The increased use of technology and the changed focus of the HRM function has led to the emergence of the Human Resource department as a strategic partner (Braunerhjeim, Zoltan, Audretsch and Carlsson, 2010:109). As a result, Strategic Human Resource Management has become important in management thinking and practice (Moffet and McAdam, 2006:225). As illustrated in Figure 3.4 below, the focus has shifted from the traditional HRM role to that of a Strategic Human Resource Management role.

FIGURE 3.4 THE SHIFT FROM TRADITIONAL HUMAN RESOURCE MANAGEMENT TO STRATEGIC HUMAN RESOURCE MANAGEMENT

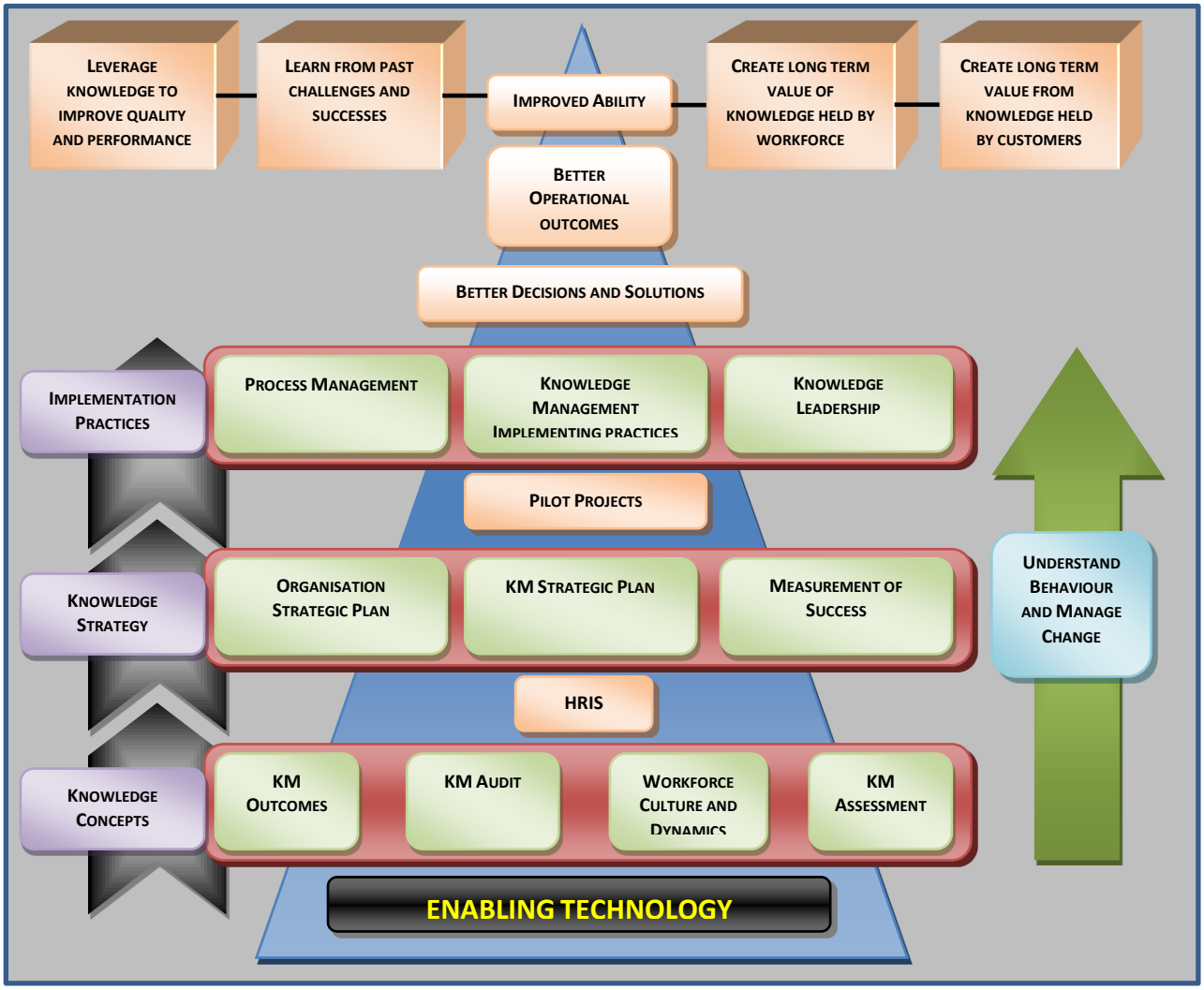


Source: Leonard, D. and Swap, W. (2005:103). Adapted.

According to Leonard and Swap (2005:119-120), Strategic Human Resource Management stresses the importance of Human Resource systems and structure to enable HC decision-making for HE institutions (Figure 3.4). Abel and Deitz (2011:2) contend that HRIS allows the HRM department to shift from an administrative function to a strategic decision-making function. HRIS also encourages the HE institution and the HRM department to incorporate business measurements (such as the Balanced Scorecard) and HRM reports to capture, maintain and develop HC as a strategic component of KM (Lengnick-Hall and Moritz, 2003:366; Fullan and Scott, 2009:23). Singh and Kant (2012:667) reiterate that HRIS also allows for a HE institution to shift the focus of Human Resources from the processing of transactions to strategic HRM. According to Abel and Deitz (2012:667), HRIS also improves employee satisfaction in a HE institution by delivering Human resource services more quickly and accurately.

Lippert and Swiercz (2005:345) refer to the Concept, Strategy, Practice (CSP) Model designed by the company Working Knowledge in the United States of America. The CSP Model assists HE Institutions in the United States of America to integrate information technology, KM and strategy. The CSP Model, which is depicted in Figure 3.5 below, emphasises the importance of combining institutional leadership, strategic planning and HC to ensure that HRIS can act as an efficient and effective enabler for the implementation of KM at a HE institution and may prove beneficial to the DUT. Lippert and Swiercz (2005:345) state that the CSP Model (Figure 3.5) recognises that KM is a long term strategy for a HE institution and should incorporate technology and HC. This opinion of Lippert and Swiercz (2005:345) is supported by Maassen and Olsen (2007:17) and Acemoglu and Robinson (2013:179). Maassen and Olsen (2007:18) further emphasise that the successful implementation on KM in the HE sector depends on HRM departments revisiting their role and function, while regarding HRIS and technology as important enablers to achieve the operational objectives of the institution.

FIGURE 3.5 CONCEPT, STRATEGY, PRACTICE (CSP) MODEL



Source: Lippert, S.K. and Swiercz, P.M. (2005:345). Adapted.

3.2.2.3.3 Human Resource Information Systems in the South African Higher Education UoT Context

Brown, Apgar and Steinemann (2008:2) assert that in the South African context, HE UoT institutions focus on developing and sourcing funding for information technology to facilitate teaching and learning, but often fail to acknowledge the importance of HRIS as an enabler to facilitate the implementation of KM in the

Knowledge-based Economy. The opinion of Brown, *et al.* (2008:2) is shared by Wessels, Grobbelaar and McGee (2003:14); Kok (2007:1); HESA (2009:6); and Botha (2010:202). Wilson-Strydom and Fongwa (2012:9-13) report that the unenthusiastic sentiment of UoTs towards the value and importance of HRIS in the South African context is mirrored in Southern Africa by countries such as Angola, Botswana, the Democratic Republic of the Congo, Malawi, Madagascar, Mauritius, Zambia and Zimbabwe. Botha (2010:202) states that this Southern African mindset needs to change and that UoTs can play a strategic role in enabling the HE sector to value the importance of HRIS.

Various researchers are in agreement that the HE UoT sector in South Africa is at a crossroads, since institutions are expected to deliver on teaching, research and community engagement, while producing and sustaining knowledge workers capable of meeting national, regional and continental needs (Jansen, McLellan and Greene, 2008:105-106; Kotecha, 2012:19-20). Conversely, the UoT sector focuses on the common challenges of access, equity, quality, efficiency, relevance and democracy in educational and training policies (Cooke and Leydesdorff, 2006:8; Cloete, *et al.* 2011:13). According to Abrahams, Burke, Gray, and Rens (2008:4), UoTs are proportionately channelling funds to teaching and learning to address these challenges, while overlooking the value of developing HRIS to record, assist and maintain HC within the institutions in order to sustain IC and KM. The opinion of Abrahams, *et al.* (2008:4) is shared by Gumede (2012:124) and Kotecha (2012:20). The DUT has shifted its emphasis towards the value and importance of information technology to equip its students with skills, knowledge and expertise to prepare them for the Knowledge-based Economy. However, the DUT has neither recognised nor made an effort to develop strategic technologically-orientated HRM. The DUT still regards HRM as an administrative function and fails to recognise the value of strategic HRM. Moreover, HRIS at the DUT is not developed to enable the institution to obtain, develop and maintain knowledge of the institution's HC. In the next section, the learning organisation is explored to demonstrate its value in the HE sector with regard to KM, IC and HC.

3.2.3 The Learning Organisation

The positive impact of a learning organisation is regarded as a best practice when implementing KM (as depicted in Figure 3.1) and is reinforced by research conducted by Van de Ven (2005:368) and Odhiambo (2011:301). These researchers espouse that a learning organisation creates an organisational culture that encourages knowledge creation, knowledge sharing and individual development to promote the implementation of KM. Keengwe and Agamba (2015:23) state that learning is the core of KM and that "it encourages organisations to shift to more interconnected ways of thinking, solving problems, developing new ideas and embracing change". Various authors describe the relationship between a learning organisation and KM as complementary. This relationship is best described by King (2008b:1377), who states: "Through KM an organisation takes on a learning focus, while seeking to acquire or create potentially useful knowledge and to make it available to those who can use it at a time and place that is appropriate for them to maximise effective usage in order to positively influence organisational performance".

Senge (1990:3) states that learning organisations are "organisations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspirations are set free, and where people are continually learning to see the whole together". Mulford (2005:14) defines learning organisations as "organisations that structure, restructure and develop themselves in such a way that the organisation as well as its organisational members continually learn from their experiences, from one another as well as from the environment". The learning results in effective problem-solving and organisational improvement, which allows an organisation to embrace KM in the wake of the Knowledge-based Economy (Monyooe, 2013:108).

Senge (1994:21-34) provides five guidelines for creating a learning organisation, which include fostering personal mastery; encouraging team work; creating a shared vision; understanding mental models to determine human behaviour; and linking these components through systems thinking. Based on the groundbreaking work of Senge (1994:21-34), various dimensions associated with a learning organisation are reported in the literature, such as identifying learning as a continuous, strategically used process that is integrated with employees' tasks and duties (Monyooe, 2013:108). Rothwell (2002:87) adds that in a learning organisation all employees realise the importance of ongoing organisation-wide learning initiatives and learning is accomplished by the organisational system as a whole.

Rafaeli and Worline (2000:74) highlight that in a learning organisation there is a focus on creativity and management ensures that employees have continuous access to information and data resources. Pasher and Ronen (2011:102) affirm that a learning organisation embraces an organisational climate that encourages and accelerates individual and group learning. According to Seddon and Caulkin (2007:3), some organisations embrace change, while failures are viewed as opportunities to learn, because the organisation is agile and flexible. Sheer, Jost and Gungoz (2007:13) postulate that in a learning organisation everyone is driven by a desire for quality and continuous improvement, which is evident in activities that are characterised by aspiration, reflection and conceptualisation of the value of KM.

3.2.3.1 The Importance of the Learning Organisation in the Higher Education Context – An International Perspective

Higher education (HE) institutions are ideally situated to develop and implement four learning competencies, namely, the absorption of knowledge from the external environment; the diffusion of knowledge within the institution; generating knowledge within; and developing new programmes and services

(Kumar, 2005:28). Li-Hua, Wilson, Aquad and Xiang (2011:13) state that internationally, HE institutions are recognising the value of creating a learning organisation within each department of the institution and aligning these learning initiatives to allow both employees and students to adapt to changes driven by the Knowledge-based Economy. Akhtar, Arif, Rubi and Naveed (2011:328) conducted research on the HE sector in Malaysia and their findings revealed that the survival of public institutions of HE depends on how these institutions accept changes, improve practices and competitiveness. Akhtar, *et al.* (2011:328) further highlight that HE institutions can no longer afford to operate on the same premise as traditional organisations, since the nature, purpose and role of the HE sector is rapidly changing. Doctor (2008:116) conducted research on HE institutions in India pertaining to incorporating the principles of the learning organisation in terms of the operational plans of these institutions. The findings reported by Doctor (2008:116) found that HE institutions that incorporated learning and development on an ongoing basis and adapted faster to change.

Lussier and Achua (2009:22) differentiate between the guidelines and characteristics of a learning organisation as opposed to a traditional organisation, which is depicted in Table 3.7 below. The traditional organisation paradigm (Table 3.7) is characterised by control; top-down and distorted communication; inflexibility; and discipline. According to Chen, Wang and Yang (2009:228) as cited by Lussier and Achua (2009:23), over the years HE institutions have become known for their characteristics listed in Table 3.7. Salim and Sulaiman (2011:119) highlight that HE institutions should embrace life-long learning, develop an innovative organisational culture and instil two-way communication (Table 3.7). Ho (2011:119) states that HE institutions will benefit by introducing the shift from the traditional organisation paradigm (Table 3.7) to the learning organisation paradigm, since it will allow the HE sector to adapt rapidly to the changes associated with the Knowledge-based Economy.

TABLE 3.7 TRADITIONAL ORGANISATION VERSUS THE LEARNING ORGANISATION PARADIGM

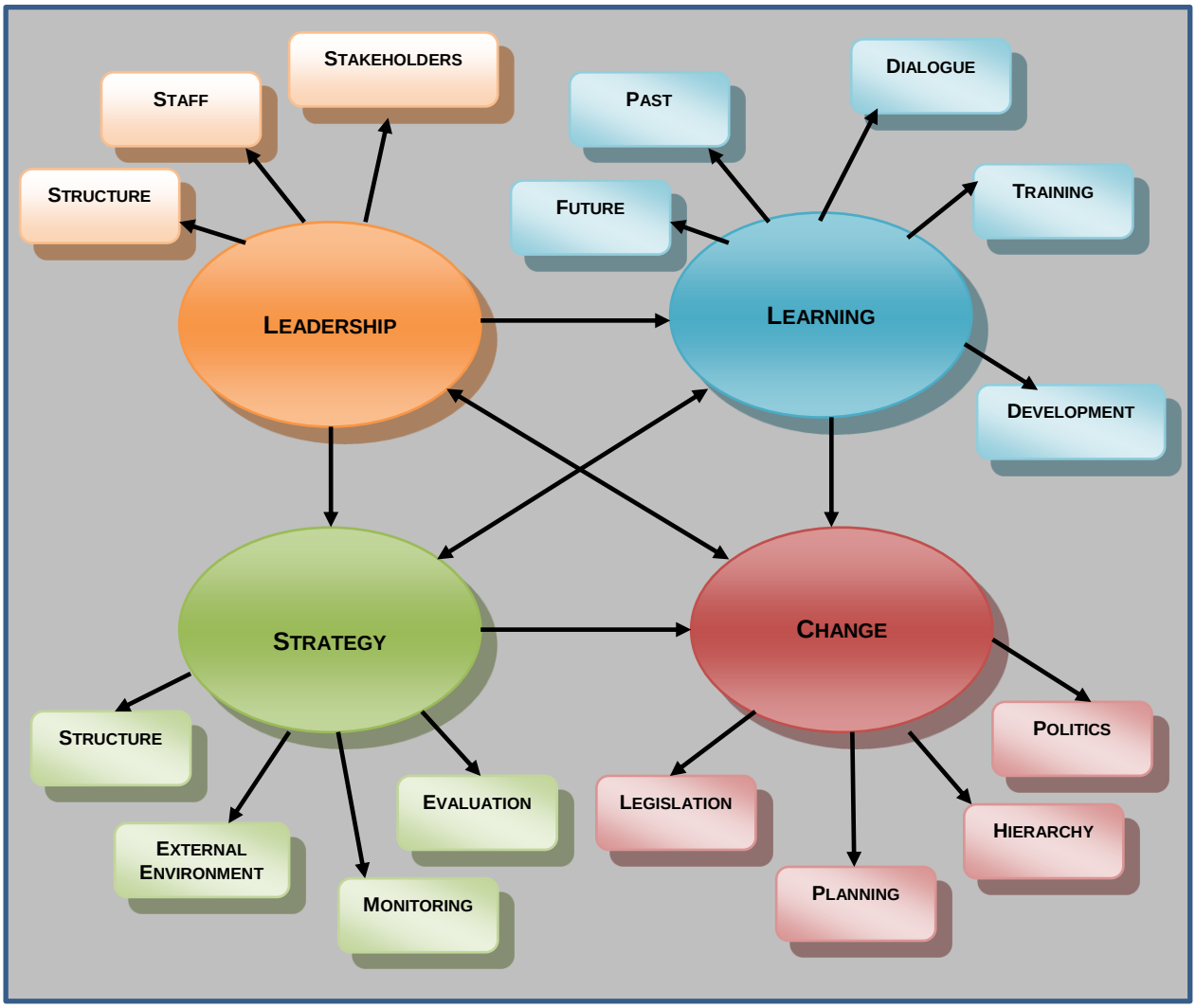
Traditional Organisation Paradigm	Learning Organisation Paradigm
Organisation Discipline	Organisational Learning
Training and Development	Life-Long Learning
Inflexible Organisational Structure	Flexible Organisational Structure
Distorted Communication	Open Communication Channels
Top-down Communication	Two-Way Communication
Management Administrators	Management Leaders
Strategic Business Units Drive Product / Service Development	Core Competencies Drive Product / Service Development
Assumption that most organisational members are Untrustworthy	Assumptions that most organisational members are Trustworthy
Tacit and Local Knowledge of most members of the organisation must be Disciplined by Managerial Prerogative	Tacit and Local Knowledge of all members of the organisation is the most important factor in success
Groups are prominent in the organisation	Teams are established and encouraged in the organisation
Strategic Learning occurs at the apex of the Organisation	Strategic Learning Capacities are widespread
Employees are regarded as Workers	Employees are regarded as Knowledge Workers
Organisational Culture is based on Instructions and Control	Organisational Culture is based on Innovation and Participation

Source: Lussier, R. and Achua, C. (2009:22). Adapted.

To become a learning organisation, HE institutions need to establish five core activities, namely, a climate in which all employees are encouraged to learn and develop to their full potential (Seddon, 2009:33); an extension of the learning culture to include customers, suppliers and other significant stakeholders (Dymock and McCarthy, 2006:528); a human resource development strategy that should be central to the institutional policy (Tettey, 2010:1); a continuous process of organisational transformation (Grieves, 2008:467); and a commitment by each individual to want to learn to become better and produce better results (Lombard and Kloppers, 2015:3). Grieves (2008:468) argues that a HE institution that intends to implement KM should consider introducing the First and Second Order Model of a Learning Organisation as depicted in Figure 3.6 below. The First Order Model (Figure 3.6) identifies four elements of a learning organisation, namely, leadership, strategy, change and learning that

should be present in a HE institution. Each of these four elements is further sub-divided to form the Second Order Model (Figure 3.6). The First and Second Order Model of a Learning Organisation demonstrates the importance between connecting and integrating the four elements to achieve KM in a HE institution. The model (Figure 3.6) by Grieves (2008:468) emphasises the importance of approaching a learning organisation in a systematic and holistic manner, by integrating employees, management, environmental factors and strategy.

FIGURE 3.6 THE FIRST AND SECOND ORDER MODEL OF THE LEARNING ORGANISATION



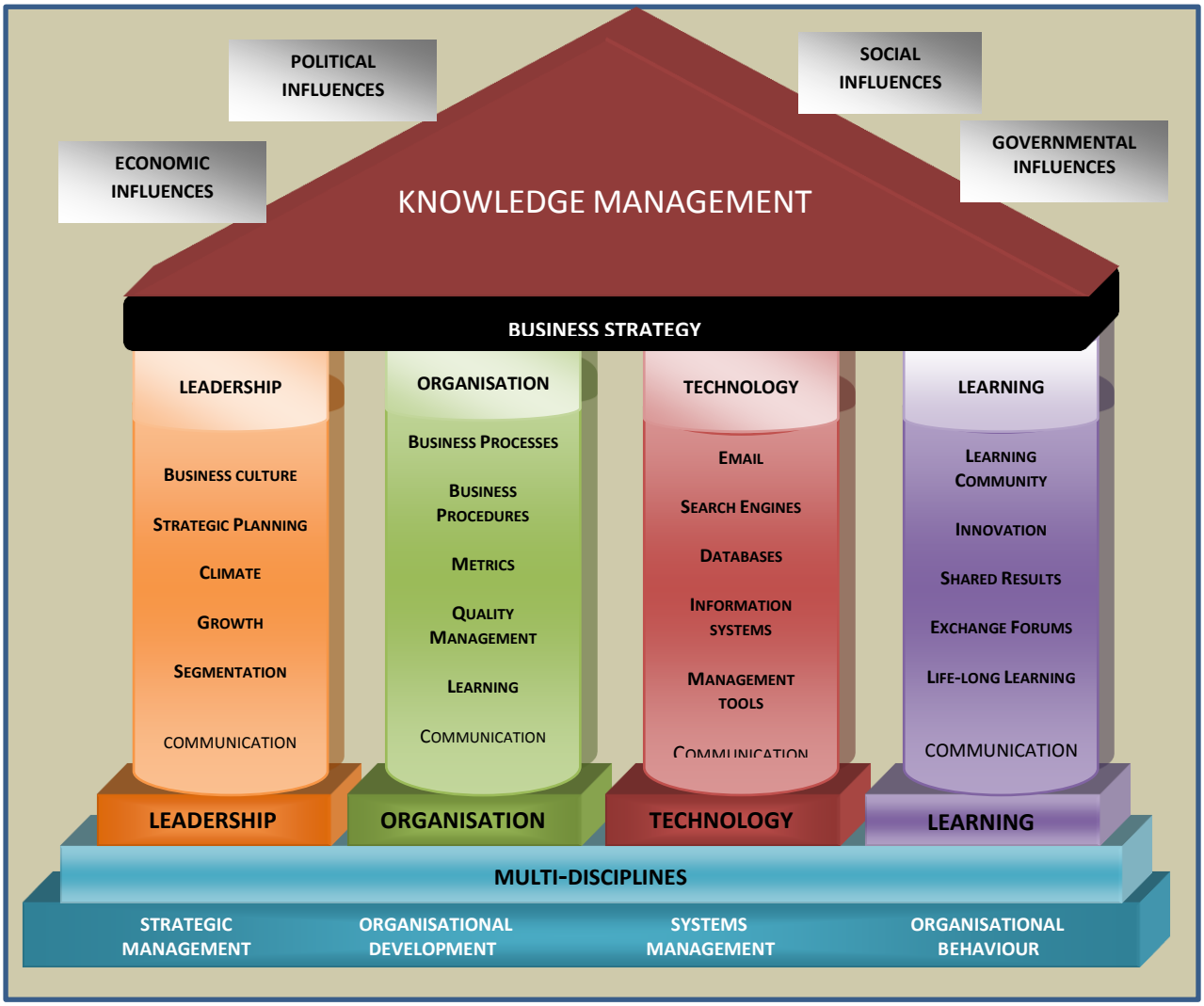
Source: Grieves, J. (2008:469). Adapted.

3.2.3.2 The Concept of the Learning Organisation applied to the South African Higher Education UoT Sector

According to Boughey (2007:12), the post-apartheid era has marked a period of profound change for South African HE institutions with concomitant legislation to facilitate the change process. Marshall and Case (2010:598) contend that South African HE UoT institutions face a conundrum, because they are only expected to change in the context of South Africa, but should also embrace the challenges of the African continent and mirror structures, processes and practices of international HE best practices (Clegg, 2009:54; Marshall and Case, 2010:598). According to Shay (2012:313), learning organisations have special qualities, as reported above, and although HE UoT institutions like the DUT are ideally positioned, they do not automatically qualify as learning organisations and hence have a long way to go.

Mngoma (2014:2) states that "becoming a learning organisation involves more than a paradigm shift for South African HE UoT institutions - It requires a revolution, a quantum leap towards individual recognition and growth, leadership development and empowerment and institutional learning". South African HE UoT institutions such as the DUT will have to re-organise and re-structure to meet the demands of the Knowledge-based Economy (Moleke, 2005:14). The opinion of Moleke (2005:14) is shared by Pasher and Ronen (2011:19) and Gumede (2012:129). Stankovsky's Pillars of Enterprise Learning (2005:83) as cited by Cranfield and Taylor (2008:88) presents guidelines for UoTs when re-organising and re-structuring to incorporate the best practices of a learning organisation as illustrated in Figure 3.7 below.

FIGURE 3.7 STANKOVSKY'S PILLARS OF ENTERPRISE LEARNING



Source: Cranfield, D.J. and Taylor, J. (2008:88). Adapted.

Stankovsky's Pillars of Enterprise Learning (Figure 3.7 above) reinforces the First and Second Order Model (Figure 3.6) of Grieves (2008:469), since it also recognises the foundation of organisational learning to be rooted in employees, management and strategy, while adding technology as an additional building block. Communication is regarded as being of cardinal importance in Stankovsky's model (Figure 3.7) and allows for the four pillars, namely, leadership; organisation; technology; and learning to be translated into the business strategy of the institution (Bezuidenhout, 2011:61).

Consequently, the DUT is expected to make the paradigm shift from a UoT to a learning organisation in order to implement KM to support IC and HC. This shift will require a HE UoT institution with particular reference to the DUT to encourage individual learning, group or team learning and organisational learning (Bezuidenhout, 2011:62). Steur, Jansen and Hofman (2012:866) report that UoTs often place more emphasis on organisational learning, since it is deemed to be the core of a learning organisation. Bezuidenhout (2011:54) regards organisational learning for a UoT as necessary, since it allows the institution to learn from the past and present to apply the specific knowledge gained in the future. However, Bezuidenhout (2011:61) warns that UoTs should not regard learning as a quick-fix to ensure KM, since effective learning requires all stakeholders, not only top management, to appreciate the value of knowledge creation, implementation and monitoring. Smit (2012:372) concurs with Bezuidenhout (2011:61) and emphasises that UoTs, such as the DUT, should place the learning and developmental needs of employees at the core of a learning organisation to ensure that KM is implemented in the HE UoT sector.

Grant (2007:38) believes that learning is not possible at a UoT if employees are not exposed to systems thinking, personal mastery and leadership development. However, the DUT focuses on an ad hoc approach to learning and employees are not encouraged to develop skills that will equip them to adapt to the challenges of a learning organisation. Badat (2009:460) states that UoTs do not have an in-depth understanding of HC development needs and they have not fully integrated training and development as a core aspect and activity for learning. Badat (2009:461) warns that KM initiatives will fail since UoTs are not acknowledging and embracing the best practices of a learning organisation.

3.2.4 ROLE OF KNOWLEDGE WORKERS

The term ‘knowledge worker’ was coined by Peter Drucker in 1959, as one who works primarily with information or one who develops and uses knowledge in the workplace (Acemoglu, 2010:19). Drucker (1999:104) states that “the most valuable asset of the 21st century institution, whether business or non-business, will be its knowledge workers and their productivity”. Various authors such as Nonaka and Takeuchi (1995:3); Saint-Onge (1996:13); and Sakellaris and Spilimbergo (2000:224) concur with the opinion of Drucker (1999:104) that knowledge in organisations should be regarded as renewable and changing. Nonaka and Takeuchi (1995:3) regard the knowledge worker to be the change agent at the HE institution to embrace the implementation of KM in the Knowledge-based Economy.

Peter Drucker (1995:23) first defined knowledge workers as “high level employees who apply theoretical and analytical knowledge, acquired through formal education, to develop new products and services”. According to Acemoglu (2010:19), a knowledge worker (also referred to as an intellectual worker or brain worker) is “a person employed due to his or her knowledge of a subject matter, rather than the ability to perform manual labour”. Knowledge workers are those employees who acquire, manipulate, interpret and apply information in order to perform multi-disciplinary, complex and unpredictable work (O’Neill and Adya, 2007:412). They analyse information and apply their expertise in a variety of areas to solve problems, generate new ideas, or create new products and services (Bhatt, 2001:70).

Knowledge work can be differentiated from other forms of work by its emphasis on “non-routine” problem solving that requires creative thinking (Mosco and McKercher, 2007:2). Knowledge workers use information in their specific work situations in a creative manner and are allowed the autonomy to do so (Blackler, 1995:1023; Argranoff, 2008:322). O’Neill and Adya (2007:413) state

that knowledge work is complex and those employees who perform it require certain skills and abilities as well as familiarity with actual and theoretical knowledge. Carneiro (2000:90) emphasises that knowledge workers must be able to find, access, recall and apply information; interact well with others; and possess the ability and motivation to acquire and improve these skills to implement KM in the Knowledge-based Economy. Table 3.8 below shows the distinction between knowledge workers and manual workers by comparing various characteristics that are found in both categories of workers (Coclová, 2012:21).

TABLE 3.8 COMPARISON OF DIFFERENCES OF THE MANAGEMENT OF MANUAL WORKERS AND KNOWLEDGE WORKERS

Characteristics	Manual Workers	Knowledge Workers
The Main Raw Material of Work	Tangible Elements	Knowledge
Work Flow	Apparent	Hidden
Visibility of Work	High	Low
Results	Direct and Immediate	Indirect and Delayed
Knowledge	Concentrated in Hands of Managers	Diffused in Heads of Workers
Power is Based on	Position in Formal and Power Structures of Organisations	Profession, Expertise, Skills and Knowledge
Nature of Work	Linear	Non-linear
Way of Reaction	Given by the Position and the Role	Worker decides individually depending on the concrete situation
Standards are Created by	Other Workers	Worker by oneself
Control is Focused	On the Worker	On the work and results
Control is performed by	The Manager	The Worker
Performance is measured	In accordance with Standards	On the bases of Results

Source: Coclová, J. (2012:21). Adapted.

Coclová (2012:21) reports that manual workers (Table 3.8) present highly visible work that is apparent and tangible, while knowledge workers use knowledge to achieve results. Martel (2003:27), as cited by Coclová (2012:22), states that manual workers' performance (Table 3.8) is assessed in accordance with standards and this impacts on the manner in which these employees are

managed. Donnelly (2006:80), as cited by Coclová (2012:22), postulates that for manual workers, control is focused on the worker (Table 3.8), while for knowledge workers, the emphasis is on results.

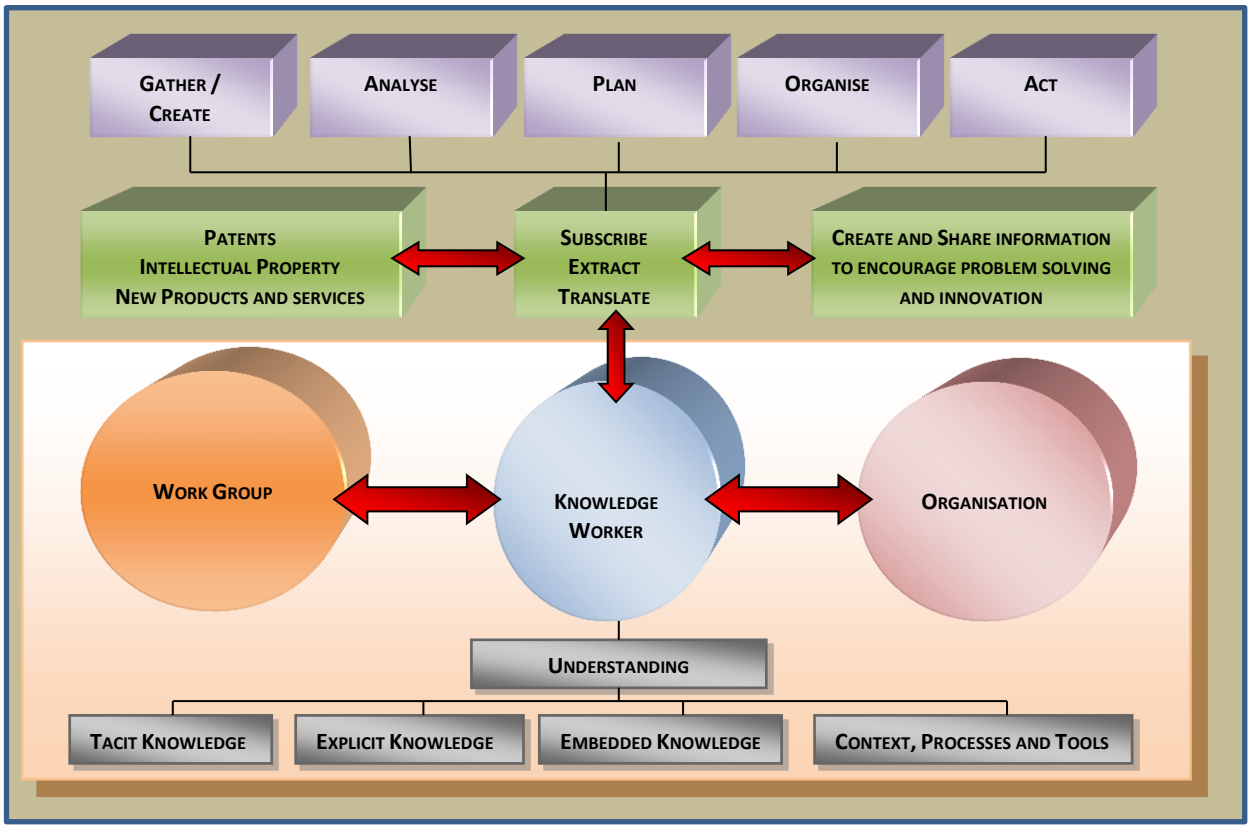
3.2.4.1 The Contributions of Knowledge Workers to Organisational Success

The literature highlights an array of benefits that knowledge workers bring to organisations. Davenport (2013:3) states that knowledge workers are able to identify and understand industry and organisational trends. They are able to conceptualise cause and effect by analysing data to establish relationships between teams, departments and organisations (Davenport, 2013:8). Knowledge workers develop business intelligence by assessing inputs in order to evaluate complex or conflicting priorities relating to products and services (Leonard and Swap, 2005:119). Huang, Wei and Chang (2007:611) assert that knowledge workers contribute to the expansion of the organisation's knowledge assets, such as patents and intellectual property, by finding solutions and creating innovative concepts, products and services. Rajender and Kumar (2012:2) concur with the observation of Huang, *et al.* (2007:611) and add that organisations that employ knowledge workers yield a return on investment, as a result of increased market share and growth, higher levels of productivity, improved customer service and the ability to adapt to change.

Figure 3.8 below depicts a summary of the contributions that knowledge workers can make towards an organisation (Sutherland and Jordaan, 2004:55). According to Sutherland and Jordaan (2004:56), knowledge workers (Figure 3.8) act as intermediaries between the organisation and work groups. Knowledge workers (Figure 3.8) develop appropriate knowledge, skills and understanding to extract and translate tacit, explicit and embedded knowledge in the organisation. Lengnick-Hall and Moritz (2003:367), as cited by Sutherland and Jordaan (2004:56) (Figure 3.8), affirm that knowledge workers

contextualise their knowledge and use processes and tools to create and share information to encourage problem solving and innovation.

FIGURE 3.8 THE CONTRIBUTION OF KNOWLEDGE WORKERS TO AN ORGANISATION



Source: Sutherland, M. and Jordaan, W. (2004:55). Adapted.

3.2.4.2 Challenges Pertaining to Knowledge Workers in the South African Higher Education UoT Sector

Despite the various benefits associated with employing knowledge workers, O'Neill and Adya (2007:411) report that the biggest challenge that organisations face is to attract and retain suitable employees to confront the information age and the challenges of a Knowledge-based Economy. The American Society for

Training and Development maintains that while nine out of every ten jobs require post-secondary levels of reading, writing and mathematics, only half of those entering the American workforce for the first time have attained these skills (Awad, 2010:76-78; Huidor and Cooper, 2010:148). According to Auguado and Malik (2009:210), the concerns expressed by the American Society for Training and Development are shared by The Organisation for Economic Co-operation and Development (OECD) and the European Union. In the South African context, the Department of Science and Technology (DST, 2007:12-14) and Higher Education South Africa (HESA, 2009:7) concur with the concerns expressed internationally that people entering the workforce are ill-equipped to take on the role of a knowledge worker. Various South African researchers, such as Akoojee and Nkomo (2007:390); Letsaka and Maile (2008:1); and Case, Marshall and Grayson (2013:1) have also expressed their concerns as to whether South African HE UoT institutions are adequately equipping students for the world of work within the Knowledge-based Economy.

The national and international challenges associated with developing, attracting and retaining knowledge workers have shifted the focus of the HE UoT sector to becoming increasingly focused on life-long learning in order to ensure that students receive the skills necessary to be productive knowledge workers in the 21st century (Scott and Hendry, 2006:2). Cloete (2009:3) explains that many of the knowledge workers currently entering the workforce are from the Generation X demographic. These new knowledge workers value life-long learning over life-long employment (Archer, 2010:15). Bhorat, Mayet, and Visser (2010:102) emphasise that where baby boomers are proficient in specified knowledge regarding a specific organisation, Generation X knowledge workers acquire knowledge from many organisations and transfer that knowledge from one organisation to another. The challenges associated with knowledge workers have created a window of opportunity for the UoT sector to focus on practical work-integrated knowledge and skills transfer by offering programmes that address the needs of students and organisations (Scott, Yeld and Hendry,

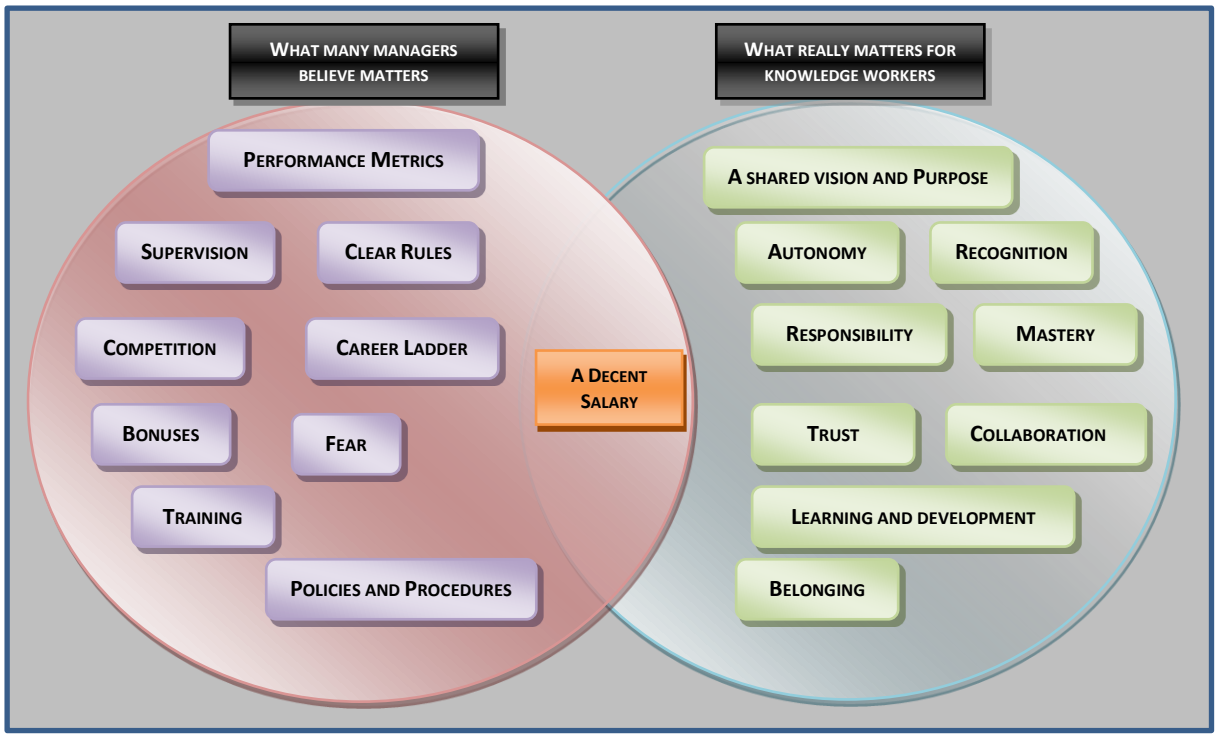
2007:3; Scott, 2009:4; Scott, 2010:2). Thus, the DUT is ideally positioned to take up these challenges due to strong industry partnerships.

However, the greatest challenge for the HE UoT sector, including the DUT, is to ensure that the knowledge workers employed at the various institutions are equipped with the knowledge, skills and expertise to meet the life-long focused HE service-delivery objectives of South Africa (Jacobs, 2008:879; Case, 2011:78). Davenport (2013:9) states that "knowledge workers are at the core of the implementation of Knowledge Management in an organisation, but are also the most challenging factor to manage". Davenport's (2013:9) assertion (2013:9) highlights a grave concern expressed by other South African researchers, such as Jacobs and De Bruin (2010:21) and Wieman, Perkins and Gilbert (2010:9), that knowledge workers, in the context of the South African HE environment, require a different style of institutional leadership and management, as well as a supportive working environment that encourages knowledge creation and knowledge sharing.

The South African HE UoT landscape has evolved in the past two decades, but in the UoT sector the shift from manual workers to knowledge workers has not yet occurred (Snyman and üuger, 2004:10; Moleke, 2005:92; Stumpf, 2010:3). According to Slonimsky and Shalem (2005:93), institutional leadership and management in the HE UoT sector still believe that employees should be governed by close supervision and enforced performance metrics, as opposed to workplace autonomy and a shared vision and purpose. Odhiambo (2011:304) adds that HE UoTs are often regarded as an environment for training as opposed to encouraging life-long learning amongst employees. Botha, *et al*. (2008:72) attest that UoTs fail to recognise the need for a collaborative decision-making approach and management instills a culture of fear instead of belonging.

HE UoTs highlight competition and employee career ladders, instead of enabling employees to master knowledge and skills relating to their field of expertise by emphasising individual recognition (Kreber, 2002:13; Mikail, 2008:11). Meyer and Allen (1997:12) argue that the HE sector is failing to recognise that a decent salary is required to attract and retain knowledge workers. According to Meyer and Botha (2000:12), the South African HE UoT sector can no longer afford to short change knowledge workers, since private organisations are then in a position to attract these employees. Consequently, the HE UoT sector loses out on valuable knowledge, skills and expertise which negates institutions to meet the challenges of the Knowledge-based Economy (Meyer and Herscovitch, 2001:312). As illustrated in Figure 3.9 below, the reported approaches of management and the expectations of knowledge workers in the HE UoT sector are highlighted (Newell, Robertson, Scarborough and Swan, 2009:102).

FIGURE 3.9 APPROACHES OF MANAGEMENT AND THE EXPECTATIONS OF KNOWLEDGE WORKERS



Source: Newell, S., Robertson, M., Scarborough, H. and Swan, J. (2009:102). Adapted.

As depicted in Figure 3.9, Newell, *et al.* (2009:102) state that management approaches perceive employees in the UoT sector to value bonuses, policies and procedures and training. However, the expectations of UoT employees differ from those believed to be important by management, as illustrated in Figure 3.9. Newell, *et al.* (2009:102) further reaffirm that employees also value autonomy, recognition and learning and development (Figure 3.9). Kreber (2002:14), as cited by Newell, *et al.* (2009:102), states that managers emphasise performance metrics (Figure 3.9), whereas employees prefer shared vision and purpose. According to Newell, *et al.* (2009:102), the common ground for management and employees is a decent salary (Figure 3.9) that will enable the HE institution to attract and retain knowledge workers.

Since the merger of Technikon Natal and M L Sultan Technikon in 2002, the DUT staffing requirements have come under pressure to meet the objectives of the institution. In the next five years, 18% of the current DUT staff compliment will retire and inevitably the institution will run short of experienced academics (DUT Workplace Skills Plan, 2013:13-15). This problem is common in most HE institutions and the Department of Higher Education and Training has set aside R169 million to address staffing shortages at South Africa's universities, since the average age in the HE sector is 55 years (Mailore, 2014:2).

Minister Blade Nzimande, the Minister of Higher Education in South Africa, summarises the dilemma of knowledge workers in HE institutions as follows: "The challenge is multi-facetted, having to do with the aging workforce; developments in higher education worldwide that demand ever greater levels of expertise from staff; the relatively under-qualified academic workforce; low numbers of postgraduate students – representing an inadequate pipeline and the slow pace of regeneration and change on the part of the sector itself" (Mngoma, 2014:1). Despite this important observation by Minister Blade Nzimande, the DUT has neither a strategy in place to address academic skills shortages in the next decade, nor recognise the needs of skilled knowledge

workers within the institution. At the DUT, the concept of knowledge workers is not yet acknowledged or embraced as an institutional necessity and minimum effort is made to attract or retain suitably qualified and experienced academic staff. If the DUT fails to address this skills shortage, it can detrimentally affect the ability of the institution to meet the challenges associated with KM in the 21st century.

3.3 AN OVERVIEW OF INTELLECTUAL CAPITAL AND ITS LINK TO THE HIGHER EDUCATION UOT SECTOR

The value of knowledge depends on how knowledge is being used and the importance of evaluating the impact of knowledge should provide insights for an organisation on how it is managing its knowledge assets (Newell, *et al.*, 2009:103). Intellectual Capital relates to the various measurement techniques and models that an organisation uses to measure the success of KM implementation (Archer, 2010:16). In this section of the literature, IC is shown as the link between IC and KM. Intellectual Capital models applicable to the HE context are discussed and the importance of IC for HE institutions operating in the Knowledge-based Economy is explored further.

3.3.1 Intellectual Capital Defined

Initially, IC was described by Steward and Ruckdeschel (1997:57) as “the sum of everything everybody in a company knows that gives it a competitive edge - Intellectual capital is intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth”. Stewart (2001:35) later defines IC as “knowledge that transforms raw materials and makes them more valuable, consisting of intangible assets such as employee knowledge, patents and research and development. Intellectual capital is the sum and synergy of an organisation’s knowledge, relationships, experience, discoveries, processes, innovations, market presence and influence on the community”.

3.3.2 The Link between Intellectual Capital and Knowledge

According to Bontis (2001:42), the interest in IC was sparked by a few organisations, such as Skandia, Dow Chemicals and the Canadian Imperial Bank of Commerce. These organisations recognised the importance of knowledge as a competitive advantage, but regarded the measurement indices that were available to be insufficient, since they favoured tangible assets and excluded intangible assets (Mulford, 2005:18). O'Neill and Adya (2007:411) assert that the trend that was started by Skandia encouraged other organisations to revisit the traditional focus that only the management of tangible assets ensured organisational success. This shift in organisational emphasis from tangible assets to intangible assets, encouraged Karl-Erik Sveiby to conduct research on how knowledge can be measured in relation to intangible assets (Swart and Kinnie, 2003:65). In an attempt to maximise value creation in an organisation, Sveiby developed the IC framework, which was based on three intangible assets, namely, the external structure, internal structure and individual competence (O'Neill and Adya, 2007:411). O'Neill and Adya (2007:410) demonstrate that the initial framework by Sveiby has been adapted by various researchers as shown in Table 3.9 below, but the basic tenet is to recognise the value of both tangible and intangible assets in managing knowledge in an organisation.

TABLE 3.9 COMPARISONS OF INTELLECTUAL CAPITAL CONCEPTUALISATIONS BY VARIOUS AUTHORS

Annie Brooking (United Kingdom)	Goran Roos (United Kingdom)	Thomas Stewart (United states of America)	Nick Bontis (Canada)
Human-Centred Assets	Human Capital	Human Capital	Human Capital
Skills, abilities and expertise, problem-solving abilities and leadership styles	Competence, attitude and intellectual agility	Employees are an organisation's most importance assets	The individual-level of knowledge that each employee possesses
Infrastructure Assets	Organisational Capital	Structural Capital	Structural Capital
All the technologies, processes and methodologies that enable a company to function	All organisational innovations, processes, intellectual property and cultural assets	Knowledge embedded in information technology	Non-human assets or organisational capabilities used to meet market requirements
Intellectual Property	Renewal & Development Capital	Intellectual Property	Intellectual Property
Know-how, trademarks and patents	New Patents and training efforts	All patents, plants and trademarks	Unlike IC, IP is a protected asset and has a legal definition
Market Assets	Relational Capital	Customer Capital	Relational Capital
Brands, customers, customer loyalty and distribution channels	Relationships which include internal and external stakeholders	Market information used to capture and retain customers	Customer Capital is only one feature of the knowledge embedded in organisational relationships

Source: O'Neill, B. and Adya, M. (2007:411). Adapted.

According to O'Neill and Adya (2007:411), renowned authors in the field of IC, as shown in Table 3.9, recognise the value of categorising IC in an organisation by distinctive groupings such HC, Structural Capital, Intellectual Property and Relational Capital. Bontis (2001:43), as cited by O'Neill and Adya (2007:412), states that management should assess which IC descriptors are best suited for the objectives of an organisation (Table 3.9). Brooking (1997:364), as cited by O'Neill and Adya (2007:411) in Table 3.9, suggests that the four common IC descriptors often relate to employees (HC); the market share or customers of the company; intellectual property; and infrastructure.

Mohope (2014:1988) points out that a key aim of KM is to clearly support and manage all IC elements in an organisation and effective KM will contribute to the development of IC. Misha (2009:2) concludes that IC informs an organisation of the approaches, methods and measurement tools available that

identify, measure and manage knowledge in the Knowledge-based Economy. Seddon, O'Donovan and Zokaei (2010:15) state that IC or knowledge assets embrace more than mere knowledge and serve as an overarching term for the knowledge available in the organisation and the effectiveness and efficiency with which it is managed.

3.3.3 Deconstructing Intellectual Capital in the Higher Education Sector

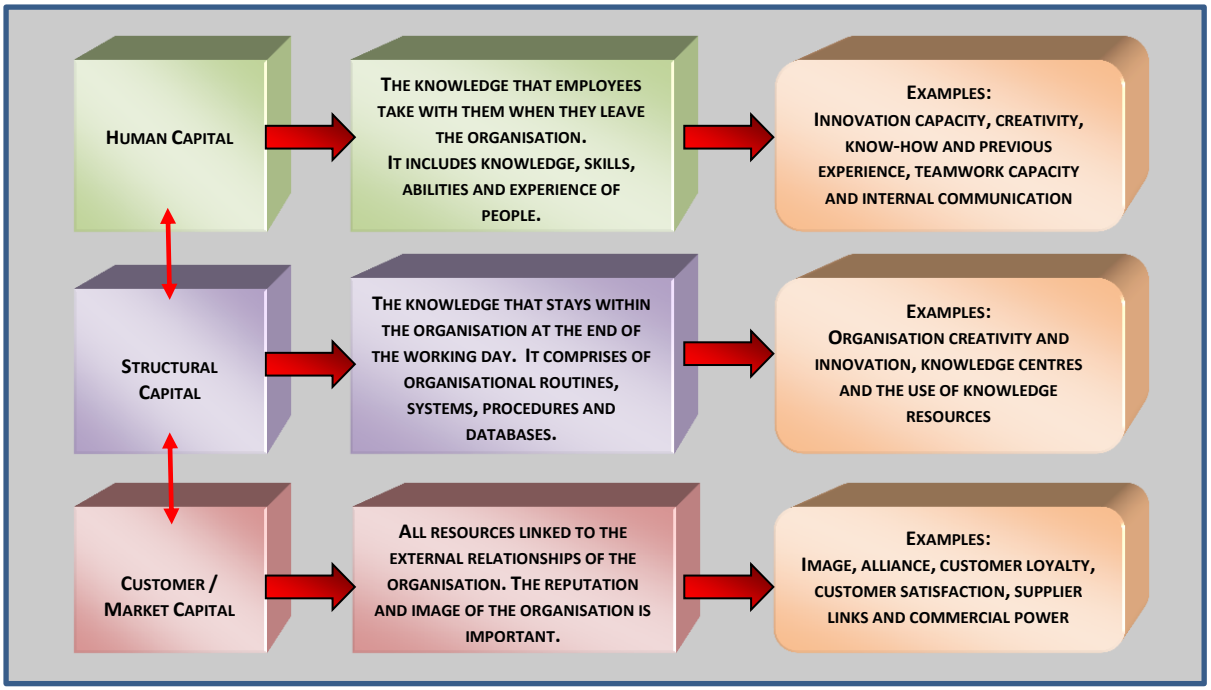
KM in the HE sector has become prevalent in the last decade as a result of globalisation, legislation and increased demands that HE institutions have to face in order to play a leading role in knowledge creation and knowledge development in the Knowledge-based Economy. This section provides a systematic deconstruction of IC by means of identifying the different types of IC, which is followed by the various IC models that have been empirically tested in the context of the HE sector. Lastly, this section provides an overview of the most popular IC measurement methods identified in the HE sector that can be used at UoTs and DUT as an institution of higher learning.

3.3.3.1 Types of Intellectual Capital

The three most commonly reported types of IC in the HE context (as depicted in Figure 3.10) are Human Capital, Structural Capital and Customer or Market Capital (McIntyre, Dalkir, Paul and Kitambo, 2015:13). Scott (2009:18) states that HC is composed of the skills, talent, knowledge and expertise of the employees in an institution. It can be described as the HE institution's collective capability to extract the best solutions for customers and stakeholders from the knowledge base of its individuals (Muller, 2012:14). Easterbury-Smith and Lyles (2011:90) describe Structural Capital as the knowledge that has been captured and institutionalised within the structure, processes and culture of an

institution. It includes patents, copyrights, proprietary software, trademarks and all documented organisational know-how (Marshall and Case, 2010:496). Customer or Market Capital (also referred to as Relational Capital) refers to all of the relationships with the outside world such as brand recognition, the reputation of the HE institution and the extent to which it has developed relationships with external stakeholders (Marshall, 2009:135).

FIGURE 3.10 THE THREE TYPES OF INTELLECTUAL CAPITAL



Source: McIntyre, S., Dalkir, K., Paul, P. and Kitambo, I.C. (2015:13). Adapted.

Figure 3.10 below provides a summary of the three types of IC (McIntyre, *et al.*, 2015:13). The three types of IC (Figure 3.10), namely, Human Capital, Structural Capital and Customer or Market Capital emphasise the value of categorising various areas of IC in an organisation to allow management the opportunity to monitor and assess the contribution of each component. Each of the three types of IC (Figure 3.10) is briefly described by McIntyre, *et al.* (2015:13), followed by examples to further clarify the categorisation of IC.

3.3.3.2 Intellectual Capital Models empirically tested in the Higher Education Sector

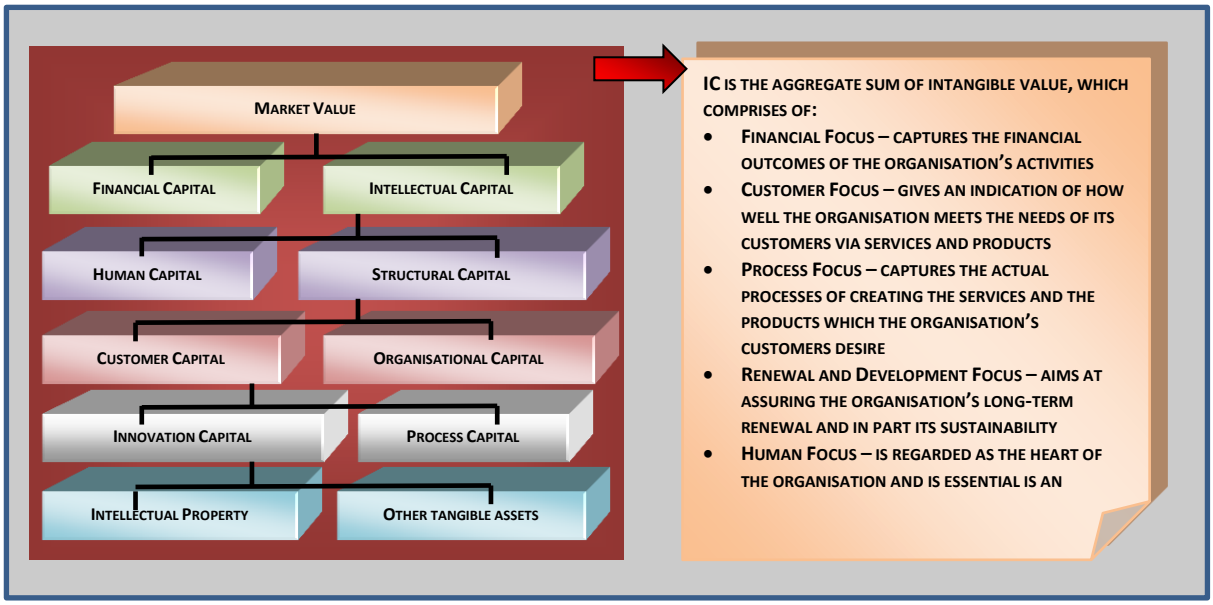
Since the 1990s, a variety of IC models have been developed to assist organisations to measure knowledge. These IC models are generally grouped into four categories, namely: The first category is models based on direct intellectual capital methods, which estimates the value of intangible assets in an organisation (Senge, 2004:11). The second category of IC models is based on market capitalisation and focuses on the difference between an organisation's market value capitalisation and stakeholder equity (Shakir, 2009:313). Thirdly, IC models have been grouped based on return on assets and rely on traditional accounting practices, while the last category of IC models covers models based on scorecard methods, which use the components of IC to develop indices (Newell, *et al.*, 2009:19).

Shay (2012:315) reinforces the view that in the HE context, the scorecard models are preferred since these models are more holistic than other strict financial approaches and they incorporate concepts such as HC, Structural Capital and Customer and Relational Capital. The viewpoint of Shay (2012:315) is shared by Abel and Deitz (2011:3); Coclová (2012:21); Tehrani (2012:2); and Bennet and Bennet (2014:42). Marshall and Case (2010:496) state that the IC models that address the non-financial aspects of the HE institution offer a more balanced approach to measuring institutional knowledge and determining the success of implementing KM in the HE sector. Stumpf (2010:4) adds that since IC in the HE sector is inherently intangible and influenced by a complex web of socio-political and cultural factors, the use of scorecard IC models in KM assessment ensures that the objectives of the HE institution can be met.

3.3.3.2.1 THE SKANDIA INTELLECTUAL CAPITAL VALUE SCHEME

The Skandia Intellectual Capital Value Scheme, as illustrated in Figure 3.11 below, was developed by Leif Edvinsson at Skandia (a Swedish financial company) and is a collection of all measurements that comprise a holistic view of performance and goal achievement (Magal and Word, 2009:29). According to Gabe, *et al.* (2012:1185), the Skandia Intellectual Capital Value Scheme (Figure 3.11) allows the management team to visualise the value creation process of KM, by means of identifying the importance of HC and Structural Capital. Edvinsson (2002:34) states that the Skandia Intellectual Capital Value Scheme (Figure 3.11) can be described as "a house, with the financial focus as the roof; the walls are the customer focus; the inside of the house is the human focus; the door is the renewal and development component and the foundation is the process focus".

FIGURE 3.11 THE SKANDIA INTELLECTUAL CAPITAL VALUE SCHEME



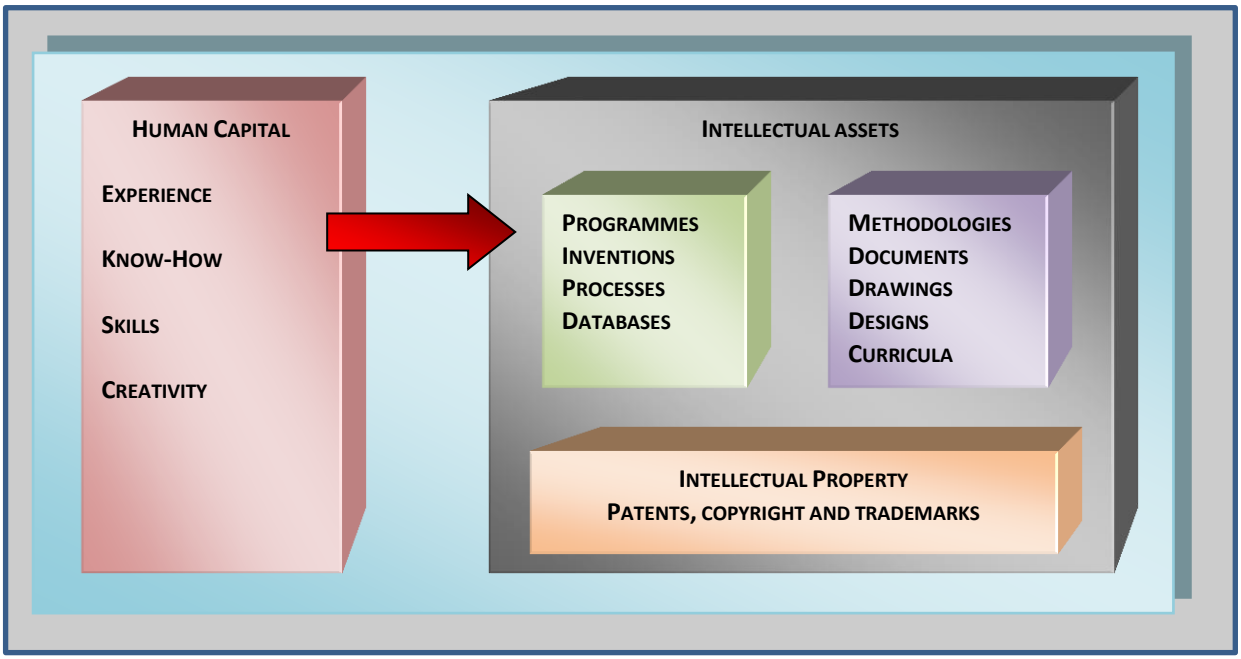
Source: Edvinsson, L. (2002:34). Adapted.

Salanjaku (2014:2) explains that the value of the Skandia model (Figure 3.11) for HE institutions lies in its ability to provide a balanced picture of the financial and intellectual capital within the UoT. Grant (2007:38) adds that the Skandia model (Figure 3.11) also acknowledges the importance of customers in the HE sector, the need for innovation and processes, as well as integrating intangible assets with IC. According to Kruger and Johnson (2011:271), the Skandia model (Figure 3.11) further allows a UoT to visualise that IC and KM comprises of financial, human and structural interventions. Manuri and Raja Abdullah (2011:77) state that the Skandia Intellectual Capital Value Scheme (Figure 3.11) encourages the executive management team of a UoT to value both the tangible and intangible assets in the institution. However, Kruger and Johnson (2011:271) warn that the Skandia model (Figure 3.11) fails to provide more then general guidance to executive management in a UoT on how IC can be managed for value creation and should therefore be used in conjunction with other IC models.

3.3.3.2.2 Sullivan's Intellectual Capital Model

Sullivan (1999:138) developed an IC model consisting of three components, namely, Human resources, Intellectual Assets and Intellectual Property as depicted in Figure 3.12 below. According to Boughey (2007:7), it is Sullivan's contention that Human resources provide the know-how and institutional knowledge concerning topics of importance to the UoT. Gilpin and Murphy (2008:75) contend that Sullivan's Model (Figure 3.12) recognise that Human Resources comprise the collective experience, skills and general know-how of all the employees in the HE institution. Clegg (2009:59) clarifies that Intellectual Assets refer to the codified, tangible or specific descriptions of specific knowledge to which the HE institution can assert an ownership. Seddon, *et al.* (2010:54) describes Intellectual Property as an intellectual asset, which Sullivan believed could be legally protected, such as patents, copyrights and trademarks.

FIGURE 3.12 SULLIVAN'S INTELLECTUAL CAPITAL MODEL



Source: Sullivan, P.H. (1999:138). Adapted.

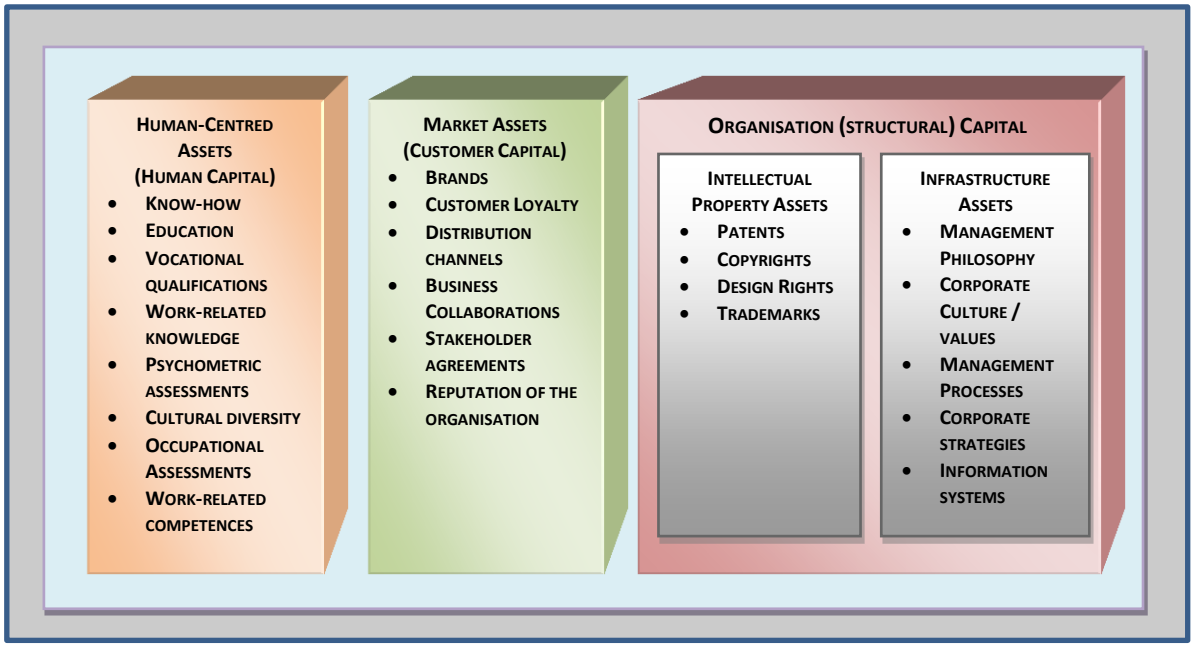
Wamundila and Ngulube (2011:3) explain that in the context of the HE sector, the model (Figure 3.12) recognises that Human Capital creates Intellectual Assets, which results in Intellectual Property. Chong (2006:238) affirms that Sullivan's Model (Figure 3.12) encourages HE UoT institutions to value employees and to acknowledge the importance of HRM when implementing IC and KM. Wamundila and Ngulube (2011:3) conclude that Sullivan's IC model (Figure 3.12) demonstrates that Intellectual Assets in a UoT is not possible without employees, who are skilled, knowledgeable and experienced.

3.3.3.2.3 Brooking's Technology Broker Intellectual Capital Model

Brooking's Technology Broker Intellectual Capital Model is formed by four components, namely, Market assets; Human-centred assets; Intellectual property assets; and Infrastructure assets as illustrated in Figure 3.13 below. Peters and Besley (2005:128) describe market assets in the Brooking IC Model

(Figure 3.13) as all market related intangibles, including brands, customers and customer loyalty. Keengwe and Agamba (2015:6) assert that human-centred assets relate to employees' skills, expertise, problem-solving abilities and leadership styles. Peters and Besley (2005:128) clarify that in Brooking's IC Model (Figure 3.13), intellectual property assets are any intangibles that can be protected by copyright, while infrastructure assets represent all the technologies, processes and methodologies enabling an organisation to function.

FIGURE 3.13 BROOKING'S TECHNOLOGY BROKER INTELLECTUAL CAPITAL MODEL



Source: Peters, M.A. and Besley, T. (2005:128). Adapted.

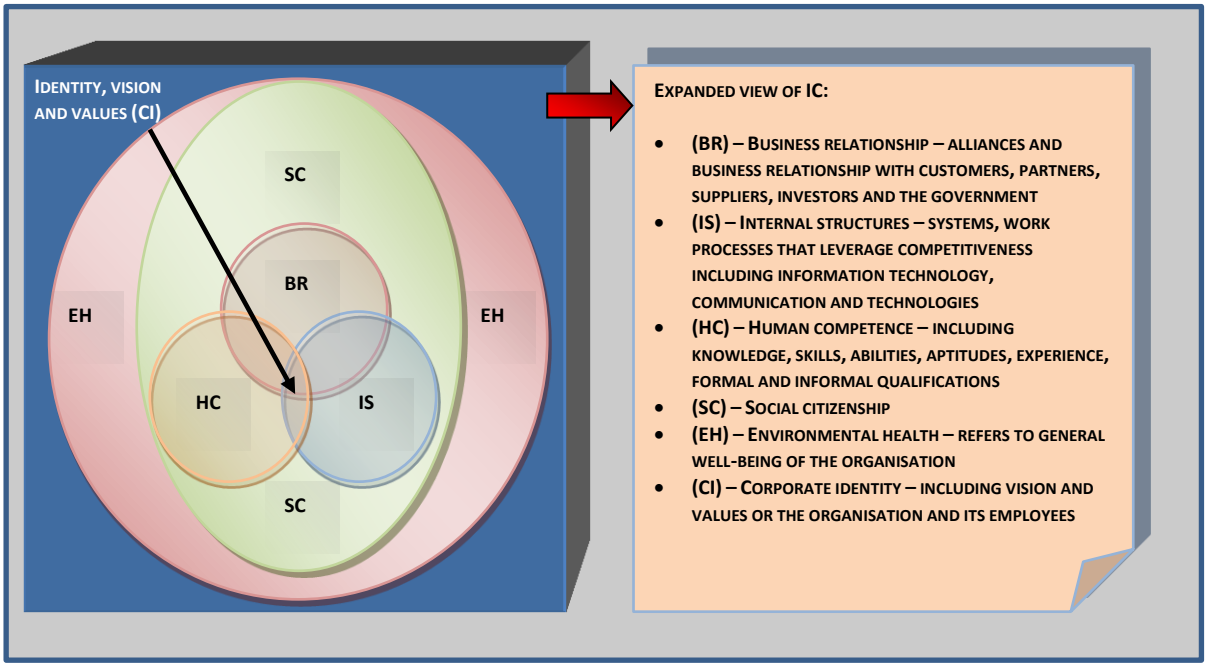
According to Hulsekopf (2014:47), the important contribution of Brooking's Technology Broker Intellectual Capital Model (Figure 3.13) to UoTs lies in identifying aspects such as cultural diversity, management philosophy, organisational culture and management processes as criteria to consider when implementing IC and KM. Peters and Besley (2005:128) state that Brooking's

Model (Figure 3.13) acknowledges the value of integrating all four components of IC in the context of the HE sector by means of recognising the need to balance human assets, the needs of the customer, the institutional structure and intellectual property. Vergauwen, Bollen and Oirbans (2007:1174) affirm that HE UoT can become aware of a broader variety of IC components by utilising Brooking's Model (Figure 3.13).

3.3.3.2.4 Allee's Value Network Approach to Intellectual Capital

Allee (2009:429) developed the Value Network Approach to IC as depicted in Figure 3.14 below, which emphasises the importance of knowledge networks in building and sharing IC and implementing KM. Freeman and Soete (2009:584) assert that the emerging trend is that organisations today are working to formalise and jump start knowledge networks, so that best practices, ideas and innovations can be efficiently refined and shared. Venezia and Allee (2007:21) comment that training and development contribute to this effort by creating course and performance support structures that both nurture and take advantage of knowledge networks. Allee (2009:72) adds that knowledge networks incorporate business relationships, human competencies and internal structures. Jacobs and De Bruin (2010:21) further recognise the relationship between knowledge networks and social networks in an organisation, since the social structures or relationships between individuals and groups in the organisation affects how knowledge networks develop and evolve.

FIGURE 3.14 ALLEE'S VALUE NETWORK APPROACH TO INTELLECTUAL CAPITAL



Source: Allee, V. (2009:429). Adapted.

In the context of the South African HE UoT sector, Allee's Value Network Approach to Intellectual Capital (Figure 3.14) recognises the importance of developing an institutional identity (Jacobs and de Bruin, 2010:21). Jacobs and De Bruin (2010:22) state that Allee's Value Network Approach to Intellectual Capital (Figure 3.14) also encourages employees to become social citizens of an institution and develop a sense of belonging. Gabe and Abel (2012:439) support the assertion of Jacobs and De Bruin (2010:22) and add that knowledge networks in a HE UoT can be simply defined as who communicates with whom and who learns from whom. Consequently, according to Alhawaria, Karadshehb, Taletc and Mansoura (2011:54), knowledge workers develop effective ways of doing their jobs in that they share information with each other and thus knowledge networks grow spontaneously.

Liyanage, Elhag, Ballal and Li (2009:128) contend that social citizenship in a HE institution results in employee retention, increased levels of job satisfaction and an environment that encourages knowledge sharing. The opinion of Liyanage, *et al.* (2009:128) is shared by Hall (2006:120) and Gabe and Abel (2012:439). Marouf (2007:119) affirms that, in the UoT sector, institutions such as the DUT can utilise social networks and knowledge networks to encourage creativity and innovation, since employees should be allowed to participate within groups and across group structures. Martins, *et al.* (2004:94) warn that UoTs will have to rethink their institutional identity, since most institutions, like the DUT, have experienced challenges in developing and maintaining knowledge networks, social networks and the general well-being of the institution in terms of retaining HC.

3.3.4 Intellectual Capital Indicators in the Higher Education Sector and the Balanced Scorecard

Yang (2007:88) states that for most countries, the appearance of IC indicators in HE constitutes a response to two policy objectives: exercising more rigorous monitoring in this field and, in times of financial restraint, establishing a more direct and observable link between government funding and performance. Weitzel, *et al.* (2010:71) highlight that the goal of using a system of IC indicators is to make the autonomy and diversification of HE institutions compatible with accountability and the effective management of these institutions. According to Zoltan and Armington (2004:254), IC indicators thus provide a means of not only external monitoring of these HE institutions by governments, but also internal monitoring of overall institutional goals or specific ones set by departments or service units. Acemoglu and Yared (2010:83) agree with the observation made by Zoltan and Armington (2004:254) and concur that using an IC indicator system can provide a clear and coherent definition of government goals and policies in matters relating to HE institutions. Yu, *et al.*

(2007:43) assert that the IC indicator system provides a means of assessing progress towards the objectives of a HE institution and the educational programmes offered. Blankley and Booyens (2010:372) postulate that IC indicators can be regarded as the medium through which politicians, decision-makers and the executive management of a HE institution can precisely define the results they expect from their strategies and plans.

Tebele (2013:86) stresses that the most commonly reported IC indicator system for HE institutions is that for public information, which relates to the information trends in the student population; the degrees, diplomas and certificates issued; qualifications of employees; funding resources; and research assets. Gilpin and Murphy (2008:19) state that for a number of years IC indicators that are merely developed for public information have been regarded as sufficient in the context of the HE sector. Lom (2012:20) believes that as important as these traditional indicators are, these IC measures fail to present a comprehensive image of the current status of an institution. Huang, *et al.* (2007:619) caution against HE institutions merely relying upon IC indicators for public information, since the data often excludes strategic intent, financial planning and HC management. Gumede (2012:139) concurs with Huang, *et al.* (2007:619) and refers to trends in various countries such as France, the United Kingdom, Malaysia, Niger, Uganda, Botswana and Namibia where IC indicators contain data "that is nice to know, but fail to contribute to the management of a HE institution". Venezia and Allee (2007:21) contend that in order to address these problems, a balanced approach to IC indicators and measurement is needed, which then combines the government indicators for public information as well as the unique indicators for each HE institution in terms of financial planning, customers, HC and internal structures. Various authors such as Tettey (2010:87); Wamundila and Ngulube (2011:3); Tebele (2013:87); and Hulsekopf (2014:47) regard the Balanced Scorecard (here after referred to as BSC) to be the most effective IC measurement tool in the HE sector.

3.3.4.1 The Balanced Scorecard (BSC)

The Balanced Scorecard (BSC) as illustrated in Figure 3.15 below, was developed by Robert Kaplan and David Norton in 1992 as a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics to give managers a more balanced view of organisational performance (Mazutis and Slawinski, 2008:443). Kaplan and Norton (1996:7) regard the BSC (Figure 3.15) as a management system that includes measurement and control in order to view the organisation from four perspectives, namely, financial, customer, internal processes and learning and growth. Roche (2013:143) affirms that the four perspectives are intertwined in a causal relationship in which a financial perspective is considered as a result indicator driven by the other three operational indicators. This system allows the organisation to focus its strategic initiatives and investments on those aspects that are important triggers for achieving strategic goals (Hall, 2006:121). Kaplan and Norton (1996:12) recognise that performance measurement should start from the organisation's strategy and that effective measurement must be an integral part of the management strategy within the organisation. Since its development in 1992, the BSC (Figure 3.15) has been extended as an IC measurement model in business and industry, government and non-profit organisations worldwide to align business activities to the vision and strategy of the organisation (Gabe, *et al.* 2012:1187).

FIGURE 3.15 THE BALANCED SCORECARD

Source: Kaplan, R.S. and Norton, D.P. (1996:7). Adapted.

The four perspectives of the BSC (Figure 3.15) allow an organisation to collect data and analyse it in a manner relative to each of the perspectives. The Learning and Growth Perspective includes employee training and organisational cultural attitudes related to both individual and organisational self-improvement (Huidor and Cooper, 2010:149). Hislop (2013:76) states that the Business Process Perspective (Figure 3.15) refers to internal business processes and allows the managers to know how well their business is running and whether its products and services conform to customer requirements. Acemoglu, Egorov and Sonin (2010:1534) describe the Customer Perspective (Figure 3.15) as the best indicator to predict future success, since poor performance from this perspective is a leading indicator of future decline, even though the current financial picture of the organisation may be good. Gabe and Abel (2011:1359) emphasise that Kaplan and Norton (1996:7) do not disregard the traditional need for financial data, but declare that the Financial Perspective (Figure 3.15) should be viewed in relation to the other perspectives.

Milton (2010:103) reports that in the past two decades the BSC (Figure 3.15) has gained popularity in the HE sector, since it combines financial and non-financial IC indicators. Carneiro (2000:92) associates the popularity of the BSC with its holistic measurement approach, which can be applied at the HE institution's strategic level, operational level and individual level. Gabe and Abel (2011:1359) concur with Carneiro (2000:92) and state that the BSC allows all employees in the HE institution to understand how they contribute towards the success of the institution. According to Leydesdorff and Fritsch (2006:1548), the BSC aims to improve internal and external communications in a HE institution and monitor the institution's performance against strategic goals.

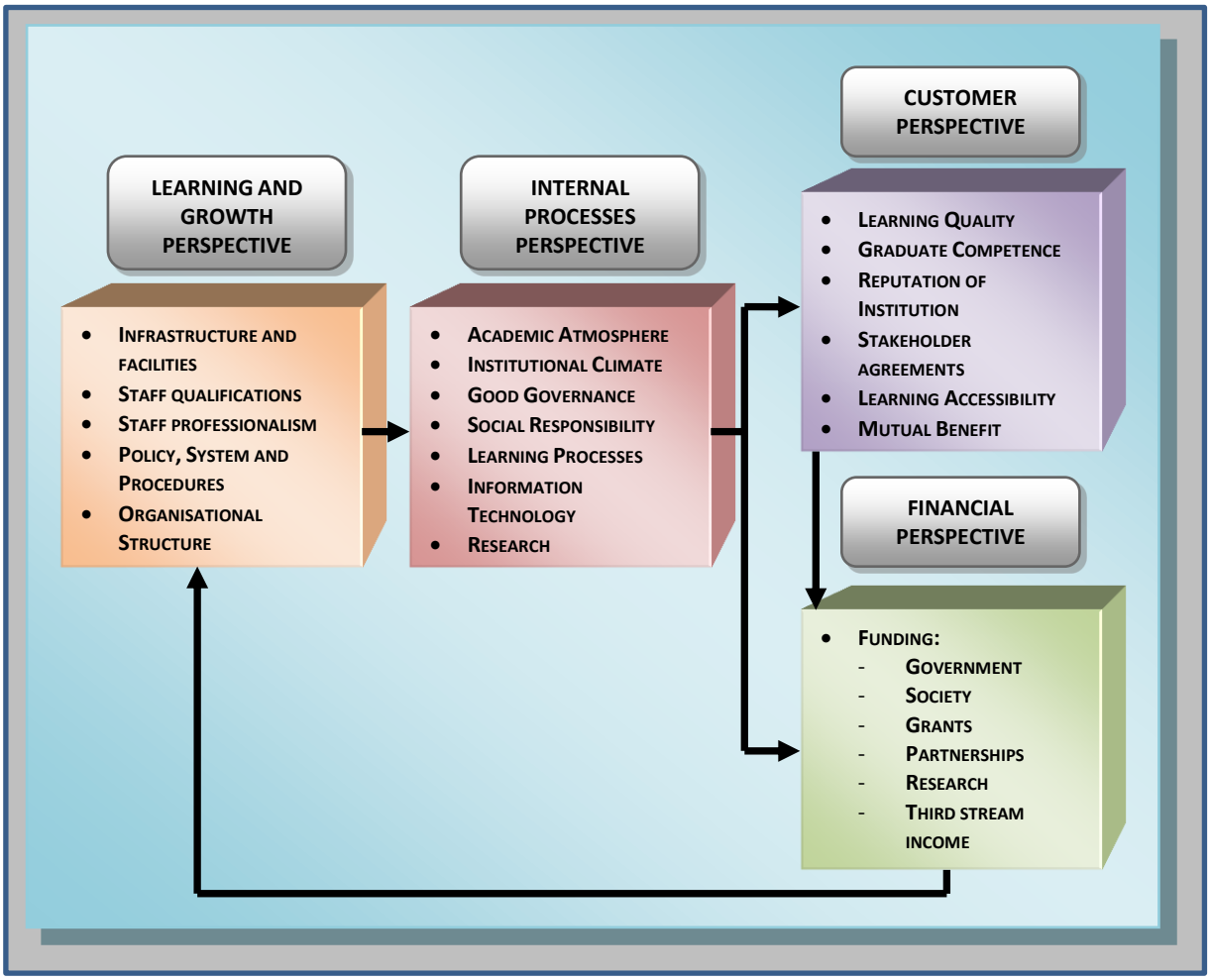
3.3.4.2 The Balanced Scorecard in the South African UoT Context

In the South African HE context the BSC has become prevalent since 2002 due to government initiatives to restructure the HE sector (Doctor, 2008:119). Case, *et al.* (2013:3) aptly summarise the shift in the South African HE UoT sector as "entering a new era where if something cannot be measured, it will not be understood. If it cannot be understood, then it will not be controlled; and if it cannot be controlled, it will not be developed". Etzkowitz (2008:84) remarks that this perception requires HE UoTs to revisit their strategic roles in terms of government policies and objectives. UoTs, such as the DUT, can no longer afford to only rely on IC indicators for public information purposes, but should also provide evidence on the successful management of the institution with regards to the implementation of KM in the Knowledge-based Economy (Du Pré, 2010:34).

Case, *et al.* (2013:3) highlight the benefits associated with implementing the BSC in the HE UoT sector and state that the BSC provides an integrated perspective on goals, targets and measures of progress for HE UoTs. Hall and Andriani (2003:150) attest that the BSC is an example of a closed-loop controller where actual performance at the UoT is measured. The measured value is then compared to an expected value and based on the difference between the two, corrective interventions are made as required. Jacobs (2008:872) agrees with Hall and Andriani (2003:150) and proposes that the BSC allows UoTs to become proactive strategic planning institutions adapting timeously to the challenges of the Knowledge-based Economy. However, the BSC is not optimally utilised at the DUT and the contribution of the BSC is not recognised throughout the institution as a means of contributing more effectively towards the strategy of the institution, especially from a financially sustainable perspective.

Letsaka and Maile (2008:4) support the flexibility of the BSC and refer to The Logical Hierarchy Model for Public Sector Organisations as illustrated in Figure 3.16 and developed by Wisniewski and Olafson in 2004, which proposes a flexible strategy map incorporating the BSC in the HE UoT sector. According to Letsaka and Maile (2008:4), this model (Figure 3.16) emphasises the importance of knowledge in the HE UoT sector, since the Learning and Growth Perspective of the BSC is regarded as the starting point for a HE institution to measure IC. Wisniewski and Olafson (2004:34) stress the relationship between the Learning and Growth Perspective (Figure 3.16) and the Internal Process Perspective in the BSC and believe that the core of a UoT lies with its HC.

FIGURE 3.16 THE LOGICAL HIERARCHY MODEL FOR PUBLIC SECTOR ORGANISATIONS



Source: Wisniewski, M. and Olafson, S. (2004:43) as cited by Letsaka, M. & Maile, S. (2008:2).

At the DUT, although the Learning and Growth Perspective (Figure 3.16) is recognised at a strategic level (DUT Strategic Plan, 2013:9), the institution has not created an environment that is conducive to learning, growth, development and training of its HC. It would prove beneficial if the DUT recognises the value and importance of its HC as an IC indicator; its knowledge workers as enablers for the implementation of KM; and proactive leadership as change agents in embracing the demands of the Knowledge-based Economy.

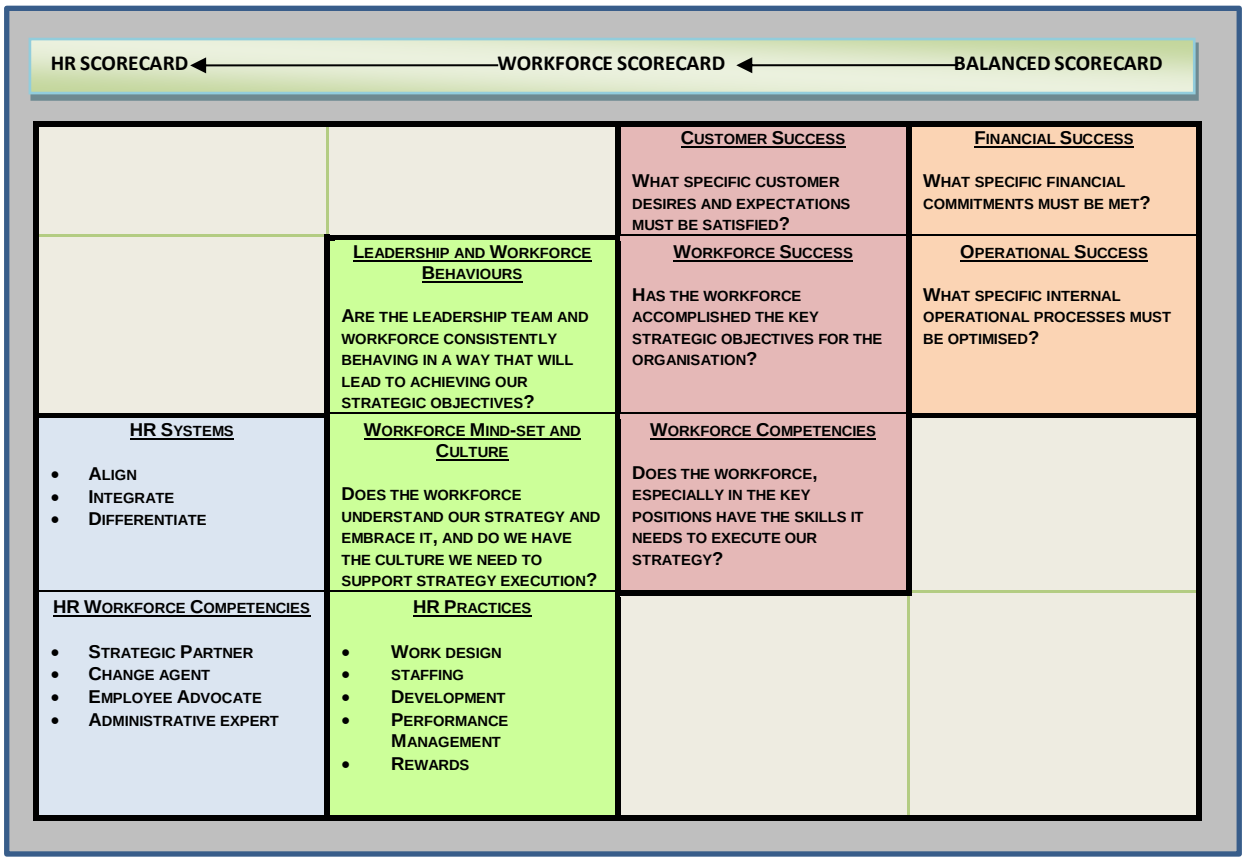
3.3.5 The Human Capital Balanced Scorecard

Wickramasinghe and James (2003:298) state that because the BSC focuses on the strategy and metrics of the institution, Mark Huselid took the BSC concept further and developed the Human Resource and Workforce Scorecard to provide a framework specific to HRM. According to Huselid and Becker (2011:427), the Workforce Scorecard as depicted in Figure 3.17 below, identifies and measures the behaviours, skills, mindsets and results required for employees to contribute to the institution's success.

Huselid and Barnes (2003:83-84) identify four key sequential elements in the Workforce Scorecard as summarised in Figure 3.17 below, namely: the Workforce Mind-Set and Culture, which explores the extent to which the employee understands and embraces the strategy and whether the institution's culture support the execution of the strategy; secondly, the Workforce Scorecard (Figure 3.17) identifies Workforce Competencies to determine whether employees in the institution have the necessary skills to execute the strategy (Becker and Huselid, 2010:385-386); thirdly, Leadership and Workforce Behaviours are investigated to establish whether the institution's leadership and employees are behaving in a way that will lead to the institution attaining its key strategic objectives (Beatty, Huselid and Schneier, 2003:119-121); and lastly, the Workforce Scorecard (Figure 3.17) identifies Workforce Success, which relates to whether or not the employees have achieved the key strategic objectives for the institution (Huselid, Becker and Beatty, 2005:219-221).

Huselid and Becker (2011:426) further assert that the Workforce Scorecard (Figure 3.17) is as much about managing employee success as it is about measuring employee performances. Beatty, *et al.* (2003:122) add that the Workforce Scorecard (Figure 3.17) also emphasises the importance of managing employees as opposed to the role and contribution of the HRM function in a HE institution. Liebowitz (2009:11) affirms that the Workforce Scorecard (Figure 3.17) is a tool that executive management can use in a HE institution to hold line managers accountable for employees' performances. Huselid and Barnes (2003:83) recommend that employee success depends on a shared responsibility between line managers and Human Resource professionals. Employee success also requires line managers and the HRM function to adopt a different perspective on managing employees (Lytras, Pouloudi, and Poulymenakou, 2002:43). Huselid, *et al.* (2005:3) state that the traditional perspective on employee' success often focuses on standardisation and cost reduction and has little to do with the demands of successful strategy execution. According to Beatty, *et al.* (2003:122), what is needed in the future is a differentiation workforce strategy where the needs and expectations of employees are managed based on their unique contribution to the institution.

FIGURE 3.17 THE HUMAN RESOURCE AND WORKFORCE SCORECARD



Source: Huselid, M.A., Becker, B.E. and Beatty, R.W. (2005:4). Adapted.

The arrows at the top section of Figure 3.17 move from the BSC towards the Human Resource Scorecard, which reflects a development process that begins with a clear statement of the institution's strategy and operational goals, as well as a strategy map showing the significant linkages in the process (Becker and Huselid, 2010:383). In the case of the DUT, the institution's strategy and operational plans are clearly identified in the DUT Strategic Plan (2013:8-14). The next step in the process outlined in Figure 3.17 above, is the development of a workforce strategy and scorecard and the process concludes with the development of a Human Resource function strategy and scorecard (Becker and Huselid, 2010:384). However, according to Huselid, *et al.* (2005:6), the

value creation process runs in the opposite direction and therefore the foundation of employees' success begins with the HRM function, which is responsible for the design and implementation of HRM systems that can have a long-term impact on the benefits associated with the performance of a HE institution. However, at the DUT, the HRM function is ill-equipped and unprepared to ensure that the employee value creation process is effectively utilised. There is a need for IC and KM to be implemented at the DUT, thus recognising the value of HC.

3.4 HUMAN CAPITAL IN THE HIGHER EDUCATION SECTOR

Guthrie and Lee (2010:11) contend that HC is generally regarded as a significant component of IC and KM, which has become a management buzz-word encouraging organisations to value their employees' knowledge, skills, expertise and experience. Wieman, *et al.* (2010:9) regard HC as the hardest of the three sub-domains of IC to codify and measure. Steur, *et al.* (2012:867) argue that the HC value-adding potential of individuals grows when pools of HC are created with complementary skills and tacit knowledge. Greenhalgh, Robert, Macfarlane, Bate and Kyriakidou (2004:599) explain that effective organisations integrate HC approaches as strategies for accomplishing their mission and goals in order to deliver results. Frick and Frick (2010:124) add that high performing organisations stay alert to emerging demands and HC challenges and remain open to re-evaluating their HC practices in the light of their demonstrated successes or failures in achieving the organisation's strategic objectives. The subsequent section focuses on HC, identifies various HC models that have been tested empirically in the HE sector and the development of a HRM BSC in the context of a UoT, and in particular the DUT.

3.4.1 Human Capital Defined

Becker (1964:23) as cited in Frick and Frick (2010:124), describes HC in the HE sector as "a collection of resources – all the knowledge, talents, skills, abilities, experience, intelligence, training, judgment and wisdom possessed individually and collectively by individuals in a population. These resources are the total capacity of the people that represents a form of wealth which can be directed to accomplish the goals of the nation or state". Lussier and Achua (2009:18) concur with Becker (1964:23) and state that HC is the stock of knowledge, habits, social and personality attributes, including creativity, embodied in the ability to perform labour so as to produce economic value.

Roos and Von Krogh (1996:335) describe HC as the soul that embraces the organisation and believe that HC is the collection of intangible resources embedded in the employees of the organisation. The opinion of Roos and Von Krogh (1996:335) is supported in research conducted by various authors in the HE sector, namely, O'Neill (2005:14); Rherrad (2009:169); and Secundo, Margherita, Elia, and Passiante (2010:146). The value of HC in the HE sector is also acknowledged by various South African researchers such as Rossouw (2003:42); Van Staden (2010:154); Weitzel, *et al.* (2010:66); and Wamundila and Ngulube (2011:3). Hence, its importance to the DUT.

3.4.2 An Overview of Human Capital Models in the Higher Education Sector

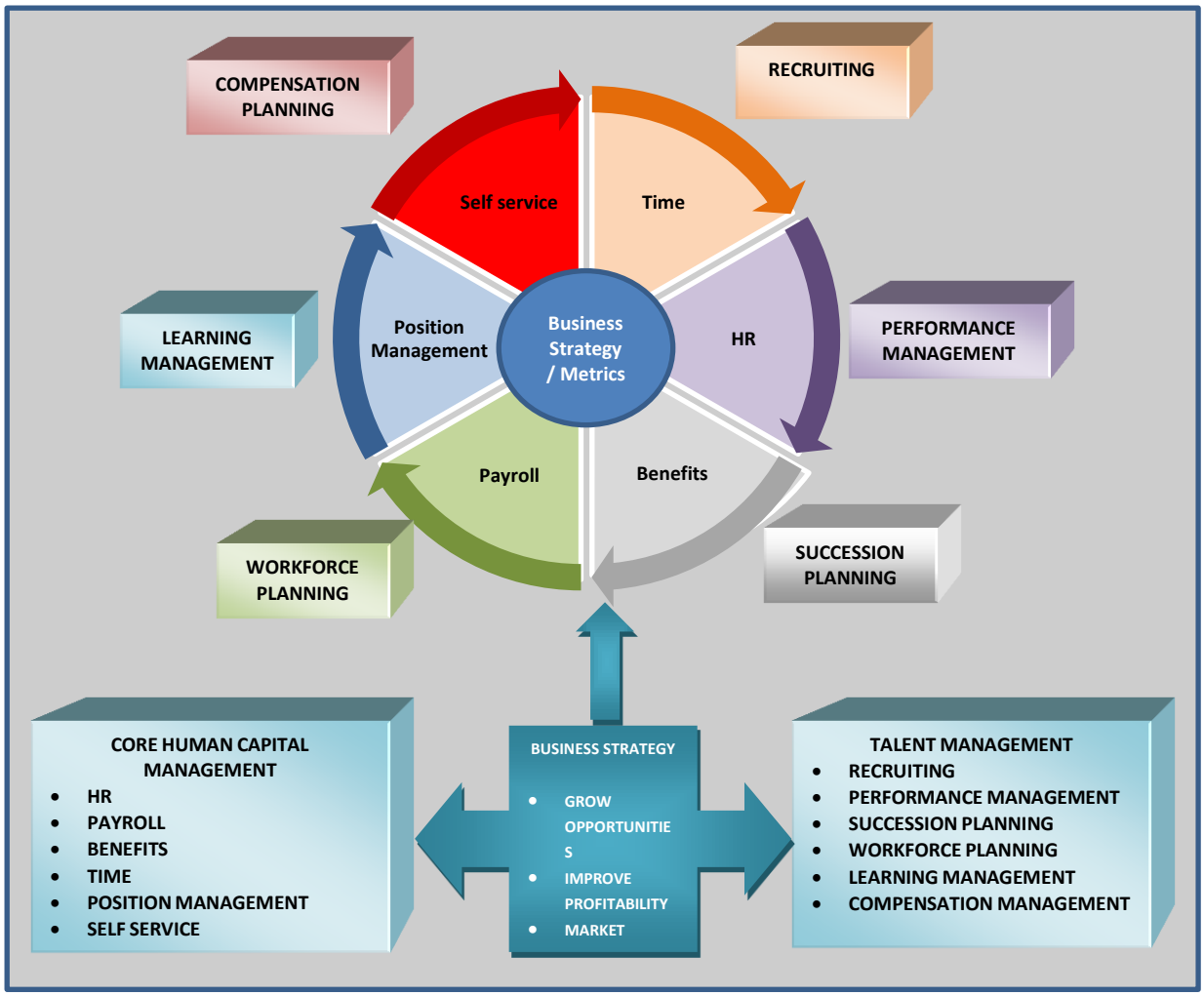
In the past decade, a vast number of HC models applicable to different industries, organisations and purposes have been developed. Each of these models epitomises a different approach to recognising the role and value of HRM to an organisation. There are three HC models that have been empirically tested in the HE sector. A brief discussion on each of these HC models follows:

3.4.2.1 The Human Capital Talent Management Model

The Human Capital Talent Management Model, which is depicted in Figure 3.18 below, is developed to assist HE institutions to value the knowledge, skills and experience that the institution's employees contribute towards the achievement of strategic objectives (Michaels, Handfield-Jones and Axelrod, 2001:154). The model (Figure 3.18) provides an overview of talent management and emphasises that the institution shares the responsibility for talent management with an employee (Tehrani, 2012:2). Tettey (2010:3) affirms that the Human Capital Talent Management Model (Figure 3.18) regards HC and talent management to be of equal importance in contributing towards the HE institution's strategic objectives.

The Human Capital Talent Management Model (Figure 3.18) also stresses the contribution of various segments, namely, time, Human Resources, benefits, payroll, position management and self-service (Michaels, *et al.,* 2001:154). Each of these segments in the wheel of Figure 3.18 below, is linked to a specific HRM function, namely, recruiting, performance management, succession planning, workforce planning, learning management and compensation management (Michaels, *et al.,* 2001:155). Central to the model (Figure 3.18) is the Business strategy and metrics, which identifies the importance of planning and measurement for an organisation (Michaels, *et al.*, 2001:155).

FIGURE 3.18 THE HUMAN CAPITAL TALENT MANAGEMENT MODEL



Source: Michaels, E., Handfield-Jones, H. and Axelrod, B. (2001:157). Adapted.

In the South African HE UoT sector, various researchers such as Lategan and Smit (2000:109); Kruger and Snyman (2007:60); and McLellan (2008:135) express concern that talent management is not recognised as a valuable contributor towards the ability of UoTs to adapt to the Knowledge-based Economy. Kruger and Snyman (2007:61) add that UoTs fail to direct their strategies to source, attract, select, train, develop, retain, promote and move employees through the institution. Tebele (2013:3) cautions that UoTs often lack the development of robust leadership pipelines and succession planning is

not implemented across the institutions, often resulting in gaps of knowledge and a lack of decision making and responsibility. Marshall and Case (2010:498) express their concern that UoTs often regard talent management and training and development as the same intervention. Kruss (2008:237) agrees with Marshall and Case (2010:498) and suggests that UoTs fail to realise that a holistic approach to talent management is required. Martins, *et al.* (2004:86) postulate that UoTs experience a lack of value proposition that appeals to multiple generations and these institutions neither have strategies in place to retain Generation Y employees, nor to encourage Generation X to share their knowledge and expertise. Thus, from a DUT perspective in a HE sector, HC and talent management is of paramount importance and should not be understated.

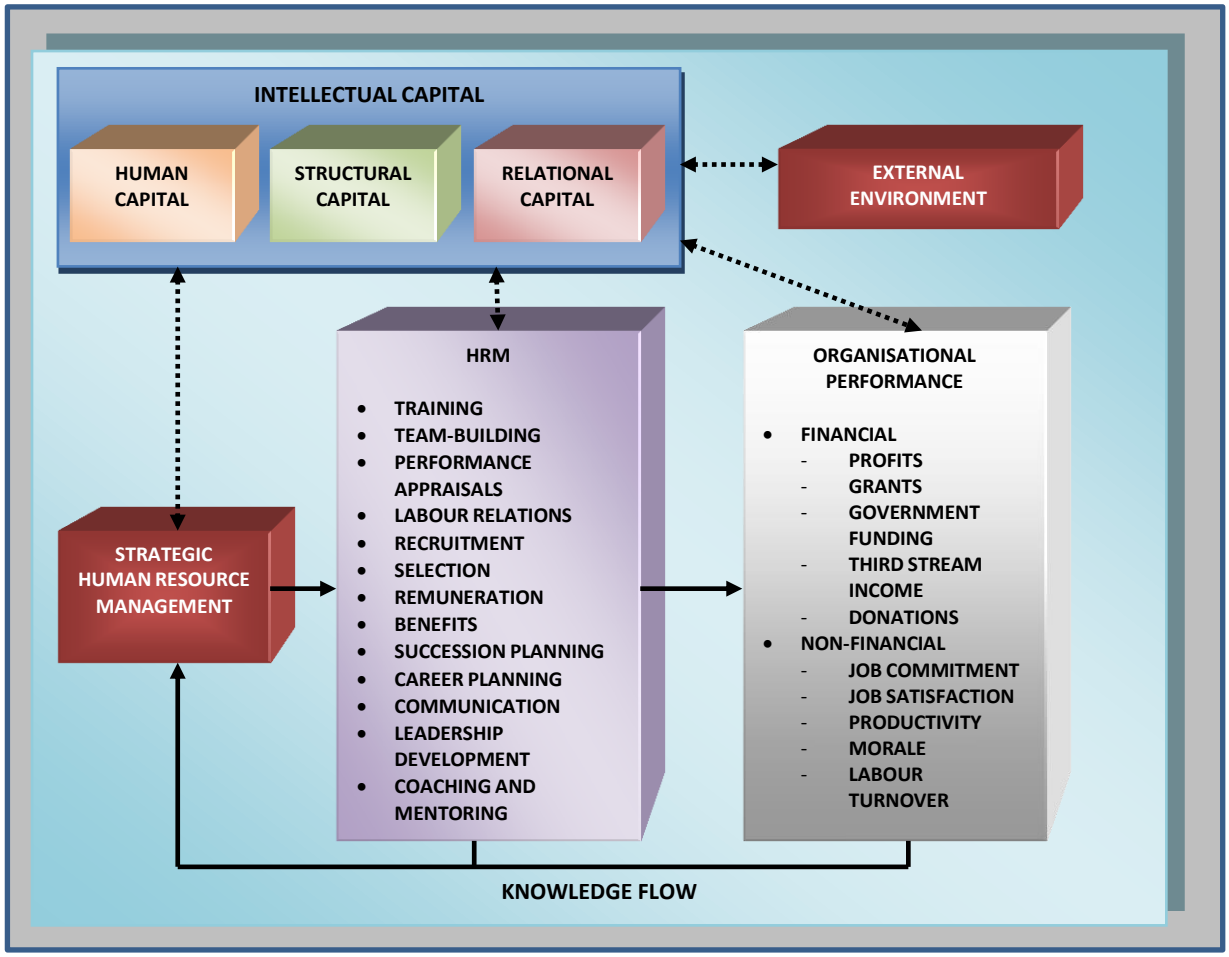
3.4.2.2 The Alignment of Human Capital and Strategic Human Resource Model

Kong (2010:98) developed The Alignment of Human Capital and Strategic Human Resource Model, as illustrated in Figure 3.19 below, which focuses on integrating Strategic Human Resource Management, IC and HC. The model (Figure 3.19) was empirically tested in the HE sector and Kong (2010:99) found a correlation between IC, Strategic Human Resource Management and IC. Kong (2010:100) concluded that the three concepts are closely connected, but also that IC should play a key role in Strategic Human Resource Management processes and policy interventions for sound HRM practices in HE institutions.

Kong (2010:99) states that The Alignment of Human Capital and Strategic Human Resource Model (Figure 3.19) emphasises that HRM practitioners need to understand the relationship between the HRM function and the HE institution. Russ (2010:104) adds that by placing IC and HC in a holistic alignment with Strategic Human Resource Management and HRM, it will allow HRM practitioners to conceptualise how IC can benefit the role and function of HRM in HE institutions. Salim and Sulaiman (2011:119) argue that the model (Figure

3.19) highlights the resource-based view of HE institutions, which underpin the internal aspects of the institution that should be at the centre of its strategic analysis. McIntyre, *et al.* (2015:178) also give credence to the model (Figure 3.19) and propose that HE institutions should underscore the value of HC that are rare, valuable, imperfectly imitable and non-substitutable and which allow a HE institution to have the potential of sustained competitive advantage in the HE sector. Mngoma (2014:2) observes that the model (Figure 3.19) also identifies the value of monitoring financial and non-financial organisational performance indicators.

FIGURE 3.19 THE ALIGNMENT OF HUMAN CAPITAL AND THE STRATEGIC HUMAN RESOURCE MODEL



Source: Kong, E. (2010:101). Adapted.

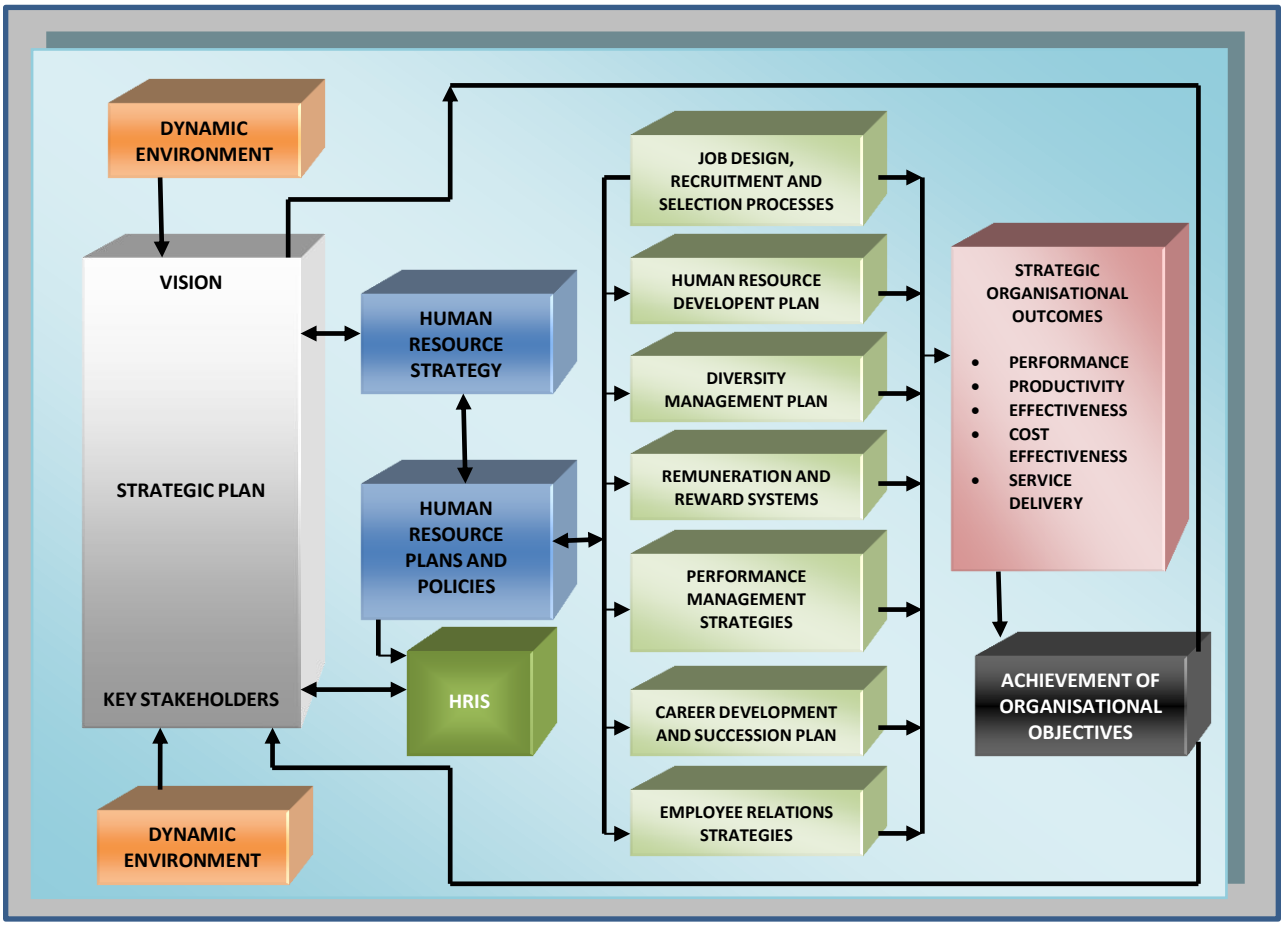
In the South African HE UoT environment, Archer (2010:18) expresses concern that institutions regard the HRM function as an administrative department rather than a strategic partner. Various South African authors concur with Archer (2010:18) such as Asmal (2009:5); Bezuidenhout (2011:87-88); Steur, *et al.* (2012:866); and Mngoma (2014:2). Bezuidenhout (2011:89) attributes this perception about HRM to the historic role that has been associated with the old connotation of personnel management as a service department. Seddon and Caulkin (2007:4) assert that UoTs fail to integrate the various HRM functions into a holistic strategy that aims to encourage pro-active planning as opposed to reactive planning. Soogwan and Zoltan (2010:249) highlight that due to a lack of Strategic Human Resource Management, UoTs fail to evaluate current HRM policies and replace outdated or inefficient policies with ones that promote a better workplace environment and employee relations. The researcher contends that the challenges relating to Strategic Human Resource Management and HRM that are described above are also experienced at the DUT.

3.4.2.3 The Integrated Human Capital Model

Wright and Boswell (2002:13) propose The Integrated Human Capital Model as depicted in Figure 3.20 below, that combines four elements, namely, the dynamic external environment of the HE sector, the institution's strategy, HRM and HRIS. The model (Figure 3.20) depicts the important relationship between Human Resource strategy and functional HRM (Renzl, 2007:48). Wright and Boswell (2002:14) refer to the Human Resource strategy role as the macro side to HRM and functional HRM as the micro side. The macro and micro sides of HRM are integrated by means of a HRIS that allows the organisation to capture, access and evaluate data to support timeous decision-making at both strategic and operational levels (Tan and Rao, 2013:76). Wieman, *et al.* (2010:9) state that The Integrated Human Capital Model (Figure 3.20) shows that Strategic Human Resource Management comprises both activities and processes that

focus on people-related organisational issues, rather than business issues *per se.* Stevenson and Bauer (2014:92) state that the model (Figure 3.20) also highlights that Strategic Human Resource Management is seen as a set of activities, plans, systems and strategies geared towards competitive advantage within the HE sector and by extension to the DUT.

FIGURE 3.20 THE INTEGRATED HUMAN CAPITAL MODEL



Source: Wright, P.M. and Boswell, W.R. (2002:13). Adapted.

Tebele (2013:3) makes reference to The Integrated Human Capital Model (Figure 3.20) in the South African HE UoT context and warns that institutions disregard the value of HRIS as a means of gathering, processing and disseminating knowledge amongst internal and external stakeholders. Various South African researchers have expressed concern about the micro side of HRM in the UoT sector, such as Asmal (2009:2), who states that UoTs often apply inconsistent performance management strategies, which differentiates between academics and support staff. Bitzer and Botha (2011:103) confirm that UoTs lack employee relations strategies and the institutions have become known for protracted employee grievances, disciplinary matters and performance related issues. According to Black, Calitz, Steenkamp, and Siebrits (2011:99-102), there is a reported lack of career development and succession planning at UoTs and employees often report feelings of stagnation in their jobs. Botha (2010:209) warns that UoTs are not making a concerted effort to introduce and manage diversity management, often resulting in conflict and animosities amongst employees. Chetty (2010:187) remarks that in the UoT sector, mergers have often highlighted disparities in the remuneration and reward systems of the different institutions, which are difficult to address. However, at the DUT the concerns expressed by Asmal (2009:2); Chetty (2010:187); Botha (2010:209); Bitzer and Botha (2011:103); Black, *et al.* (2011:99-102); and Tebele (2013:3) are still experienced more than a decade after the merger of Technikon Natal and M L Sultan Technikon.

3.5 CONCLUSION

This chapter provided a comprehensive overview of the best practices when implementing KM in the HE UoT sector, followed by an overview of IC and HC models. Arising from the theoretical exposition, this chapter also emphasises the importance of KM, IC and HC in the UoT sector, with specific reference to the DUT. In order for the DUT to adapt to the challenges of the Knowledge-based Economy, the institution requires a holistic integrated HC Framework linked to IC to ensure that the HRM needs of the institution are met. The ability

of DUT to meet the expectations of its stakeholders and the government depends on a comprehensive integrated framework in which the institution identifies the value of its HC and develops concrete interventions to attract, develop and retain employees with adequate knowledge and skills. The next chapter deals with the formulation of an exploratory model on HC linked to IC and KM for the DUT. This epitomises the original contribution to the study.

CHAPTER 4

THE FORMULATION OF AN EXPLORATORY HUMAN CAPITAL FRAMEWORK LINKED TO INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT FOR THE DURBAN UNIVERSITY OF TECHNOLOGY

4.1 INTRODUCTION

The shift from industrialised economies and natural resources to Intellectual Capital (IC) has compelled management to reassess the role that knowledge plays in organisations and how it is used (Abeysekera, 2008:738). According to Owuor (2012:131), in this highly competitive economy, competitors continually have to revisit their strategy to match the quality and price of products and services in the market, where organisational success is measured by the ability of an organisation to innovate and to continuously set the industry benchmark. Godin (2002:14) states that "organisations can no longer afford to be predictable, since what worked in stable times is precisely what will lead to an organisation's demise when things are changing".

Huang, Wei and Chang (2007:614) contend that the management of knowledge has increasingly surfaced to become an organisation's leveraging mechanism, providing an important competitive edge. Pan and Leidner (2003:75) add that the foundation of Knowledge Management (KM) is the organisation's knowledge base, where collective knowledge is leveraged and decisions made in response to current and future market needs. Hence, Prusak and Davenport (1998:48) postulate that a quality knowledge base will enable the organisation to move from a "knowledge-rich knowledge managing organisation to a new level of quality, creativity and efficiency". Radaelli, Mura, Spiller and Lettieri (2011:344) support the assertion of Prusak and Davenport (1998:48) and affirm that HC is the most important component of an organisation's knowledge base.

4.2 THE ADOPTION OF KNOWLEDGE MANAGEMENT IN THE HIGHER EDUCATION UOT SECTOR

The reported value of KM to the competitive position of organisations has shifted the expectations of industries, stakeholders and governments to demand that Higher Education (HE) institutions embrace the role of KM (Bali, Wickramasinghe and Lehaney, 2009:19). Bansal (2005:203) highlights that changing global economic trends and the demand for highly skilled HC required for the Knowledge-based Economy have placed an unparalleled pressure on HE institutions to meet the demands of the new economic era. Asmal (2009:3) states that HE institutions are now expected to participate actively in the Knowledge-based Economy and to become the enabler of renewed economic and social systems by extending knowledge and specialist skills to students to allow them to engage effectively in knowledge production. Barnes and Milton (2015:11) believe that HE institutions are now enrolled as central engines in building the Knowledge-based Economy. Archer (2003:14) argues that HE institutions should realise that their newly defined role is dependent upon their ability to attract, develop and retain Human Capital (HC) that will build internal capacity and allow these institutions to deliver the demands imposed by the Knowledge-based Economy.

In the South African HE landscape, Jansen, McLellan and Greene (2008:116) regard the development of Universities of Technology (UoTs) as one of the most important stages of the build-up towards a South African Knowledge-based Economy. Jacobs and De Bruin (2010:21) attest that UoTs are in a unique position to capitalise on enhancing strong industry relationships due to their emphasis on practical work-related and work-integrated programmes. These industry ties allow UoTs to play a pivotal role in identifying, attracting, developing and retaining knowledge, skills and expertise for the South African Knowledge-based Economy (James, Ralfe, Van Laren and Ngcobo, 2006:687). Altbach (2004:15) reports that HE UoTs are no longer regarded as merely training institutions that produce qualified students, but are seen as a means of

attracting international talent to the South African economy. Onyancha and Ocholla (2009:6) concur that the activities of UoTs are not confined to the process of knowledge transfer on a local basis, but act as a conduit of new knowledge through national and international research and industry networks. Badat (2009:461) affirms that UoTs are now expected to not only generate new knowledge through primary research, but also provide technical support and specialised expertise for on-going organisational support. Case, Marshall and Grayson (2013:2) warn that UoTs can no longer afford to act as ivory towers isolated from their communities and society at large, since they are expected to act as community players that facilitate local linkages and networks to develop talent attraction and development.

Firer (2005:14) states that the greatest challenge faced by UoTs is attracting and retaining suitable HC to meet the new envisaged role in the HE sector. Botha (2004:2) cautions that the expectations that have been imposed on UoTs by the government, globalisation challenges and market forces are placing increasingly new demands on employees in the HE UoT sector. Davel and Snyman (2005:16) state that employees are expected to balance teaching, academic research, community engagement and self-development amidst a fast changing HE landscape that focuses on equality, output and cost efficiencies. Hulsekopf (2014:3) argues that the management of HC in the UoT sector has become increasingly problematic, due to employee expectations, impositions on academic freedom and competitive rivalry from both the public and private sectors. In addition, UoTs tend to take their HC for granted and fail to recognise the value of HC contingency plans in view of employee retention challenges that the HE sector faces amidst national and international challenges (Chetty, 2010:175).

The present study identifies the need for the Durban University of Technology (DUT) as a UoT, to revisit their role in the context of a Knowledge-based Economy and to acknowledge the importance of attracting, developing, maintaining and retaining HC. This would lend impetus to enhancing the

knowledge, skills and expertise of UoTs to deliver programmes and services that meet the needs of the corporate sector. Therefore, arising out of the literature review and the problem investigated in this study, as well as its objectives, this study develops an exploratory HC Framework linked to IC and KM for South African UoTs, with specific reference to the DUT.

4.3 GUIDELINES FOLLOWED FOR THE DEVELOPMENT OF AN EXPLORATORY HUMAN CAPITAL FRAMEWORK LINKED TO INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT FOR THE DURBAN UNIVERSITY OF TECHNOLOGY

In this study, the development of an exploratory HC Driven Framework linked to IC and KM for the DUT flows from the literature and the research questions stated in Chapter 1. Miles and Huberman (1994:4) define an exploratory framework as "a visual or written product that explains, either graphically or in narrative form, the main key factors, concepts or variables in the study and the presumed relationships among them".

Abel and Deitz (2011:2) state that an exploratory framework is developed as the initial research into a hypothetical or theoretical idea. Eggins (2010:54) adds that the researcher has observed something and seeks to understand more about it. Becker (2009:134) affirms that an exploratory framework is an attempt to lay the groundwork that will lead to future studies. Wennberg, Wiklund and Wright (2011:1137) assert that an exploratory framework flows out of exploratory research, which aims to gain new insights, discover new ideas and increase knowledge relating to a phenomenon. Jenkins (1979:26) provides four guidelines for the development of frameworks. Firstly, the researcher should identify and understand the purpose of developing a framework; secondly, the researcher should understand the problem and address it by proposing and developing the framework; thirdly, the researcher should understand the decision-making system that will be served by the model; and lastly, the framework should integrate identification, implementation and evaluation

criteria. As a consequence, the guidelines presented by Jenkins (1979:26) have been incorporated into the development of the exploratory HC Framework linked to IC and KM for the DUT for this study.

4.4 THE ENVISAGED VALUE OF A HUMAN CAPITAL FRAMEWORK LINKED TO INTELLECTUAL CAPITAL FOR THE DURBAN UNIVERSITY OF TECHNOLOGY

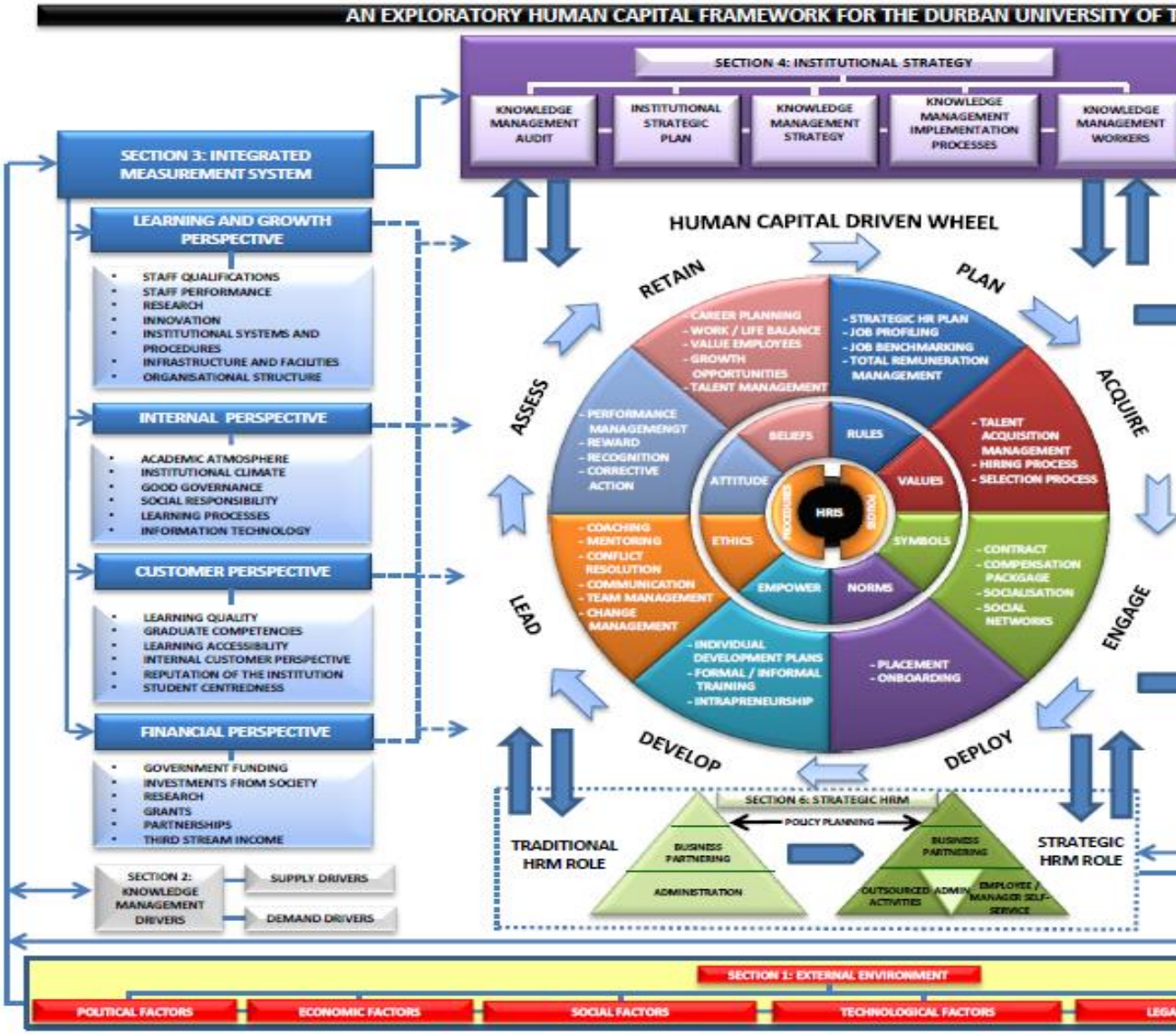
The DUT is part of a fast evolving South African UoT sector in the HE landscape, which faces a variety of challenges. These challenges are best summarised by examining the strategic imperatives adopted by the Council on Higher Education in South Africa (here after referred to as the CHE), which incorporates the development of the CHE's strategic goals and objectives from 2012 to 2017 (CHE, 2013:1). The CHE (2013:2) identifies the need to contribute to informing and influencing the transformation of the HE system. Javadein, Ramazani and Keshavarzi (2013:544) add that the CHE contributes to ensuring the currency and relevance of the Higher Education Qualifications Framework to meet the human resource and knowledge needs of the HE sector in South Africa.

Higher Education South Africa (HESA, 2009:6) further acknowledges the concerns expressed by the CHE relating to transformation, funding, quality assurance, relevant curriculum development and meeting the knowledge needs of South Africa. In addition, Higher Education South Africa (2011:4) identifies the need of the South African HE sector to achieve an appropriate balance between institutional autonomy, academic freedom and public accountability. According to Serfontein and De Waal (2015:29), HESA (2009:6) emphasises the importance of good governance and management of HE institutions. Ntshoe and Selesho (2014:1566) also point out that HESA envisages high levels of institutional diversity based on the institution's self-differentiation.

These challenges have necessitated that the DUT re-position itself as a HE institution that contributes towards the Knowledge-based Economy by gaining a competitive advantage in the national and global HE marketplace (Keengwe and Agamba, 2015:16). Fitzgerald (2014:13) affirms that the DUT is expected to address the ways in which the institution shapes knowledge and is expected to revisit its knowledge-bases in order to meet the national and international demands of the HE sector and the employees within the institution. These challenges and expected institutional changes have necessitated that the DUT review the institution's strategy and integrate KM, IC and HC to ensure that the DUT strategy is aligned to CHE guidelines, HESA's objectives and the national policy mandates of the Department of Higher Education and Training (here after referred to as DHET).

4.5 THE FORMULATION OF AN EXPLORATORY HUMAN CAPITAL FRAMEWORK LINKED TO INTELLECTUAL CAPITAL AND KNOWLEDE MANAGEMENT FOR THE DURBAN UNIVERSITY OF TECHNOLOGY

Against the backdrop of the literature review and the various models highlighted in the preceding chapters, the present investigation offers the formulation of an exploratory HC Framework linked to IC and KM for UoTs with special reference to the DUT. In developing an Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1), it is acknowledged that there is a challenge in attracting, retaining, developing and extracting knowledge at the DUT. The need for an Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1), contextualises the research problem and adds to the existing body of knowledge and is therefore recognised. Moreover, the researcher has endeavoured to produce a contribution by integrating the key constructs of HC, KM, IC, with the context of a Knowledge-based Economy for the current study aligned to the DUT. This contribution is epitomised by formulating an exploratory Framework as depicted in Figure 4.1 below.


AN EXPLORATORY HUMAN CAPITAL FRAMEWORK FOR THE DURBAN UNIVERSITY OF T
SECTION 4: INSTITUTIONAL STRATEGY
KNOWLEDGE MANAGEMENT AUDIT
INSTITUTIONAL STRATEGIC PLAN
KNOWLEDGE MANAGEMENT STRATEGY
KNOWLEDGE MANAGEMENT IMPLEMENTATION PROCESSES
KNOWLEDGE MANAGEMENT WORKERS
SECTION 3: INTEGRATED MEASUREMENT SYSTEM
LEARNING AND GROWTH PERSPECTIVE
STAFF QUALIFICATIONS
STAFF PERFORMANCE
RESEARCH
INNOVATION
INSTITUTIONAL SYSTEMS AND PROCEDURES
INFRASTRUCTURE AND FACILITIES
ORGANISATIONAL STRUCTURE
INTERNAL PERSPECTIVE
ACADEMIC ATMOSPHERE
INSTITUTIONAL CLIMATE
GOOD GOVERNANCE
SOCIAL RESPONSIBILITY
LEARNING PROCESSES
INFORMATION TECHNOLOGY
CUSTOMER PERSPECTIVE
LEARNING QUALITY
GRADUATE COMPETENCIES
LEARNING ACCESSIBILITY
INTERNAL CUSTOMER PERSPECTIVE
REPUTATION OF THE INSTITUTION
STUDENT CENTREDNESS
FINANCIAL PERSPECTIVE
GOVERNMENT FUNDING
INVESTMENTS FROM SOCIETY
RESEARCH
GRANTS
PARTNERSHIPS
THIRD STREAM INCOME
SECTION 2: KNOWLEDGE MANAGEMENT DRIVERS
SUPPLY DRIVERS
DEMAND DRIVERS
HUMAN CAPITAL DRIVEN WHEEL
RETAIN
PLAN
ACQUIRE
ENGAGE
DEPLOY
DEVELOP
LEAD
ASSESS
CAREER PLANNING
- WORK / LIFE BALANCE
- VALUE EMPLOYEES
- GROWTH OPPORTUNITIES
- TALENT MANAGEMENT
- STRATEGIC HR PLAN
- JOB PROFILING
- JOB BENCHMARKING
- TOTAL REMUNERATION MANAGEMENT
- TALENT ACQUISITION MANAGEMENT
- HIRING PROCESS
- SELECTION PROCESS
- CONTRACT
- COMPENSATION PACKAGE
- SOCIALISATION
- SOCIAL NETWORKS
- PLACEMENT
- ONBOARDING
- INDIVIDUAL DEVELOPMENT PLANS
- FORMAL / INFORMAL TRAINING
- INTRAPRENEURSHIP
- COACHING
- MENTORING
- CONFLICT RESOLUTION
- COMMUNICATION
- TEAM MANAGEMENT
- CHANGE MANAGEMENT
- PERFORMANCE MANAGEMENGT
- REWARD
- RECOGNITION
- CORRECTIVE ACTION
BELIEFS
RULES
VALUES
SYMBOLS
NORMS
EMPOWER
ETHICS
ATTITUDE
HRIS
SECTION 6: STRATEGIC HRM
POLICY PLANNING
TRADITIONAL HRM ROLE
BUSINESS PARTNERING
ADMINISTRATION
STRATEGIC HRM ROLE
BUSINESS PARTNERING
OUTSOURCED ACTIVITIES
ADMIN
EMPLOYEE / MANAGER SELF-SERVICE
SECTION 1: EXTERNAL ENVIRONMENT
POLITICAL FACTORS
ECONOMIC FACTORS
SOCIAL FACTORS
TECHNOLOGICAL FACTORS

4.5.1 An Exposition of the Sections located in the Human Capital Framework linked to Intellectual Capital and Knowledge Management for the Durban University of Technology

Section 1 of the Exploratory HC Framework linked to IC and KM for the DUT is the External Environment depicted at the bottom of Figure 4.1, which is regarded as an important part of the Knowledge-based Economy, since it assists HE institutions, in particular, the DUT, to monitor and assess the environment in which they are operating (Van Zyl, 2014:1669). Section 1 of the Framework (Figure 4.1) also identifies the components of the external environment, namely, political, economic, social, technological, legal and environmental factors (here after referred to as PESTLE), which impact on the DUT. PESTLE is also highlighted in the earlier theoretical framework presented and forms an integral component of the Knowledge-based Economy (Wigg, 1997a:4; Leydesdorff and Fritsch, 2006:1538-1543; Moffet and McAdam, 2006:231; Altaher, 2010:267; Milton, 2010:63).

Section 2 of the Exploratory HC Framework linked to IC and KM for the DUT is located at the bottom left of the Framework in Figure 4.1 and comprises Knowledge Management Drivers, which reinforce the analysis of the external environmental factors (PESTLE) for the DUT. Various authors such as Du Plessis (2005:195); Wickboldt, Bianchin, Lunardi, Granville, Gaspary and Bartolini (2011:2962); Wu, Wu, Li and Huang (2011:4389); and Rennie and Morrison (2013:38) emphasise the value of KM drivers (Figure 4.1) to enable UoTs to understand the complexities of the external environment. Two components are identified in the Knowledge Management Drivers Section of the Framework, namely, Demand Drivers and Supply Drivers as shown on the bottom left of the Framework in Figure 4.1.

Section 3 of the Exploratory HC Framework linked to IC and KM for the DUT is illustrated in Figure 4.1 for its strategic importance and linkage. The first two sections, namely, the External Environment and the KM Drivers flow into the Intellectual Capital Section, in order to allow the DUT to gather appropriate

macro information to inform the development of the institution's strategic objectives. The Intellectual Capital Section (Section 3 of Figure 4.1) is based on the Balanced Score Card (BSC) and consists of four perspectives, namely, the Learning and Growth Perspective, the Internal Perspective, the Customer Perspective and the Financial Perspective. The BSC is reported to be the most popular implementation scheme for KM and IC in the HE sector (Venezia and Allee, 2007:21; Tettey, 2010:87; Wamundila and Ngulube, 2011:3; Tebele, 2013:87; Hulsekopf, 2014:47).

The Intellectual Capital component in Section 3 is linked with Section 4 in the Exploratory HC Framework linked to IC and KM for the DUT, namely, the Institutional Strategy depicted at the top of Figure 4.1. Institutional strategy as a success factor for the implementation of KM and IC is also recognised by various authors such as Nonaka and Takeuchi (1995:43), Wiig (1997b:401), Nonaka, Von Krogh and Ichijo (2000:102) and Cristea and Căpatînă (2009:356-357). The importance of aligning KM, IC and HC to the DUT's strategic objectives is supported by Firer (2005:14), Eggins (2010:14) and Fitzgerald (2014:109).

Section 5 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) illustrates Knowledge Management Enablers (shown on the extreme top right hand side of the Framework). Knowledge Management Enablers consists of three components, namely, leadership and management, institutional culture and technological infrastructure. Various authors affirm that KM enablers can directly contribute to the success or failure of the KM initiatives in a HE institution (Chauvel and Despres, 2002:216; McCauley, 2003;1; Wong, 2005:268; Divala, 2014:1959). The Knowledge Management Enablers in Section 5 feeds back into Section 4 of the Framework (depicted at the top of the Framework in Figure 4.1), namely, the Institutional Strategy. Section 4 of the Framework is also connected to Section 6 (located below the HC Wheel in the Framework in Figure 4.1), namely, Strategic HRM.

Section 6 is separated from the rest of the HC Framework linked to IC and KM for the DUT with a dotted line to signify that the HRM department at DUT would constantly be at the forefront of change and would adapt to the internal environmental challenges of the institution by utilising the components of the HC Wheel (Figure 4.1), which is positioned in the centre of the Exploratory HC Framework linked to IC and KM for the DUT. The value of Strategic HRM in the context of KM and IC is also supported in the literature by Moffet and McAdam (2006:225), Becerra-Fernandez and Sabherwal (2010:9), Braunerhjeim, Zoltan, Audretsch and Carlsson (2010:109) and Acemoglu and Robinson (2013:179).

The Strategic HRM component shown under Section 6 in Figure 4.1 sequentially connects to Section 7 (transposed on the extreme right hand side of the Framework in Figure 4.1), namely, the HC Scorecard, which is supported by O'Neill (2005:14), Rherrad (2009:169) and Secundo, Margherita, Elia and Passiante (2010:146). Section 4 that covers the Institutional Strategy (shown at the top of the Framework in the middle of Figure 4.1) and closes the circular flow of the Framework and connects to the External Environment Section (Section 1 at the bottom of the Framework) that feeds into Section 3, namely, Intellectual Capital. A detailed description of the Exploratory HC Framework linked to IC and KM for the DUT explaining its features and the interconnectivity of the various components follows.

4.5.2 A descriptive overview of the Exploratory Human Capital Framework linked to Intellectual Capital and Knowledge Management for the Durban University of Technology

Arising from the comprehensive literature review, Figure 4.1 synthesises the key principles for the proposed DUT Framework impacting on HC in the HE UoT sector in South Africa. It also integrates the theoretical constructs linking KM, IC and HC to the challenging environment of the Knowledge-based Economy for the DUT. The Exploratory HC Framework linked to IC and KM for the DUT as depicted in Figure 4.1 consists of seven sections, namely, the External Environment; Knowledge Management Drivers; Intellectual Capital; Institutional Strategy; Knowledge Management Enablers; Strategic HRM; and the HR Scorecard. Central to the Framework (Figure 4.1) is the HC Wheel, which drives the HRM processes at the DUT as a UoT. A descriptive key for the various types of arrows is shown as legends on the extreme bottom right hand part of Figure 4.1 for ease of reference.

The process flow of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) is depicted by a solid arrow, which commences at Section 1, namely, the External Environment that integrates the PESTLE components, which impacts on the institution. A two-sided arrow connects the External Environment section with Section 2, namely, Knowledge Management Drivers (Figure 4.1), which are separated into Supply and Demand Drivers. A one-way process flow arrow connects Section 1 and Section 2 of the Exploratory HC Framework linked to IC and KM for the DUT to Section 3, namely, Intellectual Capital (depicted on the extreme left of Figure 4.1) and is based on the BSC. Fragmented arrows (as illustrated in Figure 4.1) flow out of each of the four perspectives and represent the suggested impact that the Intellectual Capital section has on the HC Wheel, which forms the core of the Framework.

The HC Wheel (Figure 4.1.) flows clock-wise and drives the DUT HRM processes and procedures to successfully implement HC, IC and KM at the institution. Section 3 of the Exploratory HC Framework linked to IC and KM for DUT (Figure 4.1) is connected to Section 4, namely, the Institutional Strategy, which is depicted with a solid block to represent that the Institutional Strategy can be subjected to constantly evolving changes over time. A two-sided process flow arrow horizontally connects Section 4 (shown in the top middle part of the Framework) and Section 5 (depicted on the extreme top rights hand side of the Framework), namely, the Knowledge Management Enablers. Section 5 of the Exploratory HC Framework linked to IC and KM for DUT (Figure 4.1) is connected with a two-sided process flow arrow to Section 6, namely, Strategic HRM, which represents the transition from a traditional HRM role to that of Strategic HRM partner. Both Section 4 and Section 6 of the Framework in Figure 4.1 have two-way communication arrows linked to the HC wheel. Section 4 flows back into the outflow of Section 1, namely, the External Environment. Section 6 (located below the HC Wheel in the Framework) is connected with a two-sided process flow arrow to Section 7 in Figure 4.1, namely, the HC Scorecard (shown in the extreme right hand side of the Framework), which includes both academic and support personnel at the DUT. Both Section 6 and Section 7 are demarcated with broken lines, which indicate that constant change occurs between these two sections (as illustrated in Figure 4.1).

4.5.2.1 Section 1: The External Environment

Van Zyl (2014:1668) states that the external environment (Section 1 located at the bottom of Figure 4.1) has become a conundrum for the HE sector due to the constant changes and challenges that the Knowledge-based Economy imposes on the external variables impacting on UoTs. Recognising the external environmental factors in Figure 4.1 informs the DUT of the macro-environmental considerations that should be used for environmental scanning conducted during strategic management (Van Zyl, 2014:1669). The macro-environmental

components (PESTLE) identified in Section 1 of the Framework (Figure 4.1) is based on the research conducted by Mostert and Snyman (2007:108) (as earlier depicted in Figure 2.4 and Figure 2.5 respectively in Chapter 2), namely, The Model of Individual Knowledge and The Model of Organisational Knowledge. The application of PESTLE to the HE sector is also supported by Leydesdorff and Fritsch (2006:1538), who developed the Three Evolutionary Functions of the Knowledge-based Economy. The contribution of PESTLE to be inclusive in an HE institution is also acknowledge by Wiig (1997a:4) in The Intelligent Organisation / Institution model. The External Environment shown as Section 1 in Figure 4.1 also allows the DUT to understand and monitor HE market growth or decline, which has become important due to increased competition between UoTs and other HE institutions, such as traditional universities, comprehensive universities, technical vocational educational training colleges (previously known as Further Education and Training colleges) and private HE establishments.

All the environmental factors under Section 1 depicted at the bottom of Figure 4.1, gave rise to a new HE landscape in South Africa in which the DUT is expected to contribute to the Knowledge-based Economy as identified by the Department of Science and Technology (DST, 2007:14-18). The DUT is also funded by the government, which impacts on the financial stability and sustainability of the institution. Economic factors (Figure 4.1) influence the affordability of qualifications at the DUT and affect the willingness of organisations to sponsor their employees' developmental, educational and training needs by selecting the DUT as their institution of choice. Social factors (Figure 4.1) include cultural aspects, health consciousness, the population growth rate, demographics, career attitudes and the emphasis on the safety and security of studying at the DUT. Trends in social factors will affect the DUT's ability to attract and retain suitable employees, as well as students. Technological factors (located on the extreme right of Figure 4.1) include research and development activities, automation and the rate of technological

change, which impact on teaching and learning programmes at the DUT, as well as the levels of innovation offered at the institution. Legal factors (Figure 4.1) relate to the legislation and HE governing bodies in South Africa, which governs how the HE sector operates. Lastly, environmental factors (Section 1 of Figure 4.1) include ecological and environmental aspects such as weather, climate, climate change and a green environment, which contribute to social responsibility initiatives and community engagement at the DUT.

PESTLE provides the DUT with a simple and easy-to-use outline to conduct an analysis of the macro-environment (Sirayi and Nawa, 2014:1654). Incorporating PESTLE (shown at the bottom of Figure 4.1) in the Exploratory HC Framework linked to IC and KM for the DUT allows the institution to reduce the effects of potential threats from the external environment. Sousa and Van Dierendonck (2010:236) attest that PESTLE aids and encourages HE institutions, such as the DUT, to identify and exploit opportunities. Mkhize (2014:1548) recommends that the process of PESTLE should be conducted regularly to be effective and the institution should be viewed as a continuum since macro-environmental factors are constantly changing. Taking the latter suggestion of Mkhize (2014:1548) into consideration, each external environmental factor (PESTLE) in Section 1 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) is linked to one another in order to represent the connectivity and flow between these factors. The External Environment section as shown in Section 1 at the bottom of the Framework, is also blocked off with a solid line from the rest of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) to illustrate that Section 1 forms part of the external macro-environment of the institution, whilst the other sections relate to the internal micro-environment within the DUT context.

4.5.2.2 Section 2: Knowledge Management Drivers

The External Environment (Figure 4.1) flows into Section 2, namely, the Knowledge Management Drivers section (located on the extreme left hand side at the bottom of Figure 4.1), which in turn informs the DUT further on its PESTLE analysis. A two-sided arrow as shown in Figure 4.1 indicates this connection between PESTLE and the Knowledge Management Drivers. Du Plessis (2005:195) postulates that Knowledge Management Drivers provide further clarity to the institution about the external environmental factors and market forces that necessitates the DUT to develop KM interventions. Senge (2008:14) identifies two categories of KM drivers, namely, supply drivers and demand drivers (located on the left below in Section 2 of Figure 4.1). Tehrani (2012:2) integrates these two drivers identified by Senge (2008:14) and presents the Knowledge Management Drivers in the Higher Education Sector model, which are depicted in Figure 3.2 in Chapter Three.

The supply side of Knowledge Management Drivers (Figure 4.1) include technological drivers that should encourage the DUT to recognise the value of social media, the internet and the increased volume in the availability of knowledge (Lombard and Kloppers, 2015:2). These technological drivers will allow the DUT to integrate the information obtained from Section 1 of the Framework, namely, the External Environment. On the demand side (Figure 4.1), the DUT incorporates the organisational structure of the institution with PESTLE by integrating legislation, operational efficiency and change management with the various internal operational functions. Soogwan and Zoltan (2010:254) assert that if a HE institution identifies and uses the KM supply and demand drivers (Figure 4.1), it will enable the institution to recognise the need for change and to respond pro-actively to the challenges of the Knowledge-based Economy.

4.5.2.3 Section 3: Intellectual Capital

The first two sections of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1), namely, the External Environment and the Knowledge Management Drivers flow, into Intellectual Capital in Section 3 on the extreme left hand side of the Framework. Yang (2007:88) highlights that the value of using integrated measurements in the HE sector lies in its benefit of ensuring more rigorous monitoring. At the DUT, Intellectual Capital will allow management to monitor the performance of the institution, faculties, departments and employees against pre-determined assessment categories or criteria. The four perspectives of the IC component in Section 3 (Figure 4.1) are based on the BSC of Kaplan and Norton (1996:7), who regard the BSC as a management system that includes measurement and control to view the organisation from four perspectives, namely, financial; customer; internal processes; and learning and growth (Mazutis and Slawinski, 2008:443). The four perspectives of Kaplan and Norton (1996:7) have been adapted by Wisniewski and Olafson. (2004:43) as cited by Letsaka and Maile (2008:2), which is illustrated in their model entitled The Logical Hierarchy Model for Public Sector Organisations. Letsaka and Maile (2008:2) affirm that the integration of these models allows the DUT to focus its strategic initiatives on the relevant aspects applicable to the HE sector.

Part 1 (shown in the first quadrant in Section 3 on the extreme left of Figure 4.1) of the Intellectual Capital section is the Learning and Growth Perspective, which identifies the following elements, namely, staff qualifications and performance; research and innovation; institutional systems and procedures; infrastructure and facilities; and organisational structure. These selected elements in the Learning and Growth Perspective (Figure 4.1) are aligned to the objectives of the Department of Science and Technology (DST, 2007:23). Lundgren, Scheckle and Zinn (2015:13) state that the Learning and Growth Perspective encourages the DUT to integrate staff development as well as institutional processes and procedures. The Learning and Growth Perspective (Figure 4.1)

is also positioned first in the Intellectual Capital section (Section 3 of the Framework), since various authors underpin the value of emphasising life-long learning, development and growth in the South African HE sector (Madileng, 2014:2032; Nkambule, 2014:2009).

Part 2 (represented in the second quadrant in Section 3 on the extreme left of Figure 4.1) of the Intellectual Capital section is the Internal Perspective, which identifies six elements, namely, academic atmosphere, institutional climate, good governance, social responsibility, learning processes and information technology. The six elements selected to form part of the Internal Perspective (Figure 4.1) are considered by various sources to aid UoTs in monitoring institutional performance (Du Pré, 2010:34; Higher Education South Africa (HESA), 2011:15, Sirayi and Nawa, 2014:1648; Wilson-Strydom, 2014:65). According to Mohaeka and Mahao (2015:47), the Internal Perspective (Figure 4.1) provides feedback to the DUT on how well the institution is able to deliver academic programmes and services to its stakeholders.

Part 3 (illustrated in the third quadrant of Section 3 of the Framework under IC in Section 3) is the Customer Perspective and encompasses learning quality, graduate competencies and learning accessibility, as well as the internal customer perspective, the reputation of the DUT and student-centeredness. The elements included in the Customer Perspective (Figure 4.1) are based on the Strategic Framework of HESA for 2010/2020 (HESA, 2011:14). The Customer Perspective allows the DUT to evaluate its efforts to meet the expectations of both internal and external customers and to assess the progress towards offering educational programmes that emphasise quality, access and equality (Yu, Kim and Kim, 2007:43). Blankley and Booyens (2010:372) state that the Customer Perspective elements can be regarded as the medium through which executive management at the DUT can define the results they expect from their strategies and plans.

Part 4 of the Intellectual Capital section (depicted in the fourth quadrant of Section 3 in Figure 4.1) is the Financial Perspective, which contains six elements, namely, government funding, investments from society, research, grants, partnerships and third-stream income. The six elements included in the Financial Perspective component are highlighted by the Department of Science and Technology 2008-2018 planning document (Mabanga, 2007:14). The Financial Perspective (as shown under Section 3 of Figure 4.1), emphasises the importance for the DUT to monitor its financial position with regard to the other three perspectives, which allows the executive management of DUT to instil a culture of financial planning, documenting and reporting (Giles, 2009:122). According to Blankley and Booyens (2010:372), the four perspectives of the BSC should be regarded as a continuum. Consequently, each of these four perspectives in the Intellectual Capital section (as shown in Section 3 of Figure 4.1) is also linked to each other to reinforce the importance of an integrated process. The fragmented horizontal arrows flow from each of the four perspectives and indicate the impact that the four perspectives of Intellectual Capital have on the operational HRM function at the DUT, which is depicted by the HC Wheel in the centre of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1).

4.5.2.4 Section 4: The Institutional Strategy

The Intellectual Capital shown in Section 3 of Figure 4.1, flows into the Institutional Strategy section (depicted as Section 4 at the top of the Framework in Figure 4.1), which identifies the contribution of strategic management to the successful implementation of HC linked to KM and IC at the DUT. The inclusion of the Institutional Strategy in the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) is based upon the Concept, Strategy, Practice (CSP) Model developed by Lippert and Swiercz (2005:345), as well as The First and Second Order Model of the Learning Organisation developed by Grieves (2008:469) discussed earlier in the literature chapter.

Section 4 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) allows the institution to identify, prioritise and exploit opportunities, while providing a structure for the improved co-ordination and control of internal processes and activities (Sirayi and Nawa, 2014:1648). According to Thondhlana and Belluigi (2014:45), strategic planning will allow the institution to minimise the effects of adverse conditions and changes, while emphasising internal communication, forward thinking and a climate of co-operation. This inclusion of strategic decisions into the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1), permits the institution to embrace change and conduct pro-active planning (Wilson-Strydom, 2014:65). Section 4 (depicted above the HC Wheel in Figure 4.1) of the Framework includes five components, namely, KM audit, Institutional Strategic Plan, KM strategy, KM implementation processes and KM workers. The selection of these five components in the Institutional Strategy section are based on the recommendations of Wisniewski and Olafson (2004:34), Letsaka and Maile (2008:2) and Keengwe and Agamba (2015:34). Each of the five components of the Institutional Strategy is also interlinked horizontally to represent the connectivity of these components to one another.

The first component of the Institutional Strategy in Section 4 of Figure 4.1 is the Knowledge Management Audit. The Knowledge Management Audit (Figure 4.1) provides accurate identification, quantification, measurement and assessment of the sum total of tacit and explicit knowledge at a HE institution (Dlamini and Adams, 2014:127). Radaelli, Mura, Spiller and Lettieri (2011:344) state that the Knowledge Management Audit identifies information glut or scarcity at an institution. Mohaeka and Mahao (2015:47) contend that KM audits provide information to all employees at the institution, since it identifies the lack of awareness of information at the institution and not knowing where to go for expertise in a specific area. By understanding what knowledge the DUT possesses, executive management can identify the most effective method of storage and dissemination to DUT employees (Dlamini and Adams, 2014:127).

The second component of the Institutional Strategy in Section 4 (Figure 4.1) is the Institutional Strategic Plan, which identifies the vision, mission, institutional goals, objectives and values of the DUT. The Institutional Strategy reinforces the core focus areas of the DUT, namely, teaching and learning, and research (DUT Strategic Plan, 2013:5-9). The importance of strategic planning at the DUT is enforced by the Department of Higher Education and Training (2014:3) and HESA (2009:3 and 2011:17). According to Papageorgiou and Townsend (2014:1633), a well formulated strategic plan should include the information from the External Environment, Knowledge Management Drivers and Intellectual Capital, which will allow the DUT to develop an informed HC plan for the future. Johnson and Cooper (2014:104) state that the Institutional Strategic Plan (Figure 4.1) reinforces the strategic focus areas of the institution. At the DUT, nine strategic focus areas are identified, namely, engagement with society; students; staff; planning for sustainability; resource mobilisation; business processes and systems; infrastructure; marketing; and internationalisation (DUT Strategic Plan, 2013:5-9).

The third component of Section 4 (highlighted above the HC Wheel in Figure 4.1) of the Exploratory HC Framework linked to IC and KM for DUT is the Knowledge Management Strategy. This component identifies the value that the DUT assigns to KM. The DUT's institutional strategy and its KM strategy form a continuum, since KM is central to the service offering of the institution (Ramaligela and Moletsane, 2013:155). According to Case (2011:78), two main approaches to KM strategies are found, namely, a codification strategy, where the institution relies on databases and information technology, or a personalisation strategy in which the HC of the institution is regarded as the enabler for technological infrastructure. Van der Walt, Potgieter and Wolhuter (2013:49) recommend that the DUT combines these two strategies, since it will optimise the service delivery of the institution in meeting the demands of the Knowledge-based Economy. A combined KM strategy (Figure 4.1) will also enable the DUT to create value for its internal customers,

namely, employees, by encouraging colleagues to share their knowledge and expertise to address service delivery and decision-making in a proactive manner.

The Knowledge Management Implementation Process component in Section 4 (located above the HC Wheel), falls under Institutional Strategy (Figure 4.1). Knowledge Management implementation processes relate to information technology and managerial competencies that are required for the DUT to implement KM (Acemoglu and Robinson, 2013:176). Chissale and Cross (2014:14-16) assert that KM Implementation Processes (Figure 4.1) will draw the attention of the DUT management to elements such as communication, commitment, trust, social networks, institutional learning and developing best practice repositories. These identified processes will enable the DUT to encourage knowledge creation and development, since the working environment will be supportive of the needs of the institution and its employees to address the demands of the Knowledge-based Economy (Botha, 2004:3). Ramaligela and Moletsane (2013:148) contend that selected processes to support the implementation of KM will grant the DUT the opportunity to create an institutional climate and culture where openness to new ideas and innovation is encouraged, recognised and valued.

The final component of the Institutional Strategy is the Knowledge Worker component highlighted above the HC Wheel under Section 4 in Figure 4.1, which is based on the research conducted by Sutherland and Jordaan (2004:55) as illustrated in The Contribution of Knowledge Workers towards an Organisation, which was discussed earlier in the literature review. Chauraya (2014:11) regards the knowledge worker to be at the forefront of implementing KM in the HE sector by incorporating tacit, explicit and embedded knowledge. The viewpoint of Chauraya (2014:11) is also supported by Davel and Snyman (2005:16), Donnelly (2006:92), Mosco and McKercher (2007:49) and Davenport (2013:14). O'Neill and Adya (2007:412) assert that it is important for the DUT to

recognise the value of knowledge workers (Figure 4.1), since the academic and support staff at the institution are expected to acquire, manipulate, interpret and apply information to perform their tasks and duties. The DUT will also benefit from incorporating knowledge workers into the institutional strategy (Section 4 of Figure 4.1) by encouraging employees to accept and embrace the changes that are required for the institution to implement KM and IC in the wake of the Knowledge-based Economy. Recognising the importance of knowledge workers at an institutional strategic level will also direct leadership and management styles to create a supportive working environment in which employees can create and disseminate knowledge at the DUT (Jacobs and De Bruin, 2010:21).

The two-sided communication arrows flow from Section 4 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) to the HC Wheel, which is positioned in the centre of the framework in Figure 4.1. The decision to include communication in the framework is based on Von Krogh and Roos' Model of Organisational Epistomology as illustrated in Figure 2.12 in Chapter 2 by Cristea and Căpatînă (2009:356). Lussier and Achua (2009:17) also emphasise communication (in Table 3.7) in the earlier discussion of the literature review, which shows the Traditional Organisation versus the Learning Organisation Paradigm; while Stankovsky's Pillars of Enterprise Learning (Figure 3.7) recognise communication as a building block to organisational strategy (Cranfield and Taylor, 2008:88). Various authors support the value of communication when developing and implementing organisational strategy (Burgelman, Maidique and Wheelwright, 2001:16; Bansal, 2005:211). Keengwe and Maxfield (2015:39) contend that communication allows for participation, information sharing and acceptance of change in the HE sector.

4.5.2.5 Section 5: Knowledge Management Enablers

As illustrated in Section 4, the Institutional Strategy in Figure 4.1, is linked by a two-sided arrow to Section 5, namely, the Knowledge Management Enablers (located on the top right hand side of the Framework), which includes leadership and management, institutional culture and technological infrastructure. Section 5 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) identifies the salient factors that are required within the DUT to ensure the successful implementation of KM and IC. It is important that the DUT identifies KM enablers since they determine the effectiveness of executing KM within the institution (Yu, *et al.,* 2007:43). Identifying KM enablers will also ensure that the DUT effectively utilises its limited resources, reduces the use of manpower, material and time and is still able to achieve the expected results (Ponnuswamy and Manohar, 2014:8).

The Leadership and Management component in Section 5 of the Framework (Figure 4.1) emphasises the value of guiding DUT employees to reach their potential (Bauer and Erdogen, 2010:77). Various researchers such as Ryan and Walsh (2004:623); Ryu, Kim, Chaudhury and Roa (2005:249); and Salojarvi, Faru and Sveiby (2005:110) have conducted studies on the contribution that leadership and management has made towards the successful implementation of KM in the HE sector. Incorporating the Leadership and Management component (Figure 4.1) into the Institutional Strategy will assist the DUT to identify developmental gaps that can build a better team of leaders and managers in the institution. Leadership and management will also enable the DUT to co-ordinate the institution's resources effectively and efficiently by means of planning, organising, leading, directing and controlling the institution to accomplish the KM strategy as identified in the Institutional Strategy in Section 4 of Figure 4.1. The Leadership and Management component under Section 5 of Figure 4.1, allows the institution to improve communication, implement change management more effectively, encourage staff development,

strategic thinking and value-driven delivery (Serenko, Bontis and Hardie, 2007:612; Jordaan and Wiese, 2010:539; Acemoglu, Golosov and Tsyvinski, 2011:1010).

The second component of Section 5 (Figure 4.1) is Institutional Culture, which relates to the set of values, feelings, attitudes, expectations and the mindset of employees at DUT (Jansen, 2002:25). Various authors recognise the contribution that culture can make towards the successful implementation of KM in the HE sector operating in the Knowledge-based Economy (De Kluyver, 2012:90-93; Chmielewska-Muciek and Sitko-Lutek, 2013:1365-1370). The institutional culture at the DUT depicted under Section 5 on the right hand side of the Framework in Figure 4.1, impacts on the way employees interact at their workplaces and provides them with a sense of direction. Several authors state that institutional culture sets the foundation for organisational strategy (Brewer and Brewer, 2010:332; Chrisholm, 2014:124; Dima, 2014:133-136). Recognising the value of institutional culture (Figure 4.1) allows the leadership and management of DUT to bring all employees onto a common platform, which unites all staff irrespective of their backgrounds, skillssets or positions in the institution.

The final component of Section 5 as illustrated under Section 5 on the far right of Figure 4.1, is Technological Infrastructure, which includes all the aspects that facilitate the flow of information and knowledge in support of the tasks, duties and responsibilities of employees at the DUT. Technological infrastructure allows the DUT to create, disseminate and manage knowledge amongst employees (Stevenson and Bauer, 2014:28). This component in Section 5 of Figure 4.1 adds value to the strategy of DUT by means of enabling the institution to effectively apply software management and network services to improve service delivery and monitoring. In addition, technological infrastructure (Figure 4.1) permits the institution to apply better risk management, implement HRIS and improve the delivery of service offerings, such as academic programmes (Monyooe, 2013:112).

Each of the three components under Section 5 of the Framework in Figure 4.1, is also interlinked to depict the importance of all three enablers contributing towards the Institutional Strategy in Section 4. By means of monitoring the leadership and management, institutional culture and technological infrastructure at DUT, the executive management would be able to make more informed decisions and implement the KM strategy across all campuses. In addition, the three components of Section 5, namely, Leadership and Management; Institutional Culture; and Technological Infrastructure (Figure 4.1), will create a working environment in which knowledge workers can identify, develop and utilise their skills, knowledge and experience more effectively and efficiently (Muller, 2012:18).

4.5.2.6 Section 6: Strategic Human Resource Management

Section 4 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) is connected to Section 6, namely, Strategic HRM (located at the bottom below the HC Wheel) with a two-sided process flow arrow that reinforces the connection between Institutional Strategy and the need for the HRM department at DUT to assume a strategic role. Strategic HRM (Figure 4.1) indicates the transition that is required for HRM to move from a traditional HRM role, which relies on delivering an administrative service to that of strategic partner (Rennie and Morrison, 2013:112-113). According to Becker, Huselid and Ulrich (2001:1), the foundation of Strategic HRM integrates four components, namely, the sum of the Human Resource function, the role of HRM practitioners, the broader HRM system relating to HRM policies and practice, and the resulting employee behaviour. Brewer and Brewer (2010:330) recognise that the four components identified by Becker, Huselid and Ulrich (2001:1) will enable the shift from traditional HRM to Strategic HRM (Section 6) in a HE institution as demonstrated in Figure 4.1 and depicted below the HC Wheel in Figure 4.1.

Section 6 in Figure 4.1 consists of two adjacent triangles that represent the shift from traditional HRM to Strategic HRM and is based on research conducted by Leonard and Swap (2005:103), whose model is illustrated in Figure 3.4 (Chapter 3). The triangle on the left-hand side in Section 6 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) reflects the three components associated with the traditional HRM role, namely, policy planning, business partnering and administration. The importance associated with each of the three components is proportionately represented in the left-hand triangle. From the traditional HRM perspective, the core function of HRM is administration and forms the basis of the triangle (Leonard and Swap, 2005:104). The triangle on the right-hand side in Section 6 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) represents the Strategic HRM role, which comprises five components, namely, policy planning, business partnering, outsourced activities, administration and employee and manager self-service.

The triangle on the bottom right-hand side of Section 6 represents the Strategic HRM role of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) and depicts a significantly smaller administration component of the HRM function than the corresponding component on the left-hand triangle. Leonard and Swap (2005:105) state that traditionally, HRM has been regarded as an administrative department that processes paperwork, but the shift to the Knowledge-based Economy has necessitated that each department and function makes a strategic contribution to the success of the organisation. This assertion by Leonard and Swap (2005:105) is shared by Carmeli (2004:388) and Becker and Huselid (2010:381).

The shift from the traditional HRM role to a Strategic HRM role (Figure 4.1) is supported by Divala (2014:1959) and Nyamupangedengu (2014:2072), who conducted research on the role of HRM in the South African HE sector. Their findings revealed that the HRM function at UoTs is still perceived by staff and management as an administrative function. Furthermore, according to Huselid

and Becker (2011:425), the foundation of Strategic HRM, as depicted in the bottom right-hand triangle in Section 6 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1), requires a balance between three components, namely, outsourcing, administration and self-service. Outsourcing (Figure 4.1) encourages the DUT to focus on the core HRM functions at the institution and to ensure that the HRM department operates effectively and efficiently. The self-service option (Figure 4.1), which is identified by Leonard and Swap (2005:105) and Huselid and Becker (2011:425), refers to the use of information technology, such as database management and online record keeping by employees and managers. In keeping pace with technological and other demands, the HRM function has to include technology as part of its repertoire to provide well-timed service delivery and problem solving (Becker and Huselid, 2010:381).

The Business Partnering component (the left triangle) in Section 6 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) reinforces the imperative that in order for the HRM function to become a successful role-player in the institution, it has to review its mandate and take on a key and partnering role in formulating, implementing and executing the institution's strategy (Becker and Huselid, 1999:291). This Business Partnering component illustrated in a triangle in the bottom left of Figure 4.1, requires that the HRM function focuses on identifying and solving HC elements of important institutional problems, which are likely to impinge on the growth, service delivery and profitability of the DUT (Becker, Huselid, Pickus and Spratt, 1997:1). Therefore, HRM issues should be addressed as business issues and HRM practitioners need to become involved with institutional effectiveness and survival (Godin, 2002:103; Bennet, 2004:56). This new business partnering role (Figure 4.1) that HRM has to fulfil, calls for a different way of doing things, embracing a strategic role and requiring new competencies on the part of both HRM professionals and practitioners at the DUT.

The Policy Planning component in Section 6 (shown between the two triangles in the bottom of Figure 4.1) of the Exploratory HC Framework linked to IC and KM for the DUT highlights the contribution that HRM makes towards developing and implementing the institution's strategy. According to Becker and Huselid (1999:290), HR policy planning is the foundation of a value-added HRM function that relies on people as a source of competitive advantage and a management culture that embraces this belief. Bedell, Floyd, Nicols and Ellis (2007:51) state that Policy Planning (Figure 4.1) requires HRM to develop the capacity to understand systems, as well as the cause and effect relationships intertwined within institutional systems, such as policies and procedures that often makes sense in isolation, but fall short when evaluated in the context of other HRM practices and the institutional strategy. Therefore, the HRM practitioner needs to understand what the institutional strategy is and what capabilities are needed to drive the successful implementation of the strategy (Kumar, 2005:28).

Section 6 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) depicts the transformation of HRM from a functionally fragmented, primarily administrative function to a value-adding, integrated function, aligned with the institutional strategy. Section 6 is differentiated from the other micro-environmental sections in the framework by a fragmented line, which represents the need for the HRM function to change and to fulfil the roles of administrative experts, employee champions, change agents and business partners (Becker and Huselid, 1999:6). The two-way arrows from Section 6 linked to the HC Wheel represent a two-way communication that is required to ensure that the objectives, strategies, interventions, policies and procedures of the HRM function is communicated throughout the DUT.

4.5.2.7 Section 7: Human Capital Scorecard

The Strategic HRM role under Section 6 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) connects with a two-sided arrow to Section 7, namely, the HC Scorecard (located on the right of the Framework), and is based on the research conducted by Huselid, Becker and Beatty (2005:4). The HC Scorecard in Section 7 (Figure 4.1) is separated from the other micro-environmental sections of the Exploratory HC Framework linked to IC and KM for the DUT by a dotted-line border, which depicts the need for the HC Scorecard to adapt to the challenges of the Knowledge-based Economy.

In the Exploratory HC Framework for the DUT (Figure 4.1), the HC Scorecard (Section 7) recognises both academic and support staff at the institution. Various authors acknowledge the importance of including all employees in the Strategic HRM planning and implementation of an organisation (Becker and Huselid, 2010:384; Blankley and Booyens, 2010:376; Stevenson and Bauer, 2014:14). Four components are identified in Section 7 (Figure 4.1) to support the HC Scorecard, namely, leverage knowledge to improve quality and performance; create the long term value of knowledge held by employees; develop a learning institution focusing on competencies and life-long learning; and develop a workforce mindset to promote KM. These four components (Section 7) are derived from the Human Resource and Workforce Scorecard developed by Huselid, *et al.* (2005:4). The four components (Figure 4.1) in Section 7 only provide a guideline in developing a HC Scorecard for the DUT, since the HC Scorecard will have to be adapted based on the tasks, duties and responsibilities of academic and support personnel.

Leveraging knowledge to improve quality and performance (Figure 4.1) in Section 7 of the Framework encourages the institution and management to acknowledge and value the tacit, explicit and embedded knowledge of all DUT employees. A challenge for the DUT is to create long term value of knowledge held by DUT employees, as shown by the research findings of Tettey (2010:1) in that the South African HE sector is facing large numbers of employees exiting the sector due to retirement in the next decade. Section 7 of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) also necessitates the development of a learning institution based on the guidelines provided by Stankovsky's Pillars of Enterprise Learning (depicted by Cranfield and Taylor, 2008:88) in Figure 3.7 in Chapter 3. Stankovsky's (2008) model (Figure 3.7) integrates four areas, namely, strategic management; organisational development; systems management; and organisational behaviour (Cranfield and Taylor, 2008:88). Therefore, Figure 4.1 highlights that the DUT management should use a multi-disciplinary approach to implement KM, IC and HC at the institution, which will also develop a positive workforce mindset to promote KM.

4.5.2.8 Human Capital Wheel

The Human Capital Wheel is situated at the centre of the Exploratory HC Framework for the DUT (Figure 4.1). The image of a wheel is selected to depict the continuous movement that is required for the HRM function to offer effective and efficient service delivery to DUT employees. In addition, the wheel is a cyclical symbol and illustrates the transition of the HRM function from the Traditional HRM role to the Strategic HRM role. The wheel, in conjunction with the inner hub, also allows strategic constructs to be moved easily thereby facilitating movement or transportation whilst maintaining its alignment with the other integrated sections and components at the DUT. This connotation represents the importance of the HRM function to carry the responsibility of integrating HC, IC and KM to meet the demands of the Knowledge-based Economy.

The inner hub of the HC Wheel in the Exploratory HC Framework for the DUT (Figure 4.1) comprises three components, namely, HRIS, policies and procedures. These three components selected for the inner hub are based on The Concept, Strategy, Practice (CSP) Model developed by Lippert and Swiercz (2005:345) as discussed in Chapter 3. The core of the inner-hub of the HC Wheel consists of HRIS in Figure 4.1. According to Hosie (1995:32), HRIS allows for strategic, tactical and operational decision-making. Horibe (1999:12) contends that HRIS provides a service and customer perspective since it allows the institution to generate timely and accurate employee information. The other two components of the inner hub of the HC Wheel (Figure 4.1), namely, policies and procedures, are linked to HRIS. These two components are positioned on either side of the HRIS to reflect the independent roles that would be assigned to policies and procedures (Mohope, 2014:1994). Gcaza and Urban (2014:24) assert that institutional HRM policies should be developed independently and then followed by the development of HRM procedures to reinforce the strategic implementation role of the HRM function.

The outer-hub of the HC Wheel (Figure 4.1) consists of two levels. Level One, which is slightly raised above Level Two, contains eight prominent spokes of the HC Wheel, namely, rules; values; symbols; norms; empower; ethics; attitudes; and beliefs. These eight spokes are based on the theoretical framework provided in Table 3.2 in Chapter 3, which shows the cross reference summary between models on organisational culture and organisational cultural elements to enable the implementation of KM models in the HE sector. However, each of the eight spokes in Level One of the outer-hub of the HC Wheel in the Exploratory HC Framework for the DUT (Figure 4.1) is not directly connected to the inner-hub, which reinforces the dynamics of organisational culture. Various authors report that organisations often assume erroneously that amending HRM policies and procedures will change the organisational culture (Ashkanasy, Wilderom and Peterson, 2000:107; Ang and Massingham, 2007:9; Chmielewska-Muciek and Sitko-Lutek, 2013:1366).

Each of the Level One outer-hub of the HC Wheel (Figure 4.1) is directly connected to Level Two, which contains the HRM activities that are required to successfully implement KM and IC at the DUT. The connectivity between Level One and Level Two of the outer-hub of the HC Wheel (Figure 4.1) recognises that institutional culture is entwined with the HRM activities of the institution (Cooke and Szumal, 2000:150; Davel and Snyman, 2005:17). Spoke A of the HC Wheel (Figure 4.1), namely, Rules, requires planning, which relates to Strategic HRM, job profiling, job benchmarking and total remuneration management. The planning activities of the HRM function will allow the DUT to formulate detailed plans to achieve the optimum balance of institutional needs or demands within the confines of available resources. Spoke A necessitates the HRM function to identify the goals or objectives to be achieved, based on Section 4 of the Framework, namely, the Institutional Strategy, while formulating strategies to achieve these objectives and monitoring the steps on a continuous basis (Issa, Isaias and Kommers, 2014:41).

Spoke B of the HC Wheel (Figure 4.1), namely, Values, relates to the HRM activities to acquire suitably qualified HC for the DUT by means of talent acquisition management, hiring and selection processes. Values refer to the broad preferences concerning appropriate courses of action or outcomes that the DUT aspires to and should be incorporated into the HRM activities relating to talent management, recruitment and selection (Ahonen, 2009:119). Acquiring suitably qualified and experienced HC is important for the DUT to ensure quality education and service delivery.

Spoke C of the HC Wheel (Figure 4.1), which is Symbols, refers to objects, ideas and visual images that are used to convey ideas and beliefs relating to the DUT. Symbols are used to engage employees in the workplace to become part of a larger social community (Boughey, 2007:11). The HRM activities associated with the engagement process are the contract of employment; the compensation package offered to the employee;

socialisation processes such as induction or orientation; and social networks within the institution to assist employees to adapt (Johnson and Cooper, 2014:103).

Spoke D of the central outer wheel refers to Norms, which refers to the individual's basic knowledge of what other employees do and what they think they should do (Johnson, Louw and Smit, 2010:119). Norms also relates to collective representations of acceptable group behaviour and conduct (Sifuna, 2010:419). HRM activities associated with instilling norms at the DUT relate to onboarding and placement (Sidhu, 2009:239), which allows a new employee to be integrated into an institutional department and to adapt timeously to the norms of both the group and the DUT.

Spoke E of the HC Wheel (Figure 4.1) relates to Empowerment and entails developing an individual to be productive, based on the specific nature of the position that he/she has been acquired for. Empowerment will encourage and develop employees' skills for self-sufficiency within the institution. HRM activities associated with this spoke relate to training and development which in turn, is linked to individual development plans and intrapreneurship to encourage innovation at the DUT (Botha, 2014:1977; Sirayi and Nawa, 2014:1654).

Spoke F refers to Leadership at the DUT to instil ethics amongst employees by means of HRM activities relating to coaching, mentoring, conflict resolution, communication, teamwork and change management (Serfontein and De Waal, 2015:30). Ethics will encourage DUT employees to act in a responsible manner that embraces the values and norms of the institution. Ndlovu (2014:2049) asserts that leadership at an institution is the catalyst for employees to embrace acceptable ethical behaviour.

Spoke G of the HC Wheel (Figure 4.1) relates to Attitude and includes HRM activities that assess the employee's performance, such as performance management, reward, recognition and corrective action. Ndlovu (2014:2048) states that employees' attitudes impact on their performance and can influence the morale of a department. Employees' attitudes will also impact on the acceptance of institutional change based on the External Environment and KM drivers (Botha, 2014:1977).

The eighth spoke (Spoke H) of the central outer wheel (Figure 4.1) refers to HRM activities introduced to retain employees at the DUT, namely, career planning, work-life balance, growth opportunities and talent management (Botha, 2004:3). Staff retention is identified as a challenge in the South African HE sector by various authors such as Bennet (2004:56) and Ndlovu (2014:2049). Spoke H is also linked to Spoke A of the HC Wheel to indicate the continuity of the HRM processes, procedures and activities at the DUT in a self-evolving changing circular action influenced by the Institutional Strategy.

It should be noted that Section 3 of the Exploratory HC Framework linked to IC and KM for the DUT, namely, the Intellectual Capital component (Section 2), also impacts on the HC Wheel (Figure 4.1). The four perspectives and the relevant elements included in each perspective of the IC section would be integrated into Level One and Level Two of the outer-hub of the HC Wheel.

4.6 CONCLUSION

This chapter describes the seven sections and various components of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1), which will enable the institution to implement KM and IC to address the demands and challenges of the Knowledge-based Economy. The formulation of the Exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1) is the original contribution made by the researcher and extrapolated from the comprehensive readings of the literature review for the current study.

The Framework (Figure 4.1) highlights the macro-environmental factors and KM drivers that impact on the institution. The importance of Intellectual Capital is identified and described to incorporate the guidelines of IC into the integrated Framework (Figure 4.1) for the DUT. The value of including KM in the Institutional Strategy is explained and the contribution of Knowledge Management Enablers to sustain KM initiatives is also highlighted. The value of Strategic HRM is recognised and will ensure that the DUT develops concrete interventions to attract, develop and retain talented employees with adequate knowledge and skills. A HC Scorecard is envisaged for implementation based on the specific skills, knowledge and expertise associated with academic and support staff at the DUT. The HC Wheel forms the central core of the Framework in Figure 4.1 and represents the importance of HRIS, HRM policies, procedures and activities to support the HC challenges of the DUT. The subsequent chapter deals with the Research Methodology and Design pertaining to the study.

CHAPTER 5

RESEARCH METHODOLOGY AND DESIGN

5.1 INTRODUCTION

In order to address the national and international demands of the Knowledge-based Economy, the University of Technology (UoT) sector, with specific reference to the Durban University of Technology (DUT), has to integrate Knowledge Management (KM), Intellectual Capital (IC) and Human Capital (HC) respectively. Sibiya and Sibiya (2014:1934) postulate that the shift from an academic institution to a knowledge-based institution involves several challenges, such as employee expectations, leadership and management development, as well as attracting, developing and retaining suitably qualified and experienced employees. Hence, Bennet and Bennet (2014:14) add that Higher Education (HE) institutions are now expected to integrate known best practices relating to KM, IC and HC. The ability of the DUT to meet the expectations of its stakeholders and the government depends on a comprehensive framework in which the institution identifies the value of its HC and develops concrete interventions to attract, develop and retain employees with adequate knowledge and skills.

The literature reviewed in the previous chapters provided a comprehensive overview for the development of an exploratory HC Framework linked to IC and KM for the DUT (Figure 4.1). According to Leech and Onwuegbuzie (2009:269), research is the process of achieving solutions to problems using a planned and systematic method. This chapter outlines the research design and methodology, the process used in administering the data collection instrument and the methods used to collect and analyse the data are also presented. This chapter also provides an insight into the need for and how ethical considerations were maintained in this study.

5.2 THE RESEARCH PROBLEM CONTEXTUALISED

Du Pré (2010:13) asserts that the South African HE UoT sector has undergone substantial changes since 1994 namely amendments to HE legislation, mergers in the HE sector, and national and international competition. HE institutions, with specific reference to the UoT sector, are now expected to contribute actively towards the South African economy by preparing and equipping graduates to meet the challenges of the Knowledge-based Economy (Pasher and Ronen, 2011:193). Abel and Deitz (2012:688) state that applying the principles of the Knowledge-based Economy to HE institutions present its own unique set of challenges, such as staff retention and ensuring employees keep abreast with the changes in the technologically advanced HE sector.

In order for DUT to adapt to the challenges of the Knowledge-based Economy, the institution requires a holistic integrated HC and IC framework to ensure that the Human Resource Management (HRM) needs of the institution are met. The ability of the DUT to meet the expectations of its stakeholders and the government depends on a comprehensive framework in which the institution identifies the value of its HC and develops concrete interventions to attract, develop and retain employees with adequate knowledge and skills. Therefore, the main aim of this study was to develop an exploratory HC Framework linked to IC and KM for a selected HE UoT, namely, the DUT, operating in the dynamic South African Knowledge-based Economy. The study aimed to develop a road map for the identification, management and operationalisation of an integrated HC and IC framework for the DUT in the South African HE UoT context.

5.3 KEY RESEARCH OBJECTIVES

The key objectives of the study were the following:

- To investigate the importance and contribution of HC to the DUT operating in a Knowledge-based Economy.
- To identify the dimensions of KM applied to evaluating HC at the DUT.
- To determine whether the DUT integrates the constructs of IC to produce, manage and control KM.
- To investigate the perceptions of staff at the DUT on the processes used when attracting and retaining competent personnel in relation to HC.
- To develop an exploratory HC Framework linked to IC for the DUT from the literature sourced.

5.4 PRINCIPLES OF RESEARCH DESIGN AND METHODOLOGY

Mouton (2001:276) maintains that the aim of research design is to plan and structure a given research project such that the validity of research findings are maximised. The research design adopted for this study was quantitative in nature given that a large target population was involved. McNabb (2002:83) asserts that research design is a strategic framework for action that links research questions to the execution or implementation of the research. Wilson (2014:67) further elaborates on the research design description of McNabb (2002:83) by stating that the research design is a plan that guides arrangements for the collection and analysis of data, because it specifies how the research is going to be carried out in such a manner that it answers the research questions.

Wilson (2014:67) maintains that the aim of research design is to provide a framework for action that will enable the researcher to draw coherent and acceptable conclusions or inferences from his or her findings. Dellinger and Leech (2007:313) state that the research design ensures that the study fulfils a particular response, as it provides answers to research questions that will stand

against criticism and ensures that the design has an impact on the validity and correctness of the research findings. This includes a description of the procedure for selecting a sample, as well as how the responses related to the collation the data are to be sorted out.

5.4.1 Types of Research Design

Zikmund, Babin, Carr and Griffen (2013:110) state that a research design is a master plan specifying the methods and procedures for collecting and analysing the needed information. In order to contextualise the research paradigm followed in this study, the different types of research designs are initially discussed briefly below.

5.4.1.1 Quantitative Research versus Qualitative Research

The difference between quantitative and qualitative research is based on different research paradigms (Giddings, 2006:198). Qualitative research focuses on the competence of the researcher to gather information through structured data collection (e.g. observations or interviews), whereas with quantitative research the researcher uses instruments (e.g. questionnaires) to gather information (Flick, Von Kardoff and Steinke, 2004:47). According to Dellinger and Leech (2007:311), qualitative research does not depend on the use of numbers or measurements and focuses on phenomena that cannot be explained adequately with statistics. Giddings (2006:199) postulates that qualitative research has a phenomenological perspective and is very flexible, since the data and circumstances change.

In contrast, Bajpai (2011:108) asserts that quantitative research depends on the use of numbers and measurements and has a structured data collection process. Brannen (2005:177) explains that quantitative research tries to establish casual relationships. In the quantitative paradigm, the researcher needs a set plan for the completion of the research and plays a more prominent

role in the data gathering process (De Leeuw, 2005:239). Owing to the nature of the methodological research component, a quantitative descriptive approach to the study was adopted to allow for the large volumes of data collected to be easily coded, analysed and described. The quantitative approach also allows for the results computed from the analysed questionnaires to be confidently generalised to the broader target population (Brannen, 2005:179).

5.4.1.2 Experimental Research versus Non-Experimental Research

According to Johnson, Louw and Smit (2010:115), there are three major types of research designs, namely, experimental research, non-experimental research and quantitative research designs. Lieber and Weisner (2010:588) attest that of the three research designs mentioned, quantitative research is applicable to the experimental research and non-experimental research designs. Leech and Onwuegbuzie (2009:269) state that in experimental research an intervention is a common factor and the researcher does not have control over the variables. Brannen (2005:180) suggests that when non-experimental research is conducted, there is no planned intervention and the researcher does not have control over the independent variables. Non-experimental research is often conducted by using surveys to test situations in real social structures (Gorard, 2006:74). In this study, a non-experimental research design was selected to support the quantitative research approach.

5.4.1.3 Exploratory Research, Descriptive Research and Explanatory Research

Gorard (2006:73) confirms that research conducted in the social sciences can take on three research processes, namely, exploratory research, descriptive research and explanatory research. Exploratory research is the initial research conducted to clarify and define the nature of a problem that has not been clearly defined in a specific setting (Zikmund, *et al.*, 2013:110). McNabb (2002:84) affirms that exploratory research is used when problems are in a preliminary

stage and can address research questions of all types. Lowenthal and Leech (2009:202) state that exploratory research is often used to generate formal hypotheses and lays the groundwork for future research. According to Briggs and Collman (2007:109), exploratory research provides greater understanding of a concept or problem, rather than providing quantification.

Fricker (2008:197) states that descriptive research is specifically aimed at describing people and situations. McNabb (2002:85) adds that data from descriptive research may be qualitative or quantitative. However, quantitative data presentations are normally limited to frequency distributions and summary statistics (Fricker, 2008:198). Lowenthal and Leech (2009:203) highlight that the primary purpose of explanatory research is to explain why phenomena occur and to predict future occurrences. Leech and Onwuegbuzie (2009:269) observe that during explanatory research, the researcher aims to understand the nature of the relationship between the independent and dependent variables. For the purpose of this study, the exploratory research process was used to develop the HC Framework linked to IC and KM for the DUT. Thus, a quantitative research approach was adopted for the empirical component of the study.

5.5 PRIMARY DATA

According to Welman, Kruger and Mitchell (2005:87), primary data is obtained from the direct observation of the phenomenon under investigation or is collected personally. Creswell (2003:170) asserts that primary data is often sourced after the researcher has gained some insight into the problem by reviewing secondary data or by analysing previously collected data. Andrew and Halcomb (2009:105) contend that primary data is collected for a specific purpose and the researcher controls the process. However, Creswell (2003:171) warns that primary data tends to be expensive to collect and takes a long time to process. The methods of collecting primary data are through interviews, personal or telephone calls and self-administered questionnaires

(Welman, *et al.*, 2005:88). For this study, a close-ended structured quantitative questionnaire (Annexure B) as a data-gathering instrument was utilised to collect data.

5.6 SECONDARY DATA

Doyle, Brady and Byrne (2009:179) state that secondary data refers to the information collected by individuals or organisations other than the researcher. Flick, *et al.* (2004:47) attest that the value of secondary data is that the researcher can use this existing data and conduct an analysis of it. Creswell (2003:171) states that although secondary data saves time and money, it requires the researcher to be very selective when including this type of data. Hence, the secondary data for this study was sourced from a comprehensive review of journals articles, related text books, the internet, media articles, government publications, periodicals and relevant dissertations and theses.

5.7 TARGET POPULATION

According to Patton (2002:118), the actual specification of a sample must start with the identification of a population to be surveyed. Gorard (2005:159) clarifies that the target population refers to the group of people who form the object of the survey and from which conclusions are drawn. A population can also be described as finite or infinite (Patton, 2002:108). A finite population has a limited or fixed number of individuals or objects while an infinite population has an unlimited or non-fixed number of individuals or objects (Gorard, 2005:160). Caracelli and Greene (1997:23) add that the researcher must anticipate decisions that are likely to arise during the actual sample selection and that respondents must possess the information and must have certain attributes or characteristics to make their responses meaningful.

Greene (2008:12) adds that a population is a homogeneous mass of individual units. Gorard (2005:160) further explains that the population consists of distinctly different strata, but the units within a stratum should be as homogeneous as possible. Lowenthal and Leech (2009:205) conclude that most of the time it is often not possible to study the entire population because of the limitations of time and costs. The target population for the study therefore comprised all academic and administrative staff members of the DUT based in KwaZulu-Natal. The composite source list of the target population was obtained from an internal staff list provided by the Human Resource Department at the DUT and equated to N = 1874 personnel. The DUT Human Resources Department also had 2 composite staff lists, separated into Staff List A comprising 691 academic personnel and Staff List B, which comprised 1183 administrative staff employed at the DUT. Both the source lists were in alphabetical order and the researcher numbered each list numerically to facilitate the proportionate selection of the sample from the aggregate target population that equated to (N=1874).

5.8 THE SAMPLING PROCEDURE

Schram and Caterino (2006:102) describe a sample as a subgroup of the population, which reflects the characteristics of the population as a whole. According to Bryman and Bell (2007:116), a population or universe is the aggregate of all the elements, whilst the survey population is the aggregate of elements from which the sample is selected. The sampling unit refers to the entity which is the focus of the survey (Schram and Caterino, 2006:103). According to Fricker (2008:197), the sampling procedure entails drawing a representative sample which includes all the elements of the universe, which can be finite or infinite. Terreblanche, Durrheim and Painter (2002:44) maintain that the most important factor about a sample is representativeness. The aim is to select a representative sample about which the researcher intends to draw

conclusions and make recommendations (Zikmund and Babin, 2012:109). According to Sekeran's (1992:253) computed table (Annexure C), for a target population of N=1874, the ideal sample size should be n=320 elements. The procedure for selecting the sample is elucidated below since it underscores the methodological procedure employed to select the sample.

5.8.1 Probability versus Non-Probability Sampling

According to Welman, *et al.* (2005:231), there are two categories of sampling methods, namely, probability and non-probability sampling techniques. Probability sampling provides a way of selecting representative samples from large, known populations (Flick, *et al.,* 2004:49). Probability sampling methods make it possible to estimate the amount of sampling error that can be expected in any given sample (Briggs and Collman, 2007:206) Non-probability sampling, (such as, convenience, judgemental, quota and snowball techniques) in contrast, risks introducing selection bias into the sample (Greene, 2008:11).

In this study, probability sampling was selected for the following reasons. Firstly, the researcher identified the need to make statistical inferences from the sample and endeavoured to minimise selection bias (Gorard, 2005:161). Secondly, the nature of the two staff lists were heterogeneous (i.e. Academic Staff List A had 691 elements, and the administrative Staff B comprised of 1183 personnel) and were aligned to the composite target population of N = 1874 employed at the DUT. However, it was easy to gain access or to locate the population elements as the population was not highly scattered and was easily accessible (Briggs and Collman, 2007:206). Thirdly, the quantitative research design was used and a large sample size was targeted (Flick, *et al.,* 2004:49). Lastly, the sampling frame was available, but there was no need to target specific elements of the population due to the research objectives of the study (Bajpai, 2011:98). There are four major types of probability sample designs, namely, simple random sampling, stratified sampling, systematic sampling and

cluster sampling (Fricker, 2008:198). For the purposes of this study the simple random sampling technique without replacement was used to select the representative sample. This strategy was adopted to select a sizeable sample to equalise the proportionate representivity of both academic and administrative staff making up the sample of 320 elements.

5.8.2 Simple Random Sampling

Briggs and Collman (2007:204) state that simple random sampling is a probability sampling procedure that gives every element in the target population an equal chance of being selected. In this study, the simple random sampling technique without replacement as a probability sampling method was used for the quantitative research design. According to Welman, *et al.* (2005:234), simple random sampling provides the researcher with a sample that is highly representative of the population being studied. Furthermore, according to Kumar (1999:107), simple random sampling is beneficial if a complete list of the population is available and the sampling frame is ordered.

Babbie (2007:109) states that there are two types of simple random sampling, namely, sampling with replacement, and sampling without replacement. In sampling with replacement, after an element has been selected from the sampling frame, it is returned to the frame and is eligible to be selected again (Greene, 2008:11). In sampling without replacement, after an element is selected from the sampling frame, it is removed from the population and it is not returned to the sampling frame (Bajpai, 2011:97). According to Terreblanche, *et al.* (2002:46), random sampling without replacement tends to be more efficient than sampling with replacement in producing representative samples, since it does not allow the same population element to enter the sample more than once. In this study, simple random sampling without replacement was used as the probability sampling technique. In addition, Greene (2008:13) explains that when using simple random sampling, either a manual approach or computed program may be used to select a sample. In this study, to eliminate

human bias, the researcher used a computerised program called Microsoft Excel 2013 Data Analysis functionality to generate the 2 sets of random numbers starting from 1 to 691 for the academic List A and 1183 administrative staff List B to generate a proportionate sample of 320 elements for the study.

5.9 SELECTION OF THE SAMPLE USING A COMPUTERISED PROGRAM

Babbie (2007:102) states that the selection of a sample describes the method used to select the sample from the population. Bryman and Bell (2007:117) state that sample size refers to the number of subjects in the study. However, Gorard (2007:92) contends that the larger the sample, the better the chances of obtaining meaningful statistical results. According to Saunders, Lewis and Thornhill (2009:158), the selection of a bigger sample produces significant statistical results for generalisations and also eliminates sampling errors. Sekaran and Bougie's (2014:268) computed Table (Annexure C) for determining the optimum sample size from a given population was used in this study to select the sample for the quantitative research design. For this study, for a total target population of N=1830 a sample size of n=320 is recommended by Sekaran and Bougie (2014:268) using the statistically computed formula to determine a simple size from a given target population. Since the two sets of the target population was lopsided, it was necessary to determine the percentage of each grouping to ensure representivity for each sample group (i.e. academic and administrative personnel). This baseline computation is illustrated below in Table 5.1 with a coherent explanation of how the final sample was selected for each Staff List.

TABLE 5.1 COMPUTATION OF THE WEIGHTED % OF THE TOTAL ACADEMIC STAFF LIST A AND ADMINISTRATIVE STAFF LIST B IN PROPORTION TO THE COMPOSITE TARGET POPULATION OF 1874 ELEMENTS AT THE DUT

	CATEGORY OF STAFF	STAFF LIST A		STAFF LIST B		TOTAL
		COUNT	%	COUNT	%	
1	Academic Staff	691	36.9%	-	-	691
2	Administrative Staff	-	-	1183	63.1%	1183
	TOTAL	691	36.9%	1183	63.1%	1874

As illustrated in Table 5.1, the percentage of academic staff in Staff List A is weighted at 36.9% of the composite target population, whilst for the administrative staff, the percentage is 63.1% computed the sample of 202 elements. These percentages were thereafter used for each of the 2 Staff Lists respectively, in order to draw the requisite sample for each grouping and equate it to the 320 sample size for proportionate representivity from the target population of 1874 employees at DUT. The sample selected for the academic staff at 36.9% equated to 118 (Table 5.1) sample respondents using a computerised program called Microsoft Excel 2013 Data Analysis functionality to generate the set of random numbers. The procedure adopted was that once the computerised random numbers were generated, using a range from 1 to 118 for the 691 total academic elements, then each number was ticked on the Staff List A and in this way 118 academic sample respondents were selected. The same procedure was followed for the administrative staff at 63.1% (Figure 5.1), using the Microsoft Excel 2013 Data Analysis functionality computerised program to generate the second set of random numbers that were generated and ticked against Staff List B, from a range of 1 to 202 to obtain a sample size of 202 administrative respondents. Thus, the computerised number that was generated for each list was ticked against the numerically ordered list for both the academic and administrative staff for the total sample selection of 320 respondents for the empirical study. This was in keeping with Sekaran's (1992:253) table (Annexure C) that indicates rom a given target population of

1874, the zample should be around 320. The *modus operandi* for selecting the proportionate sample from each Staff List in this manner, gave credence to its objectivity in the selection of each respective sample grouping for fairness of its distribution. A second analysis was also conducted thereafter to determine the spread of the sample respondents of the academic staff (Staff List A) and the administrative staff (Staff List B) as illustrated in Table 5.2 below.

TABLE 5.2 BREAKDOWN OF THE COMPOSITION OF THE SAMPLE RESPONDENTS OF ACADEMIC AND ADMINISTRATIVE STAFF AT VARIOUS CAMPUSES OF THE DUT

CAMPUS	ACADEMIC SAMPLE (STAFF LIST A)	ADMINISTRATIVE SAMPLE (STAFF LIST B)	SUB-TOTAL
Steve Biko Campus (Durban)	32	59	91
M L Sultan Campus (Durban)	19	43	62
Ritson Road Campus (Durban)	17	24	41
City Campus (Durban)	11	23	34
Brickfield Campus (Durban)	2	2	4
Indumiso Campus (Pietermaritzburg)	21	27	48
Riverside Campus (Pietermaritzburg)	16	24	40
TOTAL	118	202	320

Table 5.2 shows the spread of the 320 sample respondents, both academic and administrative on the various campuses of DUT. At this juncture, it is important to note that in almost all HE Institutions the administrative staff always outnumbers the academic staff as shown in Table 5.1 above. Hence, the rationale to select the sample in the scientific manner espoused, justified the methodology used to select the 320 sample respondents from the composite target population of 1874 employees at DUT, thereby obviating any sampling error or human bias for the final selection of both groupings. Having described the sample selected for this study, it is appropriate to describe the research instrument, which was used for gathering the data. For the purpose of this study a close-ended structured questionnaire was used because the research design was quantitative in nature.

5.10 MEASURING INSTRUMENT

Measurement tools are instruments used by researchers to aid in the assessment or evaluation of a variety of variables (Lieber and Weisner, 2010:587). According to Thompson and Seber (1996:105), a questionnaire is defined as a set of questions on a form, which is completed by respondents in respect of a research project, in order to allow the researcher to implement scientific protocols and obtain data from the respondents. For this study, a close-ended structured quantitative questionnaire was developed (Annexure B).

5.10.1 Brief Perspectives on the use of Questionnaires

According to Lieber and Weisner (2010:587), a questionnaire helps in gathering the information for the study and the process will be guided by the purpose of the study. Gorard (2007:92) defines a questionnaire as a data collection strategy, which is the most generally used instrument of all. Other authors who are in agreement with this view are Terreblanche, *et al.* (2002:293) who affirm that a questionnaire is regarded as one of the most common tools of gathering data. Sharma and Bansal (2009:31) state that a questionnaire is a formalised set of questions for obtaining information from respondents and is regarded as the main means of collecting quantitative primary data. Sharma (2010:143) highlights that the questionnaire should also satisfy the assumptions on which questionnaires are based, namely:

- that the respondents can read and understand the questions;
- that the respondents are in a position to supply the information to answer the questions;
- that the possibility of willingness to answer the questions exists; and
- that the respondents will be interested in the outcome of the research and its implications for the betterment of their situations.

5.10.2 Guidelines followed in developing the Measuring Instrument

A questionnaire needs to be well designed because it is very seldom possible to repeat the survey if the researcher finds out afterwards that the questionnaire was not complete or that some important topic was omitted (Creswell, 2003:116). According to Kumar (1999:187), good questionnaires are those that meet the research objectives; obtain valid and reliable data from respondents; facilitate data processing; and achieve and maintain the involvement of respondents. Thompson and Seber (1996:106) state that the response to a questionnaire is voluntary. Shields and Rangarjan (2013:156) contend that a good questionnaire should be designed to maintain the interest of the respondents; therefore the questionnaire should look professional and contain precise and clear instructions on how to answer the questions. Sharma and Bansal (2009:38) recommend that a questionnaire should be divided into logical sections to facilitate understanding. Siddiqui (2010:183) asserts that when developing a questionnaire, questions that are double-barrelled, sensitive, leading and negative in nature should be avoided.

5.10.3 Advantages of a Structured Questionnaire

According to Thompson and Seber (1996:108), a structured questionnaire permits the researcher to contact a large number of respondents quickly. Lieber and Weisner (2010:587) add that in structured questionnaires, where close-ended questions are used, it is relatively easy to create, code and interpret the data. Ivankova, Creswell and Stick (2006:9) state that the structured questionnaire is easy to standardise, since every respondent is asked the same question in the same way. The researcher, therefore, can be assured that all the respondents in the sample answer exactly the same questions, which makes this a reliable method of research (Goodwin, 1995:345). Leech and Onwuegbuzie (2011:173) contend that a structured questionnaire requires a lower cognitive load of the respondent and reduces

the amount of thinking that the respondent has to do, which generally leads to higher responses and more accurate data. For the purpose of this study, a close-ended structured questionnaire (Annexure B) was developed, taking cognisance of the views expressed by various authors for this component. The researcher was also aware of the 2 grouping of the sample respondents (i.e. academic and administrative staff at DUT), the large target population and the selected sample size.

5.10.4 Design of the Questionnaire

In this study, the construction and design of the questionnaire went through several drafts, which entailed a fair amount of time for refinement until the final research instrument was formulated. The questionnaire for this study was designed to include a mix of structured close-ended questions and statements or stems in the Likert scale. The questions were phrased to focus on a specific area in order to generate accurate data which would facilitate statistical analysis. In the questionnaire, a combination of single response statements with nominal and ordinal categories were used, as well as scaled questions. In the case of the single response questions, respondents were given various alternatives to choose from. For the scaled questions, the five-point Likert scale was used to elicit the degree of agreement or disagreement, with provision for a neutral column for each of a series of statements related to the main theme. Ivankova, *et al.* (2006:15) state that the Likert scale is very popular, because of its ability to measure attitudes, beliefs and opinions. The Likert scale statements were also aligned to the key objectives and those pertaining to the numerous variables highlighted in the exploratory model developed (Figure 4.1).

5.10.5 Coding the Questionnaire

The construction of the questionnaire enjoyed the advantage of including pre-coded questions in the sequence of alternatives given. Coding entails assigning numeric codes to each response which falls in a particular section of

the questionnaire (Upagade and Shende, 2007:98). Shields and Rangarjan (2013:159) report that the inclusion of pre-coded questions facilitates data capturing since the respondent is merely required to circle the numeric code on each Likert scale statement.

5.10.6 An Overview of the Final Questionnaire

The instrument used for this study consisted of a pre-coded structured questionnaire which was carefully constructed to facilitate maximum response and, at the same time, obtain more detailed information. The Questionnaire (Annexure B) comprised 130 statements and included the following sections:

- Section A: General Information.
- Section B: Knowledge-based Economy.
- Section C: Knowledge Management.
- Section D: Intellectual Capital.
- Section E: Human Capital.

Moreover, for Sections B to E, a brief definition by the researcher was highlighted at the top to reinforce an understanding of the concepts in the context of the topical theme of the study.

5.10.7 The Covering Letter

A covering letter (Annexure A) addressed to the respondent outlines the importance of the study, the aim of the study and the value of their participation. An incentive in the form of mailing the summary findings of the results was included to solicit co-operation and support from the sample respondents. The return rate was further reinforced by assuring the confidentiality and anonymity of respondents to allay any anxiety, whilst stressing the importance of HC for the HE sector with specific reference to the DUT. The covering letter (Annexure

A) was prepared by the researcher and formalised using the DUT letterhead reflecting the designation of the researcher. It was also counter-signed by the supervisor of this study, to validate its authenticity and induce co-operation from respondents and was stapled to each questionnaire.

5.11 PRE-TESTING

Pre-testing is the normal practice for evaluating a questionnaire on a small number of respondents to make sure it is understood and performs as required (Sharma and Bansal, 2009:132). It gives the researcher the opportunity to correct problems before the final questionnaire is distributed to the sample respondents (Panneerselvam, 2004:102). The value of pre-testing comes from determining whether every question or statement is fully understood by the respondent, the language and wording are clear and easy to understand and the instructions to the respondents are understandable (Thompson and Seber (1996:108). Pre-testing is important for the researcher to be satisfied with the design of the questionnaire, to facilitate the administration of the questionnaire and to encourage positive respondent participation (Sharma, 2010:143). More importantly, the responses generated should be clear and accurate to expedite the process of data capturing (Thompson and Seber, 1996:109). For the purposes of pre-testing the questionnaire, it was given to two colleagues in each of the six DUT faculties, namely, six academic staff and six administrative staff, as well as two colleagues in the English and Language Practice Department at DUT for language usage and paraphrasing the questionnaire. The 14 staff selected to participate in the pre-testing were excluded from the target population (N=1874). More importantly, these 14 respondents were not part of the computerised list of random numbers (i.e. Staff List A and Staff List B) as they were not selected when sampling occurred and remained unticked on both the Staff Lists. This, therefore, facilitated their selection for pre-testing

the questionnaire and also did not in any way compromise the main sample selection of both groupings. The comments from the 14 colleagues were collated for a constructive refinement with a view to further fine-tuning the questionnaire. These comments were important in the subsequent editing, phrasing and wording of the questionnaire. The questionnaire was amended for fluidity, consistency and standardisation prior to its administration to the main sample respondents.

5.12 VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT

Lieber and Weisner (2010:589) state that for a research study to be accurate, its findings must be reliable and valid. Kumar (1999:108) asserts that reliability means that the findings would be consistently the same if the study were repeated. Siddiqui (2010:119) describes validity as relating to the truthfulness of the findings of the research. Johnson, *et al.* (2010:117) conclude that a study can be reliable but not valid and it cannot be valid without first being reliable. Saravanavel (2003:179) warns that a researcher should never assume validity no matter how reliable the measurements are.

5.12.1 Validity of the Questionnaire

Upagade and Shende (2007:166) contend that in order for a questionnaire to be valid, it must be able to measure accurately what it is supposed to measure. Leech and Onwuegbuzie (2011:174) state that an instrument should be usable for the particular purposes for which it was designed and the concept of validity is indicative of research conclusions being sound. Bryman and Bell (2007:114) describe validity as a measuring instrument that measures accurately what it is intended to measure and allows for the appropriate interpretation of results and drawing of acceptable conclusions about the population. Wilson (2014:109) further highlights that validity takes the following different forms, namely:

- Face Validity is the extent to which a test is subjectively viewed as covering the concept it purports to measure.

- Content Validity refers to how accurately a measurement instrument taps into the various aspects of the specific construct in question.

- Criterion Validity involves multiple measurements and is established by comparing scores on an instrument with an external criterion known or believed to measure the concept, trait or behaviour under study.

- Construct Validity is concerned with the validation of the measurement instrument in that it should validate what it is measuring, how and why it operates the way it does and the theory underlying it.

5.12.2 Reliability of the Questionnaire

Briggs and Collman (2007:193) report that reliability deals with accuracy and it can be thought of as the degree of consistency of the measuring instrument. Sharma and Bansal (2009:134) state that reliability refers to the fact that a question evokes the same set of responses each time it is asked in similar circumstances. Daniel (2012:193) states that there are four types of reliability, namely, inter-rater or observer reliability that refers to the degree to which different respondents give consistent answers in a measuring instrument. The second type of reliability is test-retest reliability and refers to the consistency of a measuring instrument over time. Thirdly, according to Daniel (2012:194), parallel-forms of reliability relate to the reliability of two measuring instruments constructed in the same way, from the same content and lastly, internal consistency reliability refers to the consistency of results across items often measured with the Cronbach Co-efficient Alpha statistical tool. For the purpose of this study, internal consistency reliability was used to ascertain the reliability

construct. Creswell (2003:102) states that internal consistency reliability occurs when two or more measurements of the same concept are taken at the same time and then compared to see whether they agree. Thus, the important constructs of validity and reliability were given due recognition for the measuring instrument. The next step was to determine the potential Alpha value of the reliability construct by conducting a pilot study apart from the pre-testing that was already undertaken in this study.

5.13 THE PILOT STUDY

Johnson (2003:370) states that a pilot study involves a trial run which can be linked to a small scale survey. It assists in determining the population characteristics and also indicates the feasibility of the sample. The imperative of the pilot study was to determine the validity and reliability of the questionnaires, with a view to making necessary changes in the procedure before undertaking the actual fieldwork (Sharma, 2010:143). Panneerselvam (2004:104) recommends that as a precautionary measure, the subjects chosen for the trial run should be representative and homogenous of the target population in terms of intellectual ability, knowledge of the subject matter and attitude towards it. Sharma and Bansal (2009:133) state that the pilot study encompassing the trial run determines the advanced feasibility of the questionnaire and ensures that the responses selected as possible answers covered the host of possibilities. The pilot study should satisfy the researcher as to the acceptability of the questionnaire and therefore the administration of the pilot test should be conducted in an identical manner as the final study (Upagade and Shende, 2007:164). Thus, a pilot test was administered to a random sample of 30 respondents that were excluded from the target population (N=1874). As with the pre-test procedure, these 30 random respondents were selected from the from both Staff List A (Academic) and Staff List B (Administrative) but who remained unticked from the computer generated numbers that were assigned to select the main sample group from both lists.

Therefore, they facilitated their random selection without compromising the selection of the main sample respondents (n=320) that were selected using the computer generated numbers for both lists. The 30 respondents who participated in the pilot study comprised of 15 academic staff and 15 administrative staff, who were sourced from Staff List A and Staff List B respectively. The results of the Cronbach Coefficient Alpha Test for reliability for the main variables, namely, KBE, KM, IC, HC and the overall result is depicted in Table 5.3 below.

TABLE 5.3 CRONBACH'S ALPHA FOR THE PILOT TEST

Aspect	Cronbach's Alpha for KBE	Cronbach's Alpha for KM	Cronbach's Alpha for IC	Cronbach's Alpha for HC	Overall Cronbach's Alpha
Alpha	**0.921**	**0.924**	**0.901**	**0.882**	**.856**

Giddings (2006:200) recommends that the Cronbach's Co-efficient Alpha technique should be used to measure the reliability of a measurement instrument. The Co-efficient Alpha is a technique for judging the internal consistency of the measuring instrument by averaging all the possible ways of splitting test items and examining the degree of correlation (Creswell, 2003:105). The greater the correlation is to a score of one, the higher the internal consistency (Giddings, 2006:201), as reflected in Table 5.3.

Table 5.3 illustrates the computed Cronbach's Alpha values for each of the Section B to E of the questionnaire (Annexure B) conducted during the pilot study and yielded highly significant values which were above the norm of 0.6 (Giddings, 2006:201). The overall aggregate Cronbach's Alpha value for the pilot study was 0.856 and was considered to be an excellent precursor for the reliability of the questionnaire. This gave legitimacy and credibility to the reliability of the questionnaire for the final administration to the main sample respondents and the field work that followed.

5.14 DATA COLLECTION METHODS

According to Kumar (1999:109), data collection techniques enable researchers to systematically collect information in order to answer questions in a conclusive way. Sharma (2010:145) highlights the criteria, together with the different methods and procedures for data collection as shown in Table 5.4 below.

TABLE 5.4 CRITERIA AND DATA COLLECTION TECHNIQUES

No	CRITERIA	PERSONAL METHOD	TELEPHONE INTERVIEW	MAIL SURVEY
1	Cost	Most expensive	Intermediate	Least expensive
2	Speed	Slowest	Fastest	Intermediate
3	Accuracy	Most accurate	Least	Intermediate
4	Amount of Data	Most	Least	Intermediate
5	Response Rate	Highest	Intermediate	Lowest
6	Flexibility	Most flexible	Intermediate	Least flexible
7	Control • Sample • Interview • Administration	 Intermediate Best Worst	 Worst Intermediate Intermediate	 Best Worst Best

Source: Sharma, N.K. (2010:145). Adapted

Table 5.4 illustrates the 3 main types of data collection methods, namely, the personal method, telephone interview and mail surveys, each with their given constraints and their aligned criteria of pro and cons. It is apparent that the personal method of data collection has many advantages. According to Sharma (2010:145), the highest response rate can be obtained from the personal method of data collection and this is the most accurate method. For this study, a close-ended structured quantitative questionnaire was administered (Annexure B). The researcher hand delivered the questionnaire with a Covering Letter (Annexure A) in a sealed envelope addressed to the selected

respondent using the personal method of data collection. If the respondent was not available, the sealed envelope addressed to the selected respondent was left with the departmental secretary. According to Welman, *et al.* (2005:257), the personal method of administration, ensures a high response rate compared to other methods. The selected sample respondents were requested in the Covering Letter to return the completed questionnaires within two weeks and the researcher personally collected the completed questionnaires from the selected respondents. It should be noted that the researcher conducted no interviews nor exerted any undue influence or any form of interaction with the respondents during this phase of data collection.

5.15 ETHICAL CONSIDERATIONS

Ivankova, *et al.* (2006:16) state that there are several reasons why it is important to adhere to ethical norms in research. Firstly, norms promote the aims of research such as knowledge, truth and avoidance of error. Secondly, since research often involves a great deal of co-operation and co-ordination amongst many different people in different disciplines, ethical standards enhance the values that are essential to collaborative work, such as trust, accountability, mutual respect and fairness. Thirdly, many of the ethical protocols help to ensure that the researcher can be held accountable to the public.

Bryman and Bell (2007:115) state that respondents may have a number of questions with regards to the research that they have been asked to participate in. For this reason and to orientate the respondent to the research and the questionnaire, a Covering Letter (Annexure A) was attached to each questionnaire to introduce the respondent to the research. Frick and Frick (2010:123) identify a number of aspects, e.g. the topic, the need for the investigation, anonymity, confidentiality and ethical protocols, which were included in the covering letter in order to address the ethical considerations and transparency. According to Andrew and Halcomb (2009:139), respondents' rights to self-determination and full disclosure should be reinforced by the

researcher. As highlighted in the Covering Letter (Annexure A), respondents were fully informed about the nature and importance of the research and each respondent was in a position to decide whether or not to participate in the study. Respondents also had the option to withdraw from the study at any time without advancing any reasons and there was no undue coercion on the part of the researcher in this regard. Finally, the research proposal was reviewed by two independent reviewers and accepted by the Faculty Research Committee Panel. Thereafter, the research proposal was forwarded to the DUT Institutional Research Ethics Committee (IREC). The latter committee (IREC) reviewed the proposal submitted with the questionnaire, to ensure that all ethical protocols were observed and gave a formal Letter of Informed Consent with a reference number (Annexure C) to conduct this research at the DUT.

5.16 CODING AND EDITING

Once the responses of the close-ended structured quantitative questionnaires had been collected, data was edited and cleaned up. Saravanavel (2003:110) advocates that editing entails a thorough and critical examination of the completed questionnaires. Therefore it is essential that the data be checked for completeness and accuracy before it is accepted for capturing. Each completed return was scrutinised to ensure that the criteria for completeness was adhered to. Thereafter, the questionnaire responses were captured on the computer to form a data set by the researcher for statistical analysis.

5.17 ANALYSIS OF THE DATA

The responses were analysed using the latest version of the Statistical Package for the Social Sciences (SPSS) version 21 for Windows. The statistical analysis was conducted in two phases, namely, the first phase consisted of the descriptive statistical analysis and the second phase comprised the use of inferential statistics for hypothesis testing. According to Salim and Sulaiman (2011:123), descriptive statistics include ordering and summarising data using

tables, pie charts, graphs and calculating descriptive measures. Furthermore, Salim and Sulaiman (2011:124) state that inferential statistics use robust statistical tests to produce meaningful values about the hypothesis tested. It should be noted that the type of parametric tests was also dependent on the nature of the data captured, namely, ordinal, nominal, ratio or interval scales.

5.18 CONCLUSION

This chapter describes the research design, the target population and how the sample was selected using the computerised Microsoft Excel 2013 Data Analysis functionality to generate random numbers for both Staff List A (Academics) and B (Administrative staff) at the DUT. It also highlighted the sampling technique employed, provided a description of the questionnaire and how it would be administered, as well as the data collation method. The constructs of validity and reliability were discussed in detail. The Pilot Study conducted attested to the scientific merit of high value reliability as the Cronbach Alpha Test yielded an extremely high reliability value for the questionnaire. The next chapter presents an overview of the analysis of the data and a discussion of the findings.

CHAPTER 6

ANALYSIS OF DATA AND DISCUSSION OF FINDINGS

6.1 INTRODUCTION

This chapter presents the analysis of the data and a detailed discussion of the findings emanating from the empirical analysis of the responses obtained from the data captured. The main aim of the study was to develop an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for a selected University of Technology in South Africa. The Durban University of Technology (DUT) was used as a case study for the in-house investigation. The data collected from the sample respondents were analysed using the Statistical Package for Social Sciences (SPSS) version 21 for Windows.

The research design adopted was the quantitative paradigm and a pre-coded structured close ended questionnaire (Annexure B) comprising the 5 Point Likert Scale was used to administer the instrument to the selected sample respondents. The questionnaire comprised of 5 Sections, each under a specific theme related to the topic as well as the testing of the Exploratory Framework (Figure 4.1). The Chapter also highlights the analysis and discussion of the findings congruent with the various statistical tests used. A letter of approved Ethical Clearance was also given by the DUT Institutional Research Ethics Committee (Annexure D) after the initial research proposal and the questionnaire was assessed by the Ethics Panel to conduct this in-house investigation at the DUT. The target population comprised of 1874 employees at the DUT. A computerised program called the Excel Functionality Program was used to generate the random numbers for the sample selection. Thus, the sample of 320 employees was selected using the simple random sampling without replacement for both the Administrative and Academic staff members at

the DUT. A total of 280 questionnaires were returned by the sample respondents. However, 8 questionnaires were discarded as they were incomplete and the final questionnaire returns equated to n = 272, namely, 118 questionnaires from the Academic Staff grouping and 154 questionnaires from the Administrative Staff. This then represented a high response rate of 85%, which was largely attributed to the researcher using the personal method of data collection.

The preliminary computation of the results for Section A involved the use of descriptive statistics for the general information and the demographic variables using Microsoft Excel. For Section B to Section E, the researcher gave valuable analyses in the form of frequencies and percentages for the remaining statements in a summarised tabular format and reported accordingly in this Chapter. The rationale for this was used based on the fact that the questionnaire comprised of Likert Scale statements under the various Sections and the responses were given by the sample respondents. Therefore this proved a valuable exercise only for those variables that were conducted using baseline analyses in the form of frequency counts and expressed as a percentage with a brief reference to the findings and the statements shown in brackets. Moreover, these statements were analysed and presented in the context of the data analysed to illustrate its high value analysis and interpretations aligned to the overall empirical analysis. In addition, the main analysis for each Section also involved the use of descriptive and inferential statistics to analyse the responses and more importantly to test the hypotheses formulated for each section or theme.

The empirical analysis that follows under each of the Sections was rigorous in nature given the intensity of the data produced. The nature of the data accessed in this study was ordinal in form, which negated the application of the more robust tools of parametric testing under the ambit of inferential statistics. This was moderately constrained by the fact that there were two independent,

but homogenous groups at the DUT, i.e. the Administrative Staff and the Academic Staff. This intervening variable did not in any way compromise the analyses of the results as most respondents appeared to have similar perceptions when responding to the Likert Scale statements except for a few surprising findings. This was evident during the editing and coding phase for data capturing by the researcher. Moreover, since the use of robust tools of parametric tests would have required a substantial transformation of the data, the researcher, with the assistance of an expert Statistician, judged that for the purpose of hypotheses testing for each Section, the use of non-parametric procedures were deemed to be adequate. In the main, the analysis of the data involved the use of non-parametric tests for the primary analyses using SPSS version 21 for Windows including those statistical tests selected for hypotheses testing for the relevant section which yielded significant results. More importantly, other non-parametric tests were also used for the numerous hypotheses formulated to test the tenability of the Exploratory Framework (Figure 4.1) developed and aligned to the major variables in the Exploratory Framework.

The upper level of statistical significance for the null hypothesis testing was set at 5%, with a 95% confidence interval. All statistical test results were computed at the 2 tailed level of significance in accordance with the non-directional hypothesis tested. However, apart from reporting the more significant statistical results for each Section, marginally significant results were also highlighted including a few hypotheses that showed a non-significant result and were accordingly reported in the study. It should be noted that initially 2 statistical tests (non-parametric) were used to test each hypothesis, namely, the Pearson's Chi Square Test and the Spearman's Rank Order Correlation Test. The results of these tests are shown at the foot of the table and it proved a useful exercise to reinforce the statistical finding followed by a lucid discussion pertaining to the hypothesis tested. Moreover, other robust non-parametric tests were also used to test the various components of the Exploratory Framework developed (Figure 4.1), given the copious variables linked to the

Framework. The different statistical tests applied thus showed significant statistical correlations and causality of values with a high or moderate degree of congruency. It is worth noting that arising out of the rigorous analysis and hypotheses testing, the Exploratory Framework (Figure 4.1) proved its tenability and hence made an original contribution to the study in this field of endeavour.

6.2 ANALYSES OF DATA

According to Bajpai (2011:108), inferential statistics comprises two branches, namely, Parametric Statistical Tests and Non-Parametric Statistical Test. An overview of descriptive and inferential statistics used in this empirical study is presented below (Table 6.1). The preliminary presentation and analysis of the results begins with Section A, which uses descriptive statistics to analyse the sample profile and key demographics. In order to enhance the quality of the statistical findings, significant trends emerging from the various hypotheses tested for each Section, were also reported and further corroborated by authors or by the way of similar findings conducted in other studies by various researchers. The analyses of the results are presented in sequential order with the five sections of the Questionnaire (Annexure B), namely:

- Section A: General Information
- Section B: Knowledge-based Economy
- Section C: Knowledge Management
- Section D: Intellectual Capital
- Section E: Human Capital

In addition, in Section F the analyses of the data are presented on the Exploratory Human Capital Framework linked to IC and KM. Table 6.1 below shows a summary of the relevant statistical tests used for each section of the questionnaire using SPSS version 21 for Windows.

TABLE 6.1 SUMMARY OF THE STATISTICAL TESTS USED FOR THE ANALYSIS OF THE DATA AND HYPOTHESIS TESTING

SECTIONS	ANALYSIS OF RESULTS	
	DESCRIPTIVE STATISTICS	NON-PARAMETRIC INFERENCTIAL STATISTICS
Section A: General Information	• Graphs • Tables depicting comparative analysis	
Section B: Knowledge-Based Economy Section C: Knowledge Management Section D: Intellectual Capital Section E: Human Capital	• Frequency distribution tables	• Pearson's Chi-square statistic • Spearman's rank order correlation co-efficient
Section F: Exploratory Human Capital Framework linked to Intellectual Capital And Knowledge Management		• Pearson's Chi-square statistic • Spearman's rank order correlation co-efficient • Wald-Wolfowitz bi-variate test • Quade Test • Friedman's Two-way analysis of variance • Wilcoxon Rank Sum Test • Kendall-tau b

The analysis for Section A of the Questionnaire (Annexure B) highlights the use of descriptive statistics and frequency tables depicting comparative analyses for the demographics of the dataset. For Section B to Section E of the Questionnaire (Annexure B), the researcher selected descriptive and appropriate non-parametric tests to present the analysis of the results. In addition, Section F as shown in Table 6.1 above includes a comprehensive analysis on the hypotheses related to the Exploratory Human Capital Framework linked to Intellectual Capital (IC) and Knowledge Management (KM) for the DUT (Figure 4.1). The analysis of Section F was conducted using relevant non-parametric tests, as well as descriptive statistics in order to determine the tenability and credibility of the findings by testing the various components of the Exploratory Framework developed for the study. A brief description now follows to distinguish between descriptive and inferential statistics with reference to the empirical analysis of the study.

6.2.1 Use of Descriptive Statistics

Descriptive statistics describe the phenomena of interest and is a method used to analyse data for classifying and summarising numerical data (Sekaran, 1992:259). For Section A of the data analyses of results, descriptive statistics comprising of pie charts, bar graphs and comparative analysis tables depicting the analysed data was used. For Section B to Section E as highlighted in the questionnaire, descriptive statistics were used in the form of summarised frequency tables depicting the total sum and percentage of responses pertaining to the specific section in the Questionnaire (Annexure B). These comparative analyses provided a clearer understanding of the frequency response rate of the Administrative Sample Group and the Academic Sample Group respectively at the DUT pertaining to specific responses for each section.

6.2.2 Use of Inferential Statistics

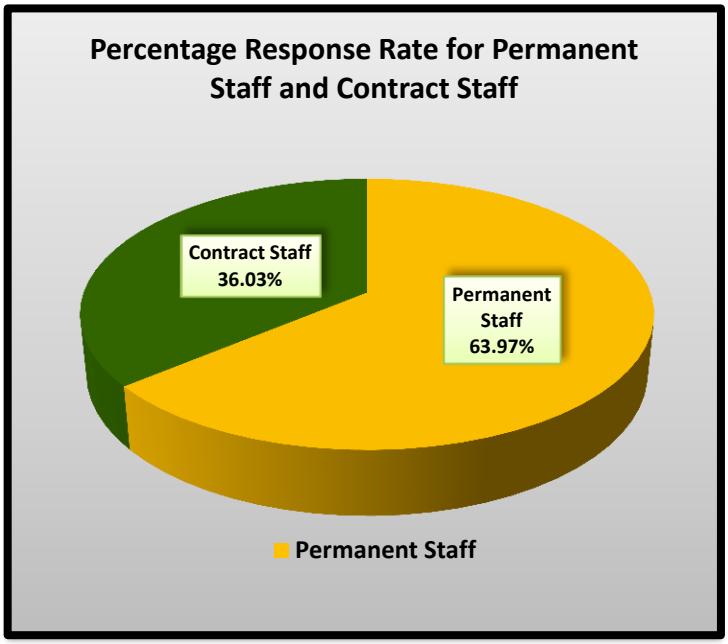
According to Saunders, Lewis and Thornhill (2009:154), inferential statistics is employed when generalisations from the sample to the population are made. In this study, various relevant non-parametric statistical tests were used to test the computed relationships between those factors and those elements deemed to have a significant bearing on the study and variables and to gauge the perceptions of the respective sample respondents. Non-parametric tests were selected since the data was ordinal in nature and hence did not require the data to have a specific distribution as there were two independent sample groups (Sharma, 2010:145).

6.3 SECTION A: ANALYSIS OF RESULTS PERTAINING TO THE GENERAL INFORMATION AND DEMOGRAPHIC PROFILE

This section focuses on the preliminary analysis which provides a baseline or descriptive analysis of the demographic variables of the sample in its totality.

6.3.1 Comparison between Permanent and Contract Staff

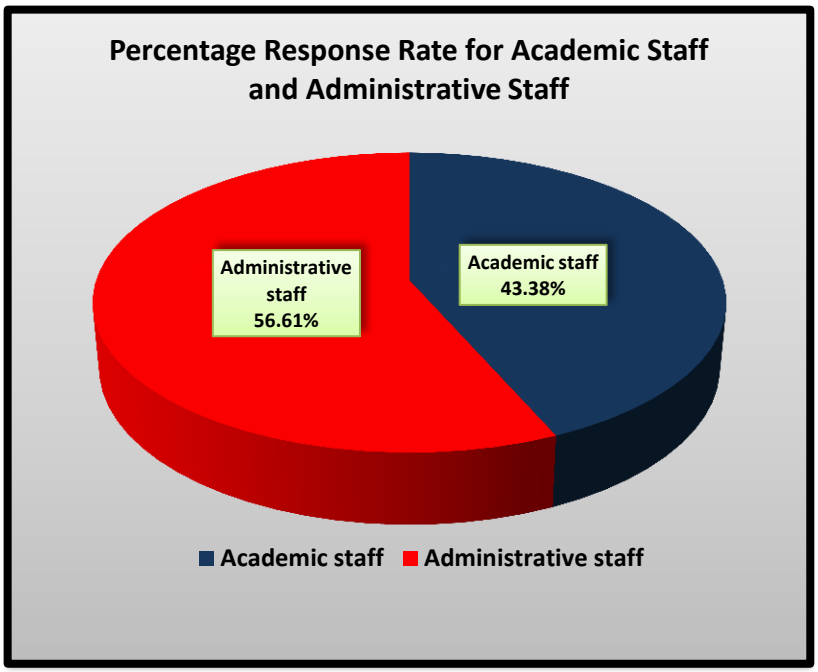
FIGURE 6.1 ANALYSIS OF PERMANENT AND CONTRACT STAFF AT THE DUT (n = 272)



Respondents were requested to indicate whether they were employed at the DUT on a permanent or contract basis. Figure 6.1 represents the percentage responses by the sample respondents in relation to permanent and contract staff reported by the sample respondents. The reported results in Figure 6.1 reflect that most of the respondents (63.97%) were employed at the DUT in a permanent capacity, while 36.03% of the respondents were employed on contract. According to Bezuidenhout (2011:88), the structure of employment in the South African HE context, with specific reference to UoTs, is characterised by a decrease in open-ended, full time employment and an increase in fixed term contracts, which is often described as atypical, non-standard employment. Research conducted by Mngoma (2014:2) revealed that the type of employment influences the expectations of employees with regards to working conditions, as well as the costs incurred by the institution by high levels of labour turnover.

6.3.2 Comparison between Academic and Administrative Staff at the DUT

FIGURE 6.2 ANALYSIS OF ACADEMIC AND ADMINISTRATIVE STAFF AT THE DUT (n = 272)



Respondents were requested to indicate whether they were employed in an academic or administrative capacity at the DUT in relation to the overall response by the sample respondents obtained from the returned questionnaires. The pie chart in Figure 6.2 represents the percentage responses from the academic and administrative sample respondents in this study. The results in Figure 6.2 shows that 56.61% of the respondents are employed at DUT in an administrative capacity and 43.38% of the respondents are academic staff. At this juncture, it is also important to note that in almost all HE Institutions the administrative staff always outnumber the number of academic staff as highlighted previously in Table 5.1 in Chapter 5.

6.3.3 Comparative Analysis between the Type of Employment and Academic and Administrative Staff at the DUT

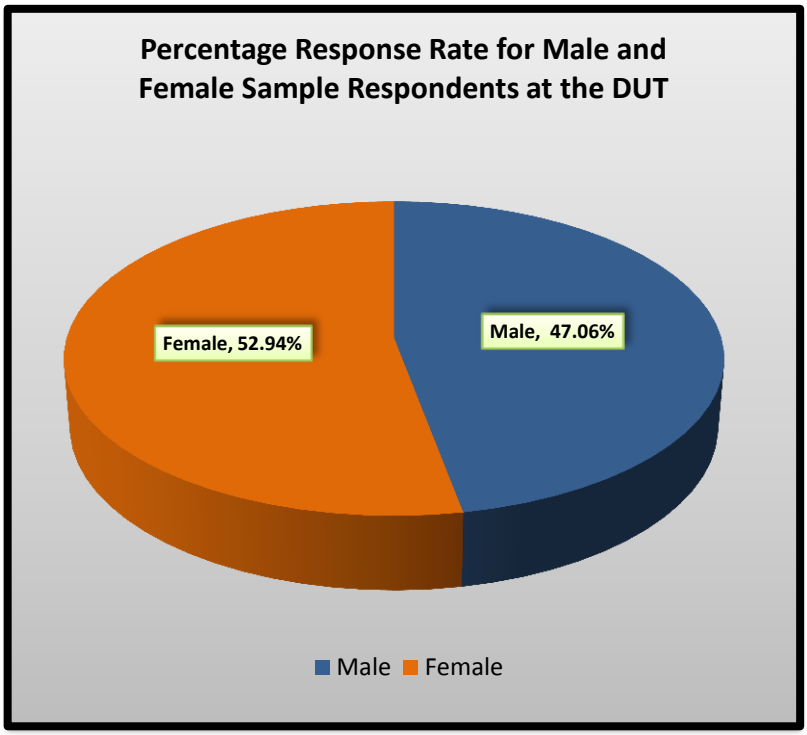
TABLE 6.2 COMPARISON OF PERMANENT AND CONTRACT PERSONNEL OF THE ACADEMICS AND ADMINISTRATIVE STAFF CATEGORY AT DUT (n = 272)

TYPE OF EMPLOYMENT	ACADEMIC STAFF		ADMINISTRATIVE STAFF		TOTAL	
	COUNT	%	COUNT	%	COUNT	%
PERMANENT	70	25.73%	104	38.24%	174	63.97%
CONTRACT	48	17.65%	50	18.37%	98	36.03%
TOTAL	118	43.38%	154	56.61%	272	100%

A further analysis was conducted to determine the percentage of administrative and academic staff in each employment category, which is shown in Table 6.2 above. Table 6.2 highlights that DUT is gradually reducing the permanent employment of staff and introducing fixed term contracts in both the academic and the administrative sectors respectively. Research conducted by Mohaeka and Mahao (2015:46-48) revealed that this trend is only in its infancy stage in the South African HE UoT context. Furthermore, Mohaeka and Mahao (2015:48) report that in the HE sector of countries such as Finland, the United Kingdom, Germany and the United States of America, an equal distribution between academic and contract staff being employed on a permanent and fixed term basis was found to be equitable. According to research conducted by Keengwe and Maxfield (2015:39), there was a strong correlation between the type of employment and the expectations that employees had with regard to remuneration packages, training and development and motivation.

6.3.4 Gender Breakdown of the overall Sample Respondents at the DUT

FIGURE 6.3 ANALYSIS OF THE GENDER BREAKDOWN (n = 272)



The gender breakdown of the overall sample respondents is shown in Figure 6.3. A fairly equal distribution is reported between males (47.06%) and females (52.94%). Research conducted by Thondhlana and Belluigi (2014:48) revealed that South African HE institutions should monitor the distribution of its male and female employees, since the different needs and expectations relating to gender influenced the perceived job satisfaction of each group.

TABLE 6.3 COMPARISON OF GENDER AND STAFF CATEGORY AT DUT (n = 272)

GENDER	ACADEMIC STAFF		ADMINISTRATIVE STAFF		TOTAL	
	COUNT	%	COUNT	%	COUNT	%
MALE	24	8.82%	104	38.24%	128	47.06%
FEMALE	94	34.55%	50	18.37%	144	52.94%
TOTAL	118	43.38%	154	56.61%	272	100%

A further analysis was conducted to compare the percentage of gender breakdown per staff category, which is shown in Table 6.3 above. The majority of the Academic respondents are female at 34.55%, whilst the majority of Administrative respondents are male (38.24%).

6.3.5 Age Breakdown of the Sample Respondents

FIGURE 6.4 ANALYSIS OF THE AGE CATEGORY OF THE SAMPLE RESPONDENTS AT DUT (n = 272)

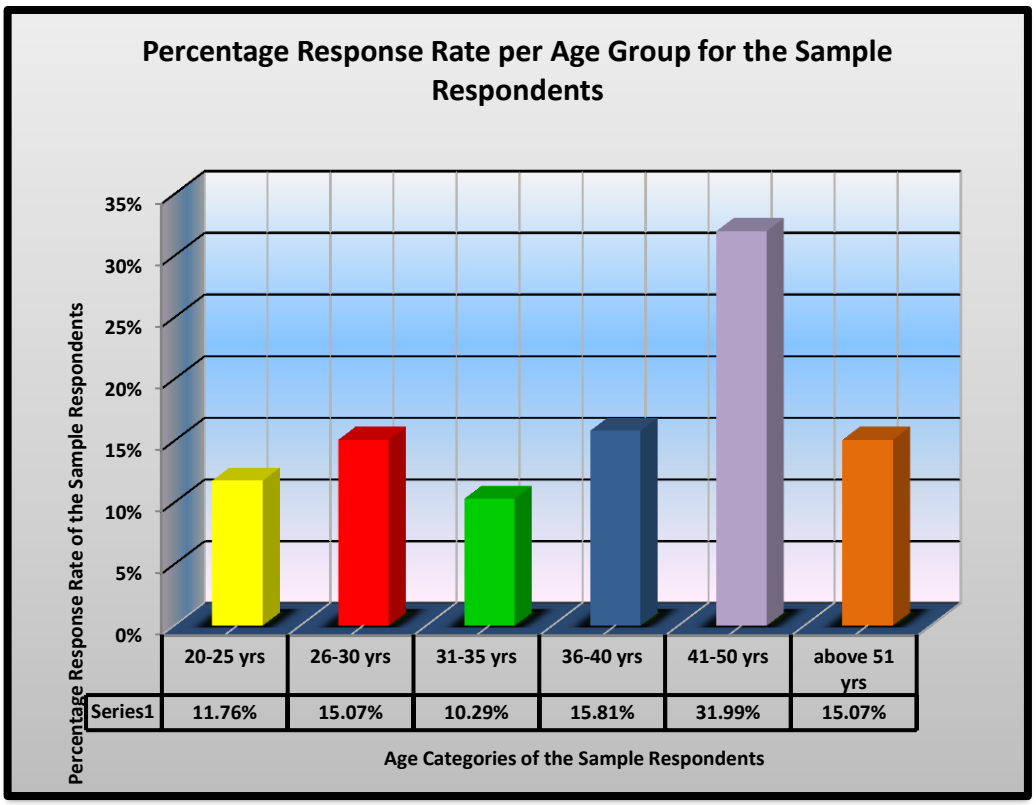


Figure 6.4 shows the percentage responses by the sample respondents per age category for the analysis. As depicted by the stacked bar graph in Figure 6.4, the majority of the sample respondents were above 36 years of age (62.86%). In the age categories representing the sample respondents between 36 and 40 years equated to 15.81% of the respondents, while 31.99% fell into the category of 41 to 50 years of age. A meagre 15.07% reported that they were above 51 years of age. Research conducted by Ramaligela and Moletsane (2013:156) on knowledge transfer in the HE sector, revealed that the age of employees at a HE institution, as is the case with DUT, influences the sharing of tacit knowledge (know-how) amongst employees. Acemoglu and Robinson (2013:178) further contend that the age of employees also impact on the sharing and development of explicit knowledge.

Higher Education South Africa (HESA, 2009:5-9) acknowledges the need for the HE sector, in particular UoTs, to play a crucial role in addressing the skills shortages in South Africa, while contributing to the Knowledge-based Economy. However, in the same report provided by HESA (2009:6), concerns were also expressed that the South Africa HE UoT sector is finding it increasingly more difficult to attract and retain younger employees, especially in the field of academia. Research conducted by Bitzer and Botha (2011:103) revealed that the HE UoT sector is facing a three-fold challenge, namely, competition amongst UoTs to attract suitably qualified staff, secondly, the UoT sector is competing with private HE institutions to retain staff and thirdly, financial benefits offered in the corporate sector often exceeded the total compensation package offered within the HE UoT sector. These three factors often contribute to employees leaving the HE UoT sector to pursue employment in the corporate environment or head-hunting occurring within the HE sector (Bitzer and Both, 2011:104).

6.3.6 Comparative Analysis between Gender, Employment Type and the Age Profile of the Respondents

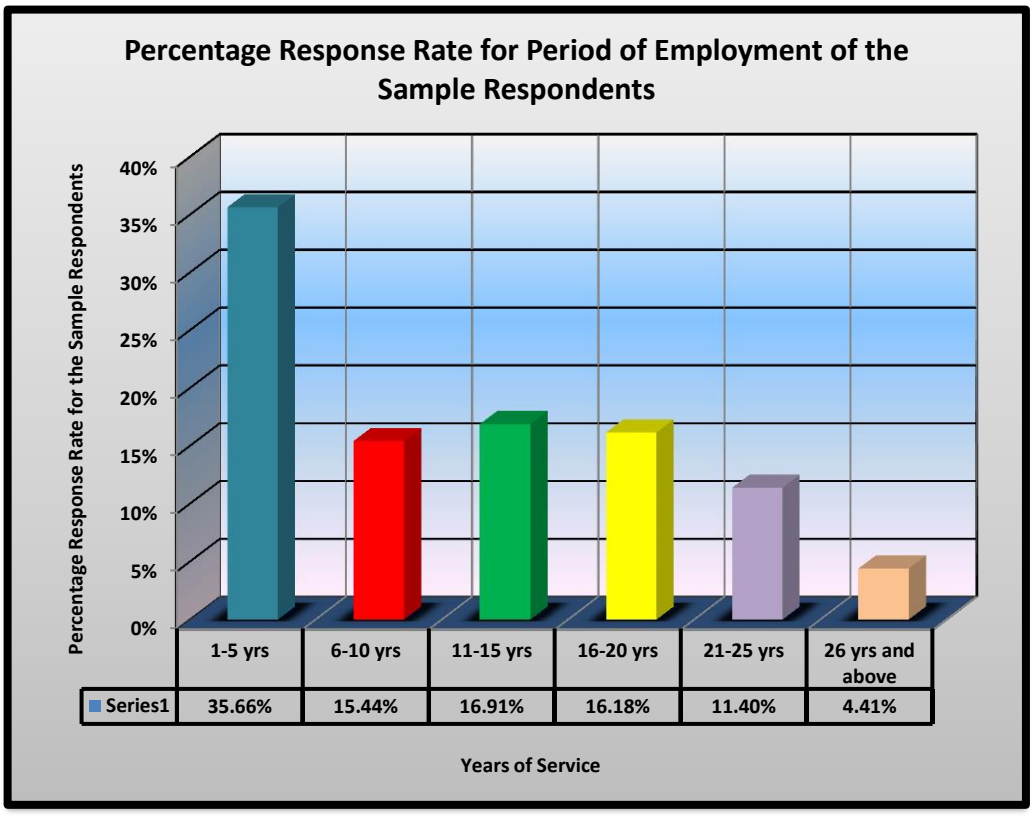
TABLE 6.4 COMPARISONS BETWEEN GENDER, EMPLOYMENT TYPE AND AGE PROFILE OF THE SAMPLE RESPONDENTS AT DUT (n = 272)

	GENDER									
	MALE				FEMALE					
	PERMANENT		CONTRACT		PERMANENT		CONTRACT		TOTAL	
AGE PROFILE	COUNT	%	COUNT	%	COUNT	%	COUNT	%	COUNT	%
20-25 YEARS	2	0.73%	10	3.67%	7	2.58%	13	4.78%	32	11.76%
26-30 YEARS	3	1.10%	14	5.14%	0	-	24	8.83%	41	15.07%
31-35 YEARS	10	3.67%	2	0.73%	4	1.47%	12	4.43%	28	10.29%
36-40 YEARS	31	11.39%	4	1.47%	1	0.35%	7	2.58%	43	15.81%
41-50 YEARS	27	9.94%	4	1.47%	52	19.12%	4	1.47%	87	31.99%
MORE THAN 51 YEARS	17	6.25%	4	1.47%	20	7.35%	0	-	41	15.07%
TOTAL	90	33.08%	38	13.96%	84	30.87%	60	22.09%	272	100%

Table 6.4 presents a comparison between gender, employment type and the reported age profile of the sample respondents. The strategic plan of the Council for Higher Education (CHE, 2013:2) reports that in the South African HE sector, the majority of staff are less than 30 years old and are mostly employed on a contractual basis, from where the permanent employment numbers increase, but drop again for those over 60 years old. Based on Table 6.4 it is evident that the analysis at the DUT corresponds to the CHE (2013:2) report. It should be noted that these findings reported by the CHE (2013:2) relates to all HE institutions in South Africa and is not confined to the HE UoT sector only.

6.3.7 Period of Employment of the Sample Respondents

FIGURE 6.5 ANALYSIS OF PERIOD OF EMPLOYMENT (n = 272)



The employment period of the sample respondents is shown in Figure 6.5. The highest percentage reported was for those in employment from 1 to 5 years of service (35.66%). The majority of the respondents reported that they have been employed at the DUT for less than 11 years (51.10%). Research conducted by Coetzee and Rothmann (2007:14) investigated the impact of years of service on employee commitment and work related stress at the Vaal University of Technology. Their findings revealed that the profile of staff employed for less than 5 years were significantly higher in comparison to those with more than 10 years of service at the institution. Johnson, Louw and Smit (2010:119) contend that employees in the HE sector with more than 15 years of service may become complacent and could suffer from burnout resulting in a lack of engagement and commitment towards the institution. Therefore, with

reference to the current analysis (Figure 6.5), those respondents who had been employed at the institution for less than 5 years (35.66%) may be more motivated and encouraged to engage actively within the DUT structures and processes.

6.4 SECTION B: KNOWLEDGE-BASED ECONOMY ANALYSIS OF DATA PERTAINING TO THE OVERALL RESPONDENTS' PERCEPTIONS TOWARDS THE KNOWLEDGE-BASED ECONOMY

The responses to Section B focuses on descriptive analysis and relevant non-parametric tests which provide an overview of the perceptions relating to the Knowledge-based Economy, namely, Section B of the Questionnaire (Annexure B).

6.4.1 Summary Responses of the Sample Respondents in relation to a Knowledge-Based Economy

Table 6.5 summarises the frequency response rate for Section B of the Questionnaire (Annexure B), namely, the Knowledge-based Economy. The salient findings reported by the respondents are as follows:

The majority of the sample respondents (81.25%) agreed that the DUT is adding value to the Knowledge-based Economy of KwaZulu-Natal (Statement 7) and 84.19% of the respondents reported that the institution was contributing towards the economic welfare of stakeholders in the province (Statement 8). In addition, 67.65% of the respondents regarded the DUT as an industry leader in the HE sector in KwaZulu-Natal (Statement 21) and 76.84% of the respondents believed that customer loyalty towards the institution was high (Statement 20). In response to Statement 9, 75.37% of the respondents perceived customer service to be a key driver at the DUT.

TABLE 6.5 SECTION B: FREQUENCIES EXPRESSED AS A PERCENTAGE BY SAMPLE RESPONDENTS IN RELATION TO THE KNOWLEDGE-BASED ECONOMY (n = 272)

STATEMENT	RESPONSES	RESPONSE OPTIONS					TOTAL
		STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	
7. DUT is adding value to the knowledge-based economy of KZN	COUNT	0	0	51	137	84	272
	PERCENTAGE	-	-	18.75%	50.36%	30.89%	100%
8. DUT is contributing to the economic welfare of stakeholders in KZN.	COUNT	0	0	43	145	84	272
	PERCENTAGE	-	-	15.81%	53.30%	30.89%	100%
9. Customer service has become a key driver at DUT.	COUNT	30	27	10	162	43	272
	PERCENTAGE	11.03%	9.93%	3.67%	59.56%	15.81%	100%
10. Customer feedback is obtained in the department in which I work.	COUNT	62	125	23	62	0	272
	PERCENTAGE	22.79%	45.96%	8.46%	22.79%	-	100%
11. Service delivery is monitored at DUT.	COUNT	56	119	67	30	0	272
	PERCENTAGE	20.59%	43.75%	24.63%	11.03%	-	100%
12. Decisions at DUT are made in response to environmental challenges.	COUNT	20	125	33	94	0	272
	PERCENTAGE	7.35%	45.96%	12.13%	34.56%	-	100%
13. The Institution's brand is well respected in KZN.	COUNT	48	52	36	113	23	272
	PERCENTAGE	17.64%	19.12%	13.24%	41.54%	8.46%	100%
14. DUT attempts to retain its staff.	COUNT	68	176	28	0	0	272
	PERCENTAGE	25%	64.71%	10.29%	-	-	100%
15. The Institution monitors its competitive environment from a legal perspective.	COUNT	16	153	38	65	0	272
	PERCENTAGE	5.88%	56.25%	13.97%	23.90%	-	100%
16. DUT is attempting to offer programmes that are increasingly being tailored to the needs of the customer.	COUNT	14	145	24	89	0	272
	PERCENTAGE	5.15%	53.30%	8.82%	32.73%	-	100%
17. DUT values the relationships it has developed with its external stakeholders.	COUNT	42	113	0	94	23	272
	PERCENTAGE	15.44%	41.54%	-	34.56%	8.46%	100%
18. Employees are DUT's main source of competitive advantage.	COUNT	4	56	6	141	65	272
	PERCENTAGE	1.46%	20.59%	2.21%	51.84%	23.90%	100%
19. Bureaucratic structures at the Institution impacts negatively on service delivery.	COUNT	4	8	7	163	90	272
	PERCENTAGE	1.46%	2.94%	2.57%	59.93%	33.10%	100%
20. In my opinion, the customer loyalty towards DUT is high.	COUNT	4	36	23	194	15	272
	PERCENTAGE	1.46%	13.24%	8.46%	71.32%	5.52%	100%
21. DUT is regarded as an industry leader in Higher education in KZN.	COUNT	6	78	4	169	15	272
	PERCENTAGE	2.21%	28.68%	1.46%	62.13%	5.52%	100%
22. DUT is characterised by a culture of openness / innovation.	COUNT	82	131	19	38	2	272
	PERCENTAGE	30.15%	48.16%	6.99%	13.97%	0.73%	100%
23. The Institution is more susceptible to competition than five years ago.	COUNT	4	28	30	150	60	272
	PERCENTAGE	1.46%	10.29%	11.03%	55.16%	22.06%	100%
24. Technology has had a positive impact on the service delivery at DUT.	COUNT	0	22	6	198	46	272
	PERCENTAGE	-	8.09%	2.21%	72.79%	16.91%	100%
25. In the last five years, the links between DUT and the job market has been strengthened.	COUNT	0	28	6	177	61	272
	PERCENTAGE	-	10.29%	2.21%	65.07%	22.43%	100%

However, as reflected in afore mentioned Table 6.5 above, 64.34% of the respondents believed that service deliv ery is not monitored at the DUT (Statement 11) and 68.75% reported that there was a lack of customer feedback to address customer-service related inefficiencies at the institution (Statement 10). Although the majority of the respondents (75.74%) considered employees to be the main source of competitive advantage at the DUT (Statement 18), 89.71% of the respondents believed that the institution was not attempting to retain its staff (Statement 14). According to 77.22% of the respondents, the institution was more susceptible to competition than 5 years ago (Statement 23), yet only 43.02% of the respondents believed that the DUT values the relationships that it has developed with external stakeholders (Statement 17). In addition, 53.31% of the respondents disagreed that decisions at the DUT were made in response to environmental challenges and 62.13% of the respondents felt that the institution was not adequately monitoring its competitive environment (Statement 12).

6.4.2 Section B: Analysis of Respondents' View to the Knowledge-Based Economy

In addition to the summary analysis provided in Table 6.5 above, the researcher developed the following hypotheses to meaningfully test significant relationships related to the Knowledge-based Economy, namely, Section B of the Questionnaire (Annexure B). The Statistical Package for Social Sciences (SPSS) version 21 for Windows was used to compute the statistical tests.

H_0^1 There is a significant relationship between DUT being regarded as an industry leader in Higher Education in KwaZulu-Natal and the contribution that the institution makes towards the Knowledge-based Economy.

TABLE 6.6 DUT BEING REGARDED AS AN INDUSTRY LEADER IN THE HIGHER EDUCATION SECTOR IN KWAZULU-NATAL AND THE CONTRIBUTION THAT THE INSTITUTION MAKES TOWARDS THE KNOWLEDGE-BASED ECONOMY (n = 272)

Statements 7 and 21	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	76.541	16	0.00001
Likelihood Ratio	74.446	16	0.00001
Linear-by-Linear Association	12.434	1	0.00019
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.79921		

* Pearson's Chi-Square = 76.651, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.79921, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.6 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant relationship between DUT being regarded as an industry leader in the HE sector in KwaZulu-Natal and the contribution that the institution makes towards the Knowledge-based Economy of South Africa. Hislop (2009:26) emphasises that the HE sector needs to be regarded as an important contributor to the Knowledge-based Economy. Goddard (1998:6-7) and Deem, Hillyard and Reed (2007:11-12) suggest that UoTs are ideally situated to play a vital role in the Knowledge-based Economy of South Africa. Du Pré (2010:4-5) observes that the value perceived by society of a UoT, in particular the DUT, depends either on the scientific impact of the knowledge it generates (research), or on its knowledge transfer capabilities (learning), along with the usefulness of the technology it develops. Hence, the perception of stakeholders with regard to the role and contribution that the DUT makes towards the Knowledge-based Economy may significantly influence the future of the institution within KwaZulu-Natal.

H_0^2 There is a significant correlation between the monitoring of the competitive environment in the Higher Education sector and the institution's response to environmental challenges.

TABLE 6.7 MONITORING OF THE COMPETITIVE ENVIRONMENT IN THE HIGHER EDUCATION SECTOR AND THE DUT'S RESPONSE TO ENVIRONMENTAL CHALLENGES (n = 272)

Statements 23 and 12	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	83.175	16	0.00001
Likelihood Ratio	80.104	16	0.00001
Linear-by-Linear Association	14.166	1	0.00009
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.77522		

* Pearson's Chi-Square = 83.175, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.77522, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

The Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) depicted in Table 6.7 above affirms that a highly significant correlation between monitoring the competitive environment in the HE sector and the DUT responding to environmental challenges do exist to address the competitive position of the institution. Giovanni (2005:123) emphasises that UoTs are increasingly exposed to marketplace pressures in a similar way than other businesses. Kanter (2000:15-16) confirms that knowledge about the external environment allows the institution to respond to market challenges and provide a UoT with a competitive advantage. According to Leydesdorff and Fritsch (2006:1538-1543), environmental challenges are necessitating the HE UoT sector to continuously engage in environmental scanning and monitoring when conducting strategic planning. Altaher (2010:267) adds that the HE sector is encouraged by Government to respond pro-actively to environmental challenges relating to economic and social factors.

H_0^3 There is a significant relationship between customer service becoming a key driver at the institution and the impact of technology on service delivery at the DUT.

TABLE 6.8 CUSTOMER SERVICE BECOMING A KEY DRIVER AT THE DUT AND THE IMPACT OF TECHNOLOGY ON SERVICE DELIVERY (n = 272)

Statements 9 and 24	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	48.192	16	0.00084
Likelihood Ratio	42.199	16	0.00079
Linear-by-Linear Association	3.198	1	0.00544
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.87765		

* Pearson's Chi-Square = 48.192, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.87765, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

The Pearson's Chi-Square test result ($p < 0.05$) depicted in Table 6.8 shows a significant relationship between customer service being a key driver at the DUT and technology impacting on service delivery does exist. The Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) also indicates a strong relationship between customer service becoming a key driver at the DUT and the impact of technology on service delivery. Pavan (2013:26) states that the Knowledge-based Economy emphasises a customer-driven approach, which reinforces the use of technology to transfer knowledge and information to both internal and external stakeholders. Research conducted by Chissale and Cross (2014:14) revealed that technology can assist a HE UoT institution, such as the DUT, to monitor, integrate, evaluate and share information to increase its service delivery in the wake of increasingly competitive market forces.

H_0^4 There is a significant correlation between DUT adding value to the Knowledge-based Economy of KwaZulu-Natal and attempts made by the institution to retain its staff.

TABLE 6.9 DUT ADDING VALUE TO THE KNOWLEDGE-BASED ECONOMY OF KWAZULU-NATAL AND ATTEMPTS MADE BY THE INSTITUTION TO RETAIN ITS STAFF (n = 272)

Statements 7 and 14	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	54.771	16	0.00002
Likelihood Ratio	51.221	16	0.00029
Linear-by-Linear Association	9.665	1	0.00212
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.93324		

* Pearson's Chi-Square = 54.771, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.93324, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.9 reveals that the Pearson's Chi-Square test result ($p < 0.05$) is highly significant. There is a significant correlation between the institution adding value to the Knowledge-based Economy of KwaZulu-Natal and attempts made by the DUT to retain its staff. The Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) also supports a very strong relationship between DUT adding value to the Knowledge-based Economy of KwaZulu-Natal and attempts made by the institution to retain its staff. Ndlovu (2014:2049) contends that staff retention is a challenge in the South African HE UoT sector. Kruger and Johnson (2011:268) reports that labour turnover in the HE UoT sector is prevalent due to various factors such as working conditions, expectations amongst staff and head hunting. Kruger and Johnson (2011:269) conclude that HE UoT institutions often fail to implement pro-active processes to retain their staff, which can impact negatively on service delivery and hence the perception of the institution's ability to contribute actively to the Knowledge-based Economy.

H_0^5 There is a significant difference between customer loyalty towards the institution and DUT regarding its staff as its main source of competitive advantage.

TABLE 6.10 CUSTOMER LOYALTY TOWARDS THE DUT AND THE INSTITUTION REGARDING STAFF AS ITS MAIN SOURCE OF COMPETITIVE ADVANTAGE (n = 272)

Statements 20 and 18	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	24.109	16	0.08321
Likelihood Ratio	22.187	16	0.08455
Linear-by-Linear Association	5.922	1	0.00116
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.43311		

* Pearson's Chi-Square = 24.109, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.43311, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.10 reveals that both the Pearson's Chi-Square test result ($p > 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s < 0.7$) produced a non-significant result. The Pearson's Chi-Square value of 24.109 is less than the χ^2 cut-off value of 26.296, whilst the Spearman's Rank Order Correlation Co-efficient of 0.43311 is less than the r_s cut-off value of 0.7. As depicted in Table 6.10, the test statistics show that there is no significant difference between loyalty towards the institution and the DUT regarding its staff as its main source of competitive advantage, hence the hypothesis is rejected. This result is in congruence with the research conducted by Milovanović (2011:37), who concluded that in the HE sector, customer loyalty is influenced by various factors, such as the reputation of the institution, the price of the academic programmes, word of mouth and geographical location. This research also revealed that the manner in which the institution values its staff has no significant impact on customer loyalty (Milovanović, 2011:39).

6.5 SECTION C: KNOWLEDGE MANAGEMENT

ANALYSIS OF DATA FOR KNOWLEDGE MANAGEMENT AT DUT

An analysis of the summarised results pertaining to Section C of the Questionnaire (Annexure B), namely, Knowledge Management is presented

below by means of utilising descriptive tests and relevant non-parametric tests for the hypotheses tested.

6.5.1 Summary of Frequencies by Sample Respondents in relation to Knowledge Management

Table 6.11 below summarises the responses for the Knowledge Management (KM) section of the Questionnaire (Annexure B). The results analysed as a percentage are briefly phrased and the numbered statements are shown in brackets. The main computed results reported are summarised below:

Arising from the computed responses in Table 6.11, the majority of the respondents (84.93%) believed that DUT is constantly creating new knowledge (Statement 46) and 82.72% of the respondents regarded the institution as a centre of learning and knowledge creation (Statement 39). In response to Statement 34, 62.13% of the respondents acknowledged that DUT recognises that KM is rapidly evolving and 93.02% of the respondents agreed that KM at the institution originated with its employees (Statement 30). Although 73.16% of the respondents supported Statement 27, namely, that each employee has original know-how that contributed towards the institution, 71.70% of the respondents believed that knowledge is not shared amongst employees at the DUT (Statement 26). The vast majority of the respondents (91.30%) perceived that best practices are not shared at the DUT (Statement 40) and 83.82% disagreed with Statement 31, namely, that the institution draws from the competencies and expertise of staff. The respondents felt strongly (90.07%) that the DUT's management failed to share information (Statement 28), while 82.36% of the respondents indicated that open communication channels at the institution were discouraged (Statement 35). 85.30% of the respondents believed that KM would be promoted at the DUT if there was greater interaction amongst staff (Statement 33), while 98.17% of the respondents felt that there was a lack of synergy at the institution between information, employees and processes (Statement 44).

TABLE 6.11 SECTION C: FREQUENCIES EXPRESSED AS A PERCENTAGE BY SAMPLE RESPONDENTS IN RELATION TO KNOWLEDGE MANAGEMENT AT DUT (n = 272)

STATEMENT	RESPONSES	RESPONSE OPTIONS					TOTAL
		STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	
26. Knowledge is shared by employees in the Institution.	COUNT	65	130	10	64	3	272
	PERCENTAGE	23.90%	47.80%	3.67%	23.53%	1.10%	100%
27. Each employee has original information (know-how) that contributes to DUT.	COUNT	0	60	13	141	58	272
	PERCENTAGE	-	22.06%	4.78%	51.84%	21.32%	100%
28. Management shares information with employees.	COUNT	206	39	22	5	0	272
	PERCENTAGE	75.74%	14.33%	8.09%	1.84%	-	100%
29. Institutional policies are easily accessible.	COUNT	25	150	22	72	3	272
	PERCENTAGE	9.19%	55.15%	8.09%	26.47%	1.10%	100%
30. Knowledge management at DUT begins with the employees.	COUNT	10	9	0	225	28	272
	PERCENTAGE	3.67%	3.31%	-	82.73%	10.29%	100%
31. The Institution draws from its employees' competencies and expertise.	COUNT	89	139	9	35	0	272
	PERCENTAGE	32.72%	51.10%	3.31%	12.87%	-	100%
32. I am allowed to update my knowledge regarding my current job on a regular basis.	COUNT	62	176	7	24	3	272
	PERCENTAGE	22.79%	64.72%	2.57%	8.82%	1.10%	100%
33. Knowledge management at the Institution is based on encouraging constant interactions amongst staff.	COUNT	202	30	25	15	0	272
	PERCENTAGE	74.27%	11.03%	9.18%	5.52%	-	100%
34. DUT recognises that Knowledge Management is ever-changing.	COUNT	21	39	43	166	3	272
	PERCENTAGE	7.72%	14.34%	15.81%	61.03%	1.10%	100%
35. Open communication channels are encouraged at DUT.	COUNT	84	140	13	35	0	272
	PERCENTAGE	30.89%	51.47%	4.78%	12.86%	-	100%
36. There is nothing that impedes knowledge sharing in the Institution.	COUNT	205	34	14	19	0	272
	PERCENTAGE	75.36%	12.50%	5.15%	6.99%	-	100%
37. There are clear vision and mission statements for the Institution.	COUNT	30	6	0	161	75	272
	PERCENTAGE	11.03%	2.21%	-	59.19%	27.57%	100%
38. Employees are aware of the importance of the Institution's name / image in the Higher Education sector.	COUNT	15	9	0	170	78	272
	PERCENTAGE	5.52%	3.31%	-	62.49%	28.68%	100%
39. DUT can be regarded as a centre of learning / knowledge.	COUNT	0	31	16	204	21	272
	PERCENTAGE	-	11.40%	5.88%	75.00%	7.72%	100%
40. Best practices at DUT are shared amongst employees.	COUNT	91	141	0	40	0	272
	PERCENTAGE	33.46%	51.84%	-	14.70%	-	100%
41. The Institution encourages information sharing with its external stakeholders.	COUNT	118	104	12	28	10	272
	PERCENTAGE	43.38%	38.24%	4.42%	10.29%	3.67%	100%
42. The Institution has a flexible organisational structure.	COUNT	145	127	0	0	0	272
	PERCENTAGE	53.30%	46.70%	-	-	-	100%
43. Customer feedback is used to make significant changes in the manner in which tasks are executed at DUT.	COUNT	117	109	17	20	9	272
	PERCENTAGE	43.01%	40.07%	6.26%	7.35%	3.31%	100%
44. There is synergy at the Institution between information, employees and processes.	COUNT	127	140	0	5	0	272
	PERCENTAGE	46.70%	51.47%	-	1.83%	-	100%
45. DUT is producing knowledge to assist stakeholders with the economic growth of KZN.	COUNT	15	33	60	164	0	272
	PERCENTAGE	5.52%	12.13%	22.06%	60.29%	-	100%
46. The Institution constantly creates knowledge.	COUNT	0	34	7	209	22	272
	PERCENTAGE	-	12.50%	2.57%	76.84%	8.09%	100%

6.5.2 Analysis of Data using Hypotheses Testing related to Knowledge Management

In addition to the frequencies and percentages summarised for the various statements in Table 6.11 above, the researcher formulated the following hypotheses to test significant relationships outlined in this regard to KM.

H_0^6 There is a significant relationship between the management of DUT sharing information with employees and the institution being regarded as a centre of learning / knowledge.

TABLE 6.12 MANAGEMENT AT THE DUT SHARING INFORMATION AND THE INSTITUTION BEING REGARDED AS A CENTRE OF LEARNING / KNOWLEDGE (n = 272)

Statements 28 and 39	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	33.447	16	0.00644
Likelihood Ratio	37.041	16	0.00207
Linear-by-Linear Association	1.495	1	0.22142
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.72233		

* Pearson's Chi-Square = 33.447, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.68833, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.12 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) produced a moderately significant result. The test statistics show that there is a moderately significant relationship between management sharing information with employees and the institution being perceived as a centre of learning and/or knowledge. Pettersson (2009:1741) emphasises that in the HE context, KM relates to the institution being perceived by management and employees alike as a centre of knowledge and/or learning. Research conducted by Botha, Kourie and Snyman (2008:15) found that although HE UoTs are quick to include

KM buzz words into the mission and strategic intent of the institution, it would not guarantee that employees would embrace and acknowledge the importance of KM. In addition, research findings reported by Evans (2003:75) identified three advantages associated with the management of a HE institution sharing information with employees in the context of KM, namely, it encourages knowledge-awareness, reinforces the benefits of KM amongst staff and facilitates the integration of KM into the culture of the institution.

H_0^7 There is a significant correlation between recognising that each employee has original know-how that contributes to the DUT and the institution drawing from its employees' competencies and expertise.

TABLE 6.13 RECOGNISING THAT EACH EMPLOYEE HAS ORIGINAL KNOW-HOW THAT CONTRIBUTES TOWARDS THE DUT AND THE INSTITUTION DRAWING FROM ITS EMPLOYEES' COMPETENCIES AND EXPERTISE (n = 272)

Statements 27 and 31	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	49.548	16	0.00003
Likelihood Ratio	43.662	16	0.00022
Linear-by-Linear Association	14.590	1	0.00126
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.81221		

* Pearson's Chi-Square = 49.548, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.812211, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.13 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant correlation between recognising that each employee has original know-how that contributes towards the DUT and the institution drawing from its employees' competencies and expertise. Vorwerk (2004:2) explains that employees know-how relates to tacit knowledge often related to processes and procedures within the HE institution and can be

of value when the institution embarks on specialised projects. However, Divala (2014:1958) contends that South African HE UoTs are following the private sector trend in appointing consultants and/or outsourcing projects, while overlooking internal knowledge, skills and expertise of their employees within the institutions. Research conducted by Nyamupangedengu (2014:2072) on utilising employees' knowledge and expertise in the South African HE UoT sector, found that higher levels of employee engagement, commitment and job satisfaction were reported at institutions were employees perceived that their knowledge and expertise were recognised, valued and utilised effectively.

H_0^8 There is a significant difference between synergy relating to information, employees and processes at the DUT and the access to institutional policies.

TABLE 6.14 SYNERGY RELATING TO INFORMATION, EMPLOYEES AND PROCESSES AT THE DUT AND THE ACCESS TO INSTITUTIONAL POLICIES (n = 272)

Statements 44 and 29	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	23.442	16	0.09541
Likelihood Ratio	19.886	16	0.06993
Linear-by-Linear Association	1.5646	1	0.33221
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.4451		

* Pearson's Chi-Square = 23.442, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.4451, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.14 reveals that both the Pearson's Chi-Square test result ($p > 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s < 0.7$) produced a non-significant result. The Pearson's Chi-Square value of 23.442 is less than the χ^2 cut-off value of 26.296, whilst the Spearman's Rank Order Correlation Co-efficient of 0.4451 is less than the r_s cut-off value of 0.7. As the test statistics show (Table 6.14), there is no significant difference between synergy relating to

information, employees and processes at the DUT and the access to institutional policies. According to Storey and Kahn (2010:399), KM is associated with synergy between information, employees and processes. Rajender and Kumar (2012:3) state that knowledge documents (i.e. policies and procedures) forms the basis of this triangulation in developing, implementing and evaluating KM in the HE sector. However, the insignificant relationship reported in Table 6.14 above in relation to information, employees and processes at the DUT and the access of these institutional policies to employees, might be in concurrence to the findings reported by Doctor (2008:116) on HE institutional policies in India. Doctor (2008:116) revealed in his findings that although institutional policies contributed towards implementing KM, the access to policies was often dependent upon the department or section in which the employees were located and consequently on their job function.

H_0^9 There is a significant correlation between best practices being shared at the DUT amongst employees and encouraging open channels of communication at the institution.

TABLE 6.15 SHARING BEST PRACTICES AMONGST EMPLOYEES AT THE DUT AND ENCOURAGING OPEN CHANNELS OF COMMUNICATION AT THE INSTITUTION (n = 272)

Statements 40 and 35	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	42.548	16	0.00004
Likelihood Ratio	39.662	16	0.00022
Linear-by-Linear Association	14.911	1	0.00016
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8766		

* Pearson's Chi-Square = 42.548, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8766, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.15 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) produced a highly significant. There is a highly significant correlation between sharing best practices amongst employees at the DUT and encouraging open channels of communication at the institution. Salim and Sulaiman (2011:119) highlight that HE institutions should embrace life-long learning, develop an innovative organisational culture of recognising, sharing best practices and instil two-way communication. Research conducted by Jordaan and Wiese (2010:539) on KM communication practices in the HE UoT sector, concluded that open communication channels significantly added value to HE UoT institutions achieving the integration and application of best practices relating to KM, IC and HC.

6.6 SECTION D: INTELLECTUAL CAPITAL AT DUT ANALYSIS OF DATA IN RELATION TO RESPONDENTS' PERCEPTIONS RELATED TO INTELLECTUAL CAPITAL AT THE DUT

An analysis of results pertaining to Section D of the Questionnaire (Annexure B), namely, Intellectual Capital (IC) is presented below by means of utilising descriptive and relevant non-parametric statistical tests for the hypotheses tested.

6.6.1 Summary of Frequencies by Sample Respondents in relation to Intellectual Capital

It should be noted that sample respondents expressed their opinions very strongly in Section D relating to IC of the Questionnaire, which reinforced the importance of IC being part of the Exploratory Framework that has been developed (Figure 4.1). Table 6.16 below summarises the responses in frequencies and percentages for the IC section of the Questionnaire (Annexure

B). The main results (Table 6.16) computed by way of frequencies and percentages by the sample respondents on IC are summarised below:

TABLE 6.16 SECTION D: SUMMARY OF FREQUENCIES EXPRESSED AS A PERCENTAGE BY SAMPLE RESPONDENTS IN RELATION TO INTELLECTUAL CAPITAL (n = 272)

STATEMENT	RESPONSES	RESPONSE OPTIONS					TOTAL
		STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	
47. Employees are regarded as the Institution's most important asset.	COUNT	162	77	0	33	0	272
	PERCENTAGE	59.56%	28.31%	-	12.13%	-	100%
48. DUT has very efficient information systems.	COUNT	14	179	20	49	10	272
	PERCENTAGE	5.15%	65.81%	7.35%	18.02%	3.67%	100%
49. Employees at DUT are assisted in adapting to the fast technologically changing environment.	COUNT	66	140	18	48	0	272
	PERCENTAGE	24.26%	51.47%	6.62%	17.65%	-	100%
50. The level of co-operation amongst employees at the Institution is high.	COUNT	15	168	0	74	15	272
	PERCENTAGE	5.51%	61.76%	-	27.22%	5.51%	100%
51. The current systems at DUT allows for easy access to information.	COUNT	57	133	28	30	24	272
	PERCENTAGE	20.96%	48.90%	10.29%	11.03%	8.82%	100%
52. DUT encourages employees to expand their know-how in areas related to their current jobs.	COUNT	54	128	26	36	28	272
	PERCENTAGE	19.85%	47.06%	9.56%	13.24%	10.29%	100%
53. Knowledge at the Institution is well managed.	COUNT	76	132	46	18	0	272
	PERCENTAGE	27.94%	48.53%	16.91%	6.62%	-	100%
54. Customers are given the opportunity to rate the service that they have received at the Institution.	COUNT	233	36	3	0	0	272
	PERCENTAGE	85.66%	13.24%	1.10%	-	-	100%
55. DUT can be termed "a learning environment for staff".	COUNT	137	108	15	5	7	272
	PERCENTAGE	50.37%	39.71%	5.51%	1.84%	2.57%	100%
56. In my opinion, the Institution under-values intangible assets (such as employee competence).	COUNT	27	30	0	96	119	272
	PERCENTAGE	9.93%	11.02%	-	35.29%	43.76%	100%
57. DUT has established a customer-care approach.	COUNT	108	123	36	5	0	272
	PERCENTAGE	39.71%	45.21%	13.24%	1.84%	-	100%
58. Employees at DUT are actively involved in problem-solving to improve service delivery	COUNT	113	128	31	0	0	272
	PERCENTAGE	41.54%	47.06%	11.40	-	-	100%
59. In my opinion, the Institution has sufficient processes and procedures to enhance service delivery.	COUNT	135	117	20	0	0	272
	PERCENTAGE	49.64%	43.01%	7.35%	-	-	100%
60. There is sufficient infrastructure at DUT to promote service delivery	COUNT	152	84	36	0	0	272
	PERCENTAGE	55.88%	30.88%	13.24%	-	-	100%
61. The Institution's philosophy has a positive impact on its ability to take on a leadership role in the KZN Higher Education sector amidst political factors.	COUNT	34	149	37	38	14	272
	PERCENTAGE	12.50%	54.78%	13.60%	13.98%	5.14%	100%
62. The systems at DUT are sufficient to assist with information sharing..	COUNT	55	212	5	0	0	272
	PERCENTAGE	20.22%	77.94%	1.84%	-	-	100%
63. DUT has introduced a variety of training programmes for staff to enhance their service delivery.	COUNT	50	195	5	22	0	272
	PERCENTAGE	18.38%	71.69%	1.84%	8.09%	-	100%
64. Employee satisfaction surveys relating to the service departments are conducted within the Institution.	COUNT	72	103	20	70	7	272
	PERCENTAGE	26.48%	37.87%	7.35%	25.73%	2.57%	100%

As illustrated in Table 6.16 above, the majority of the respondents (87.87%) perceived that employees were not valued at the DUT as the institution's most important asset (Statement 47). 90.08% of the sample respondents disagreed with Statement 55, namely, that the DUT can be termed a learning environment for staff. The sample respondents also felt strongly (79.05%) for Statement 56, that the DUT undervalues intangible assets such as employee competence, while 88.60% of the sample respondents believed that employees were not actively involved in problem-solving to improve service delivery at the institution (Statement 58). In response to Statement 54, namely, that external customers are given the opportunity to rate the service that they received at the institution, the sample respondents' expressed their disagreement very strongly with a high percentage response rate of 98.90%. In addition, 84.92% of the sample respondents reported that in their opinion the DUT had not established a customer-care approach (Statement 57). 76.73% of the sample respondents believed that employees at the institution are not adequately assisted to adapt to the fast evolving technologically changing environment (Statement 49), whilst 90.07% disagreed with Statement 63, namely, that DUT had introduced a variety of training programmes for staff to enhance their service delivery and that these programmes added minimal value to their job functions.

6.6.2 Analysis of Hypothesis Testing related to Perceptions of Intellectual Capital at the DUT

In addition to the frequencies and percentile computations summarised for the variables compiled in Table 6.16 above, the researcher developed the following hypotheses to test significant relationships on the responses given and their perceptions related to IC at the DUT.

H_0^{10} There is a significant relationship between DUT establishing a customer-care approach and adequate infrastructure at the institution to promote service delivery.

TABLE 6.17 DUT ESTABLISHING A CUSTOMER-CARE APPROACH AND ADEQUATE INFRASTRUCTURE AT THE INSTITUTION TO PROMOTE SERVICE DELIVERY (n = 272)

Statements 57 and 60	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	57.714	16	0.00002
Likelihood Ratio	51.956	16	0.00031
Linear-by-Linear Association	19.358	1	0.00000
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8211		

* Pearson's Chi-Square = 57.714, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8211, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.17 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant for this hypothesis tested. There is a highly significant relationship between DUT establishing a customer-care approach and adequate infrastructure at the institution to promote service delivery. According to Bennet and Bennet (2014:43), since the customer ultimately assesses the product and/or service of the organisation, various IC models emphasise customer-care. Wilson-Strydom (2014:65) states that in the South African HE sector, a customer-care approach has become a necessity due to government legislation and competition. However, Sirayi and Nawa (2014:1648) conducted research on customer-care in the South African HE UoT sector and their findings revealed that a customer-care approach is not yet sufficiently rooted in either the UoT programme offerings or the service delivery thereof. Research conducted by Van der Walt, Potgieter and Wolhuter (2013:49) on the impact of infrastructure development on HE service delivery in Sub-Sahara Africa, revealed that in institutions were inadequate infrastructure was present, respondents reported that customer care was compromised and had no significance and thus negatively impacted on the HE institutions to perform successfully.

H_0^{11} There is a significant difference between DUT introducing a variety of training programmes for staff to enhance their service delivery mandate and employees being regarded as the institution's most important asset.

TABLE 6.18 DUT INTRODUCING A VARIETY OF TRAINING PROGRAMMES FOR STAFF TO ENHANCE THEIR SERVICE DELIVERY MANDATE AND EMPLOYEES BEING REGARDED AS THE INSTITUTION'S MOST IMPORTANT ASSET (n = 272)

Statements 63 and 47	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	22.122	16	0.07662
Likelihood Ratio	20.313	16	0.21133
Linear-by-Linear Association	11.412	1	0.00556
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.4681		

* Pearson's Chi-Square = 22.122, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.4681, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.18 reveals that both the Pearson's Chi-Square test result ($p > 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s < 0.7$) produced a non-significant result. The Pearson's Chi-Square value of 22.122 is less than the χ^2 cut-off value of 26.296, whilst the Spearman's Rank Order Correlation Co-efficient of 0.4681 is less than the r_s cut-off value of 0.7. As the test statistics show (Table 6.18), there is no significant difference between introducing a variety of training programmes for staff to enhance their service delivery and employees being regarded as the institution's most important asset. Despite the emphasis in the literature on the value of training and development when implementing IC and recognising the value of employees, the sample respondents perceived that no value was added (Abeysekera, 2008:731; Awad, 2010:92; Stevenson and Bauer, 2014:14). Moreover, the computed results in Table 6.18 corroborates with the research findings by Braunerhjeim, Zoltan,

Audretsch and Carlsson (2010:121) which revealed that the South African HE sector is guilty of offering training and development programmes on the basis of one size fits all. Moreover, the research conducted by Wilson-Strydom and Fongwa (2012:13) on employee perceptions pertaining to the perceived individual value of talented staff associated with training and development in the Sub-Sahara HE sector revealed that at HE institutions, training and development programmes were not linked to financial rewards, such as performance bonuses. Further, the employees perceived training interventions to be merely superfluous, although they had the expertise that was not valued. .

H_0^{12} There is a significant correlation between DUT being termed a learning environment for staff and assisting employees at the institution to adapt to the fast technologically changing environment.

TABLE 6.19 DUT BEING TERMED A LEARNING ENVIRONMENT FOR STAFF AND THE ASSISTING EMPLOYEES AT THE INSTITUTION TO ADAPT TO THE FAST TECHNOLOGICALLY CHANGING ENVIRONMENT (n = 272)

Statements 55 and 49	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	47.665	16	0.00091
Likelihood Ratio	42.883	16	0.00002
Linear-by-Linear Association	7.991	1	0.00001
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8166		

* Pearson's Chi-Square = 47.665, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8166, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.19 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant correlation between DUT being termed a learning environment for staff and assisting employees at the institution to adapt to the fast technologically changing environment. Various researchers

such as Asmal (2009:2), Monyooe (2013:106) and Ndlovu (2014:2043) emphasise the link between establishing a learning environment and assisting employees to adapt to technological changes. McIntyre, Dalkir, Paul and Kitambo (2015:13) conducted research on technology transfer in the HE sector in the United Kingdom and found that the successful implementation of IC was highly dependent upon the HE institution emphasising the value of innovative skills transfer amongst its staff in a technologically changing environment.

H_0^{13} There is a significant difference between DUT encouraging employees to expand their know-how in areas related to their current jobs and employees being actively involved in problem-solving at the institution to improve service delivery.

TABLE 6.20 DUT ENCOURAGING EMPLOYEES TO EXPAND THEIR KNOW-HOW IN AREAS RELATED TO THEIR CURRENT JOBS AND EMPLOYEES BEING ACTIVELY INVOLVED IN PROBLEM-SOLVING AT THE INSTITUTION TO IMPROVE SERVICE DELIVERY (n = 272)

Statements 52 and 58	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	31.722	16	0.00301
Likelihood Ratio	28.443	16	0.00222
Linear-by-Linear Association	2.733	1	0.00354
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.7612		

* Pearson's Chi-Square = 31.722, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.7612, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.20 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are moderately significant. There is a moderately significant difference between DUT encouraging employees to expand their know-how in areas related to their current jobs and employees being actively involved in problem-solving at the institution to improve service delivery. Various authors such as Gilpin and Murphy (2008:75), Clegg (2009:59) and Gabe and Abel (2012:439) recognise

the importance of encouraging individual know-how to promote service-delivery when an institution implements IC. Research conducted by Liyanage, Elhag, Ballal and Li (2009:128) on decision making structures and problem solving in the Canadian HE sector found that although developing individual know-how encouraged problem-solving, it was not a significantly high predictor in ensuring active participation at HE institutions.

H_0^{14} There is a significant relationship between sufficient processes and procedures to enhance service delivery being present at the DUT and the efficiency of the institution's information systems.

TABLE 6.21 SUFFICIENT PROCESSES AND PROCEDURES TO ENHANCE SERVICE DELIVERY BEING PRESENT AT THE DUT AND THE EFFICIENCY OF THE INSTITUTION'S INFORMATION SYSTEMS (n = 272)

Statements 59 and 48	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	59.208	16	0.00003
Likelihood Ratio	56.187	16	0.00063
Linear-by-Linear Association	9.118	1	0.00000
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8916		

* Pearson's Chi-Square = 59.208, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8916, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.21 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant relationship between sufficient processes and procedures to enhance service delivery being present at the DUT and the efficiency of the institution's information systems. Research conducted by Tebele (2013:88-90) found that in the South African HE sector the effectiveness of processes and procedures were highly dependent upon the information systems of the institution. Ntshoe and Selesho (2014:1559) conducted research on the impact of information systems on the ranking of

South African HE institutions in terms of customer satisfaction and service delivery. Their findings revealed that the efficiency and effectiveness of the information systems at a South African HE institution had a significant impact on service delivery and the brand image and ranking of the institution.

6.7 SECTION E: HUMAN CAPITAL AT THE DUT ANALYSIS OF HYPOTHESIS TESTING OF SAMPLE RESPONDENTS' PERCEPTIONS RELATED TO HUMAN CAPITAL AT THE DUT

An analysis of results pertaining to the frequencies and percentages of the sample respondents in relation to HC in Section E of the Questionnaire (shown in Annexure B), are presented below by means of utilising descriptive and relevant non-parametric statistical tests for the hypotheses tested.

6.7.1 Section E: Summary of Frequencies by Sample Respondents in relation to Human Capital

Table 6.22 below summarises the frequency counts expressed as a percentage of the sample respondents' perceptions for the HC component of the Questionnaire (Annexure B). The main results reported by the respondents are summarised and analysed below (Table 6.22):

As computed in Table 6.22 in relation to the HC component, 71.32% of the sample respondents reported that in their opinion employees at DUT were always willing to go the extra mile (Statement 126), while 86.03% reported that they could rely on their peers if they needed assistance in their jobs (Statement 66). The majority of the sample respondents (72.05%) were of the opinion that the institution offered a detailed induction programme for new staff (Statement 75) and 61.40% of the sample respondents felt that their line manager or Head of Department was willing to assist them as and when required (Statement 113).

In a divergent view of the same variable (i.e. Human Capital), the majority of the sample respondents (89.34%) perceived that employees at DUT had a negative attitude towards the institution (Statement 67) and 76.10% of the sample respondents reported that they had minimal commitment towards DUT (Statement 69). The vast majority of the sample respondents (93.38%) disagreed with Statement 96, namely, that there was a culture of participation at DUT and 86.75% of the sample respondents perceived that an unsupportive work atmosphere was present at the institution (Statement 98). The majority of the sample respondents (81.25%) were of the opinion that the institution perceived employees as a cost factor (Statement 86) and 81.99% of the sample respondents expressed a strong disagreement pertaining to the fairness of the remuneration systems for the institution (Statement 70). A vast majority of the sample respondents (82.71%) disagreed with Statement 81, namely, that the institution attempted to retain scarce skills, while 86.40% of the sample respondents believed that DUT lacked a clear strategy to manage critical skills (Statement 92). In response to Statement 116, namely, that talent management is emphasised at the institution, 73.53% of the sample respondents disagreed. In addition, a meagre 13.97% of the sample respondents believed that DUT was regarded as an employer of choice (Statement 91) and a minor 12.14% thought that when a post became vacant it was filled within a reasonable time allowing for minimal disruptions in the workplace (Statement 87).

The vast majority (Table 6.22) of the sample respondents (90.07%), believed that the institution failed to care about the individual's career progression (Statement 71) and 85.29% of the sample respondents reported that succession planning was not effectively used at the DUT (Statement 85). In addition, the majority of the sample respondents (92.28%) felt that performance at DUT was not sufficiently monitored (Statement 72) and 90.44% strongly expressed their dissatisfaction with a lack of individual development plans for staff (Statement 74). Although 84.19% of the sample respondents (Table 6.22) felt that in the last three years the complexity level of their jobs had become

more demanding (Statement 129). A minor 10.29% of the sample respondents believed that the training and development offered at the DUT was relevant to their core job functions (Statement 89), while 94.49% reported that job design was not conducted at the institution on a regular basis (Statement 119). The vast majority of the sample respondents (94.12%) felt that the Human Resource (HR) Department was not regarded as a business partner by line managers (Statement 123) and 94.13% were of the opinion that HR strategic planning was lacking at the institution.

The sample respondents (Table 6.22) also felt very strongly (97.06%) that the institution failed to recognise employees' knowledge and skills (Statement 88) and similarly, 86.03% of the sample respondents perceived that the leadership of DUT neglected to emphasise employees' contributions towards the institution (Statement 68). The vast majority of the sample respondents (99.27%) reported that there was a lack of mentorship programmes at the DUT (Statement 111), and 87.51% of the sample respondents perceived that there was a lack of leadership development at the institution (Statement 125). Conversely, 80.52% of the sample respondents disagreed that the institution used coaching effectively to assist new employees in the workplace (Statement 130).

TABLE 6.22 SECTION E: FREQUENCIES EXPRESSED AS A PERCENTAGE BY THE SAMPLE RESPONDENTS RELATED TO HUMAN CAPITAL (n = 272)

STATEMENT	RESPONSES	RESPONSE OPTIONS					TOTAL
		STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	
65. I am satisfied with my working conditions.	COUNT	74	114	9	59	16	272
	%	27.21%	41.91%	3.31%	21.69%	5.88%	100%
66. I can rely on my peers when I need assistance in my job.	COUNT	5	23	10	98	136	272
	%	1.84%	8.46%	3.67%	36.03%	50%	100%
67. Employees have a positive attitude towards the Institution.	COUNT	129	114	13	16	0	272
	%	47.43%	41.91%	4.78%	5.88%	-	100%
68. Leadership at the Institution emphasise the contributions of employees.	COUNT	116	118	20	12	6	272
	%	42.65%	43.38%	7.35%	4.41%	2.21%	100%
69. I am committed to DUT.	COUNT	64	143	15	46	4	272
	%	23.53%	52.57%	5.51%	16.91%	1.48%	100%
70. I believe the remuneration system at DUT is fair.	COUNT	86	137	18	31	0	272
	%	31.62%	50.37%	6.62%	11.39%	-	100%
71. The Institution cares about my career progression.	COUNT	183	62	13	14	0	272
	%	67.28%	22.79%	4.78%	5.15%	-	100%
72. Performance at DUT is monitored.	COUNT	111	140	10	11	0	272
	%	40.81%	51.47%	3.67%	4.05%	-	100%
73. Employees readily have access to training and development programmes.	COUNT	132	89	9	31	11	272
	%	48.53%	32.72%	3.31%	11.39%	4.05%	100%
74. Employees at DUT have Individual Development Plans.	COUNT	197	49	14	12	0	272
	%	72.43%	18.01%	5.15%	4.41%	-	100%
75. The Institution offers a detailed induction programme for new staff.	COUNT	0	70	6	118	78	272
	%	-	25.74%	2.21%	43.38%	28.67%	100%
76. Employees at DUT have sufficient capabilities to successfully perform their duties.	COUNT	60	58	2	146	6	272
	%	22.06%	21.32%	0.73%	53.68%	2.21%	100%
77. Training and development is regarded as crucial for all employees at the institution.	COUNT	51	124	4	83	10	272
	%	18.75%	45.59%	1.47%	30.52%	3.67%	100%
78. My manager / supervisor / Head of Department allow me to be innovative in my job.	COUNT	77	89	0	81	25	272
	%	28.31%	32.72%	-	29.78%	9.19%	100%
79. The Institution promotes a culture of mutual respect.	COUNT	54	168	14	31	5	272
	%	19.86%	61.76%	5.15%	11.39%	1.84%	100%
80. Employees at DUT are loyal.	COUNT	55	130	12	70	5	272
	%	20.22%	47.79%	4.41%	25.74%	1.84%	100%
81. The Institution attempts to retain scarce skills employees.	COUNT	143	82	11	27	9	272
	%	52.57%	30.14%	4.05%	9.93%	3.31%	100%
82. I can participate actively in decision-making at DUT.	COUNT	**182**	**37**	**0**	**46**	**7**	**272**
	%	**66.92%**	**13.60%**	**-**	**16.91%**	**2.57%**	**100%**
83. I avoid taking risks in my job.	COUNT	**75**	**14**	**13**	**104**	**66**	**272**
	%	**27.57%**	**5.15%**	**4.78%**	**38.24%**	**24.26%**	**100%**
84. I am motivated to perform my duties on a daily basis.	COUNT	**78**	**91**	**26**	**34**	**43**	**272**
	%	**28.67%**	**33.46%**	**9.56%**	**12.50%**	**15.81%**	**100%**
85. Succession planning is effectively used at the Institution.	COUNT	**160**	**72**	**21**	**16**	**3**	**272**
	%	**58.82%**	**26.47%**	**7.72%**	**5.88%**	**1.11%**	**100%**
86. The Institution tends to regard employees as a cost factor.	COUNT	**20**	**27**	**4**	**204**	**17**	**272**
	%	**7.35%**	**9.92%**	**1.48%**	**75%**	**6.25%**	**100%**
87. When a post becomes vacant, it is filled within a reasonable time allowing for minimal disruptions in the workplace.	COUNT	**181**	**58**	**0**	**33**	**0**	**272**
	%	**66.54%**	**21.32%**	**-**	**12.14%**	**-**	**100%**
88. DUT recognises employees' knowledge and skills.	COUNT	**157**	**107**	**0**	**8**	**0**	**272**
	%	**57.72%**	**39.34%**	**-**	**2.94%**	**-**	**100%**
89. The training and development offered at DUT is relevant to my core job functions.	COUNT	**16**	**223**	**5**	**28**	**0**	**272**
	%	**5.88%**	**81.99%**	**1.84%**	**10.29%**	**-**	**100%**

TABLE 6.22 SECTION E: FREQUENCIES EXPRESSED AS A PERCENTAGE BY THE SAMPLE RESPONDENTS RELATED TO HUMAN CAPITAL (n = 272) (CONTINUED)

STATEMENT	RESPONSES	RESPONSE OPTIONS					TOTAL
		STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	
90. Employees are encouraged to focus on service delivery.	COUNT	16	195	30	31	0	272
	%	5.88%	71.69%	11.04%	11.39%	-	100%
91. Employees are equipped with knowledge and skills to adapt to the changing demands of the Higher Education sector.	COUNT	14	142	23	93	0	272
	%	5.15%	52.21%	8.46%	34.18%	-	100%
92. DUT has a clear strategy to manage critical skills.	COUNT	214	21	10	27	0	272
	%	78.68%	7.72%	3.67%	9.93%	-	100%
93. I believe the Institution is under-staffed.	COUNT	27	6	0	123	116	272
	%	9.93%	2.21%	-	45.22%	42.64%	100%
94. I have job autonomy.	COUNT	121	11	20	105	15	272
	%	44.49%	4.05%	7.35%	38.60%	5.51%	100%
95. DUT is regarded as an employer of choice.	COUNT	190	34	10	38	0	272
	%	69.86%	12.50%	3.67%	13.97%	-	100%
96. There is a culture of participation prevalent at the Institution.	COUNT	237	17	0	18	0	272
	%	87.13%	6.25%	-	6.62%	-	100%
97. Exceptional performance is recognised at DUT.	COUNT	104	141	0	27	0	272
	%	38.24%	51.83%	-	9.93%	-	100%
98. The working atmosphere at the Institution is supportive.	COUNT	36	200	3	33	0	272
	%	13.23%	73.52%	1.11%	12.14%	-	100%
99. Re-induction is offered annually for existing employees at the Institution.	COUNT	215	39	3	15	0	272
	%	79.04%	14.34%	1.11%	5.51%	-	100%
100. DUT is more concerned about quantity instead of quality.	COUNT	59	8	0	106	99	272
	%	21.69%	2.94%	-	38.97%	36.40%	100%
101. DUT is able to attract sufficient applicants when a post is advertised.	COUNT	163	36	0	38	35	272
	%	59.93%	13.23%	-	13.97%	12.87%	100%
102. Employee performance is measured on the basis of results.	COUNT	188	78	0	3	3	272
	%	69.11%	28.67%	-	1.11%	1.11%	100%
103. In my opinion, the Institution's control over employee's tasks and duties are monitored by the line manager.	COUNT	65	69	17	35	86	272
	%	23.90%	25.36%	6.25%	12.87%	31.62%	100%
104. My manager / supervisor / Head of Department creates the standards that I am expected to achieve.	COUNT	9	150	12	63	38	272
	%	3.31%	55.15%	4.41%	23.16%	13.97%	100%
105. The power I have in my current job is based on my position and not my knowledge.	COUNT	6	103	30	118	15	272
	%	2.21%	37.86%	11.04%	43.38%	5.51%	100%
106. I have limited decision-making power relating to my job.	COUNT	21	104	17	94	36	272
	%	7.72%	38.24%	6.25%	34.56%	13.23%	100%
107. My manager / supervisor / Head of Department share his/her knowledge with me.	COUNT	58	139	3	14	58	272
	%	21.32%	51.10%	1.11%	5.15%	21.32%	100%
108. Teams are created to achieve institutional objectives.	COUNT	99	80	23	50	20	272
	%	36.40%	29.41%	8.46%	18.38%	7.35%	100%
109. Organisational learning is emphasised throughout DUT.	COUNT	131	61	22	38	20	272
	%	48.16%	22.43%	8.09%	13.97%	7.35%	100%
110. Informal learning is encouraged in the Institution.	COUNT	74	181	2	15	0	272
	%	27.22%	66.54%	0.73%	5.51%	-	100%
111. Mentorship programmes are used at DUT to develop employees.	COUNT	152	118	2	0	0	272
	%	55.89%	43.38%	0.73%	-	-	100%
112. Trust is prevalent amongst employees.	COUNT	166	100	6	0	0	272
	%	61.03%	36.76%	2.21%	-	-	100%

TABLE 6.22 SECTION E: FREQUENCIES EXPRESSED AS A PERCENTAGE BY THE SAMPLE RESPONDENTS RELATED TO HUMAN CAPITAL (n = 272) (CONTINUED)

STATEMENT	RESPONSES	RESPONSE OPTIONS					TOTAL
		STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	
113. My manager / supervisor / Head of Department are willing to assist me as and when required.	COUNT	0	90	15	67	100	272
	%	-	33.09%	5.51%	24.64%	36.76%	100%
114. DUT encourages a culture of empowerment.	COUNT	109	153	3	7	0	272
	%	40.07%	56.25%	1.11%	2.57%	-	100%
115. The Institution focuses more on effectiveness than efficiency.	COUNT	17	77	0	60	118	272
	%	6.25%	28.31%	-	22.06%	43.38%	100%
116. Talent management is emphasised at DUT.	COUNT	132	68	3	20	49	272
	%	48.53%	25%	1.11%	7.35%	18.01%	100%
117. The Institution's Human resource policies are well designed and not ambiguous.	COUNT	206	51	0	15	0	272
	%	75.74%	18.75%	-	5.51%	-	100%
118. Individual and Team competencies are considered when tasks are allocated.	COUNT	209	59	4	0	0	272
	%	76.83%	21.69%	1.48%	-	-	100%
119. Job design is conducted on a regular basis.	COUNT	220	37	15	0	0	272
	%	80.89%	13.60%	5.51%	-	-	100%
120. Change management is embraced at DUT.	COUNT	180	59	4	28	1	272
	%	66.18%	21.69%	1.48%	10.29%	0.36%	100%
121. Institutional values are based on ethics.	COUNT	89	137	42	4	0	272
	%	32.72%	50.37%	15.43%	1.48%	-	100%
122. Professionalism is encouraged at DUT amongst employees.	COUNT	57	183	7	25	0	272
	%	20.96%	67.28%	2.57%	9.19%	-	100%
123. The HR department is regarded as a business partner by line managers	COUNT	99	157	16	0	0	272
	%	36.40%	57.72%	5.88%	-	-	100%
124. DUT conducts informed human resource planning on a regular basis.	COUNT	161	95	1	15	0	272
	%	59.19%	34.94%	0.36%	5.51%	0	100%
125. The Institution focuses adequately on leadership development.	COUNT	65	173	10	24	0	272
	%	23.90%	63.61%	3.67%	8.82%	-	100%
126. Employees are always willing to "go the extra mile".	COUNT	0	70	8	129	65	272
	%	-	25.75%	2.93%	47.43%	23.89%	100%
127. The pre-dominant role of the HR department is that of an administrative department.	COUNT	32	11	5	126	98	272
	%	11.76%	4.05%	1.84%	46.32%	36.03%	100%
128. I can immediately / directly see the results of my job.	COUNT	108	97	28	39	0	272
	%	39.71%	35.66%	10.29%	14.34%	-	100%
129. In the last three years the complexity level of my job has become more demanding.	COUNT	12	28	3	90	139	272
	%	4.41%	10.29%	1.11%	33.09%	51.10%	100%
130. DUT utilises coaching effectively to assist new employees in the workplace.	COUNT	134	85	25	28	0	272
	%	49.27%	31.25%	9.19%	10.29%	-	100%

6.7.2 Analysis of Hypothesis Testing related to Perceptions of Human Capital at the DUT

In adding to the numerous frequencies expressed as a percentage by the sample respondents (Table 2.22), the researcher developed the following hypotheses to test significant relationships of the sample respondents pertaining to the construct of HC at the DUT.

H_0^{15} There is a significant correlation between employees being satisfied with their working conditions and being motivated to perform their duties on a daily basis to enhance the retention of Human Capital at the DUT.

TABLE 6.23 EMPLOYEES BEING SATISFIED WITH THEIR WORKING CONDITIONS AND BEING MOTIVATED TO PERFORM THEIR DUTIES ON A DAILY BASIS TO ENHANCE THE RETENTION OF HUMAN CAPITAL (n = 272)

Statements 65 and 84	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	46.119	16	0.00055
Likelihood Ratio	41.807	16	0.00103
Linear-by-Linear Association	12.411	1	0.00004
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.7655		

* Pearson's Chi-Square = 46.119, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.7655, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.23 illustrates that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant correlation between employees being satisfied with their working conditions and being motivated to perform their duties on a daily basis to enhance the retention of HC at the DUT. Guthrie and Lee (2010:15) contend that conducive working conditions and monitoring employee motivational levels have a positive impact on retaining HC at HE institutions. Research conducted by Coclová (2012:21) on the challenges experienced in the HE sector in Europe revealed that at those institutions where employees perceived their working conditions to be conducive, higher levels of individual motivation, commitment and acceptance to change were reported. Donnelly (2006:91) researched the impact of working conditions on knowledge workers in the HE sector of the United Kingdom and concluded that respondents perceived working conditions as the greatest KM enabler, since it encouraged and motivated knowledge workers to remain at the HE institutions.

H_0^{16} There is a significant difference between mentorship programmes being used to develop employees and talent management being emphasised to attract and retain Human Capital at the DUT.

TABLE 6.24 MENTORSHIP PROGRAMMES BEING USED TO DEVELOP EMPLOYEES AND TALENT MANAGEMENT BEING EMPHASISED TO ATTRACT AND RETAIN HUMAN CAPITAL AT THE DUT (n = 272)

Statements 111 and 116	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	49.656	16	0.00012
Likelihood Ratio	45.116	16	0.00009
Linear-by-Linear Association	15.106	1	0.00065
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8155		

* Pearson's Chi-Square = 49.656, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8155, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.24 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant difference between mentorship programmes being used to develop employees and talent management being emphasised to attract and retain HC at the DUT. Various authors such as Tettey (2010:3), Salim and Sulaiman (2011:119) and Tebele (2013:3) emphasise the contribution of mentorship programmes and talent management towards the HE institution's strategic objectives to attract, develop and retain HC. The results in Table 6.24 are supported with research conducted by Mngoma (2014:2) on the effectiveness of using mentorship programmes and talent management to address scarce skills in the South African HE sector. Mngoma's (2014:2) study concluded that where mentorship programmes and talent management were prevalent, the HE institutions reported that they experienced no difficulty in attracting and retaining HC. Furthermore, Mngoma's (2014:2) findings revealed that where mentorship programmes and

talent management were emphasised in HE institutions, employees reported higher levels of job satisfaction and a stronger sense of belonging.

H_0^{17} There is a significant relationship between emphasising leadership development and using succession planning effectively to develop Human Capital at the DUT.

TABLE 6.25 EMPHASIS ON LEADERSHIP DEVELOPMENT AND THE EFFECTIVE USE OF SUCCESSION PLANNING TO DEVELOP HUMAN CAPITAL AT THE DUT (n = 272)

Statements 125 and 85	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	22.119	16	0.07445
Likelihood Ratio	19.322	16	0.08225
Linear-by-Linear Association	8.766	1	0.33244
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.4239		

* Pearson's Chi-Square = 22.119, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.4239, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.25 reveals that both the Pearson's Chi-Square test result ($p > 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s < 0.7$) produced a non-significant result. The Pearson's Chi-Square value of 22.119 is less than the χ^2 cut-off value of 26.296, whilst the Spearman's Rank Order Correlation Co-efficient of 0.4239 is less than the r_s cut-off value of 0.7. Therefore it may be deduced that there is no significant relationship between emphasising leadership development and the effective use of succession planning to develop HC at the DUT. Various authors such as Olssen and Peters (2005:311), Chang and Hsieh (2011:3) and De Beer (2012:3) regard leadership development and effective succession planning as important enablers when implementing KM and developing HC. However, the results depicted in Table 6.25 might be in concurrence with research findings reported by Salojarvi, Faru and Sveiby (2005:110), who conducted research on the contribution of institutional leadership and management development aligned to HC in the HE sector in

selected European countries. These researchers found that leadership development was often associated with general training and development programmes and was not regarded as a successful predictor for effective succession planning.

H_0^{18} There is a significant correlation between organisational learning being emphasised throughout the institution and training and development being regarded as important for all employees to develop and retain Human Capital at the DUT.

TABLE 6.26 EMPHASIS ON ORGANISATIONAL LEARNING AND TRAINING AND DEVELOPMENT BEING REGARDED AS IMPORTANT FOR ALL EMPLOYEES TO DEVELOP AND RETAIN HUMAN CAPITAL (n = 272)

Statements 109 and 77	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	45.772	16	0.00092
Likelihood Ratio	43.108	16	0.00071
Linear-by-Linear Association	12.116	1	0.00001
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.7933		

* Pearson's Chi-Square = 45.772, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.7933, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.26 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant correlation between emphasising organisational learning throughout the institution and training and development being regarded as important for all employees to develop and retain HC at the DUT. Salim and Sulaiman (2011:120) contend that organisational learning encourages innovation, institutional performance and forms the basis of a learning organisation. Monyooe (2013:114) investigated the contribution of training and development to reinforce organisational learning within South African HE institutions. His research findings revealed that at South African HE

institutions where training and development were linked to organisational learning, respondents perceived that training interventions were relevant to their core job functions and reinforced by the strategy of the institution, which promoted the development and retention of HC at these HE institutions.

H_0^{19} There is a significant relationship between managing critical skills at the institution and DUT conducting informed human resource planning on a regular basis to attract and retain Human Capital.

TABLE 6.27 MANAGING CRITICAL SKILLS AT THE INSTITUTION AND DUT CONDUCTING INFORMED HUMAN RESOURCE PLANNING ON A REGULAR BASIS TO ATTRACT AND RETAIN HUMAN CAPITAL (n = 272)

Statements 92 and 124	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	54.145	16	0.00004
Likelihood Ratio	49.652	16	0.00000
Linear-by-Linear Association	17.922	1	0.00000
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8399		

* Pearson's Chi-Square = 54.145, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8399, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.27 illustrates that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient result ($r_s > 0.7$) are very highly significant. There is a highly significant relationship between managing critical skills at the institution and the DUT conducting informed human resource planning on a regular basis to attract and retain HC. Paradeise, Reale, Bleiklie and Ferlie (2009:17-23) contend that in the Western European HE sector, the retention of scarce skills contributes directly to the quality of education offered and the reputation of the HE institution. Similar findings were reported by Steur, Jansen and Hofman (2012:866), who investigated the strategies that were implemented at South African HE institutions to retain scarce skills. Their research findings revealed that at those

institutions where strategic human resources planning was conducted on a regular basis, the HE institutions were in a better position to identify, plan and implement HC strategies to address scarce skills, by means of attracting applicants and retaining existing scarce skills within the institutions (Steur, *et al.* (2012:868).

6.8 SECTION F: ANALYSIS OF RESULTS RELATING TO THE TENABILITY OF THE EXPLORATORY HUMAN CAPITAL FRAMEWORK LINKED TO INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT FOR THE DUT

An analysis of results pertaining to the tenability of the Exploratory Human Capital Framework linked to Intellectual Capital and Knowledge Management for the DUT (Figure 4.1) now follows. It should be noted that the sample respondents comprised of two independent groups, namely, the Academic Group and the Administrative Group. This analysis of results on the Exploratory Framework is presented in a sequential format based on the sections illustrated in Figure 4.1, namely, Section 1 to Section 7 and the interconnected variables linked to each section followed by the Human Capital Wheel. Various relevant non-parametric statistical tests were selected for each specific section of the Exploratory Framework to test the tenability and authenticity of this Framework in Figure 4.1.

6.8.1 Section 1: The External Environment
Analysis of Hypothesis Testing related to the External Environment of the Exploratory Framework at DUT

H_0^{20} There is a significant correlation between the decisions made at the DUT in response to environmental challenges and the institution producing knowledge to assist stakeholders with the economic growth of KwaZulu-Natal.

TABLE 6.28 DECISIONS MADE AT DUT IN RESPONSE TO ENVIRONMENTAL CHALLENGES AND THE INSTITUTION PRODUCING KNOWLEDGE TO ASSIST STAKEHOLDERS WITH THE ECONOMIC GROWTH OF KWAZULU-NATAL (n = 272)

Statements 12 and 45	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	47.201	16	0.00024
Likelihood Ratio	42.802	16	0.00001
Linear-by-Linear Association	11.442	1	0.00001
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8011		

* Pearson's Chi-Square = 47.201, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8011, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.28 highlights that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant correlation between decisions made at the DUT in response to environmental challenges and the institution producing knowledge to assist stakeholders with the economic growth of KwaZulu-Natal. Muller (2006:202) postulates that a HE institution exists within the larger external environment in the Knowledge-based Economy and monitoring the needs of external stakeholders have become important for a UoT to survive. Milton (2010:64) concludes that in order to survive and prosper a HE UoT, such as the DUT, need to have knowledge of the needs of the institution's stakeholders, knowledge of the environment and the ability to apply this knowledge effectively. According to Higher Education South Africa (HESA, 2011:3), HE UoT institutions are now expected to take on an active role in society and to promote knowledge and prepare graduates on the integration of political, social, economic, technological, legal and environmental factors.

H_0^{21} There is a significant difference between monitoring the external environment and the institution recognising that Knowledge Management is ever-changing.

TABLE 6.29 MONITORING THE EXTERNAL ENVIRONMENT AND THE INSTITUTION RECOGNISING THAT KNOWLEDGE MANAGEMENT IS EVER-CHANGING (n = 272)

Statements 15 and 34	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	43.117	16	0.00024
Likelihood Ratio	39.629	16	0.00007
Linear-by-Linear Association	4.662	1	0.00023
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8297		

* Pearson's Chi-Square = 43.117, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8297, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.29 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient result ($r_s > 0.7$) are highly significant. There is a highly significant difference between monitoring the external environment and the institution recognising that KM is ever-changing. Research conducted by Van Zyl (2014:1669) on strategic planning in the South African HE sector concluded that HE institutions benefit from conducting environmental monitoring, since it reduces the effects of potential threats from the external environment. In addition, Sousa and Van Dierendonck (2010:236) conducted research in the United Kingdom to determine the correlation between conducting environmental scanning in the HE sector and the ability of HE institutions adapting faster to change. Their findings concluded that at HE institutions where environmental scanning was conducted on a continuous basis, these institutions reported that KM challenges could be proactively encouraged.

In addition to the Pearson's Chi-square statistical tests and the Spearman Rank Correlation Co-efficient tests for the selected hypotheses, the researcher conducted the Wald-Wolfowitz bi-variate runs test, which is a non-parametric statistical test to compare two independent samples concerning their mean

value for variables of interest (De Leeuw, 2005:240). The Wald-Wolfowitz bi-variate runs test allows the researcher to analyse and compare the responses of two independent sample groups and therefore provides a robust analysis on Section 1 of the Exploratory Framework (Figure 4.1).

The two independent sample groups, namely, the Academic Staff and the Administrative Staff, were compared to determine whether the sample respondents in each group perceived the relationships between selected variables to be mutually dependent or independent. The variables selected in the Wald-Wolfowitz bi-variate runs test were the six macro-environmental components (PESTLE) identified in Section 1 of the Exploratory Framework (Figure 4.1). Each of the six macro-environmental components were compared to knowledge creation, which various South African researchers such as Mostert and Snyman (2007:108), Mkhize (2014:1548) and Van Zyl (2014:1669) report to be the primary function of a HE UoT institution. The statistical results for the Wald-Wolfowitz bi-variate runs tests are presented below followed by a synthesised discussion of the findings.

H_0^{22} There is a mutually dependent relationship between knowledge creation at the DUT and political environmental factors.

TABLE 6.30 KNOWLEDGE CREATION AT THE DUT AND POLITICAL ENVIRONMENTAL FACTORS (n = 272)

Statements 46 and 61	Value n^1	Value n^2	Cases
Mean (μ)	1.772	1.812	
Standard deviation (o^2)	1.288	1.743	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 1.772, Wald-Wolfowitz bi-variate runs test n^2 = 1.812; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.30 highlights that the mean test results using the Wald-Wolfowitz bi-variate runs test for both independent sample groups, namely, the Academic sample respondents (n^1) and the Administrative sample respondents (n^2) shows a mutually dependent relationship ($Z < 1.96$ at $p < 0.05$) between knowledge creation at the DUT and monitoring the political environmental factors. The standard deviation ($\sigma^2 = 1.743$) for the Administrative sample respondents (n^2) was significantly closer to the mean ($\mu = 1.812$) indicating that the responses of this group were highly consistent with the mean. The results shown in Table 6.30 are also reinforced by research conducted by Leydesdorff and Fritsch (2006:1538) on the importance of monitoring political environmental factors for HE institutions in order to facilitate strategic planning.

H_0^{23} There is a mutually dependent relationship between knowledge creation at the DUT and economic factors located in the external environment.

TABLE 6.31 KNOWLEDGE CREATION AT THE DUT AND ECONOMIC FACTORS IN THE EXTERNAL ENVIRONMENT (n = 272)

Statements 46 and 45	Value n^1	Value n^2	Cases
Mean (μ)	1.882	1.793	
Standard deviation (σ^2)	1.801	1.722	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test $n^1 = 1.882$, Wald-Wolfowitz bi-variate runs test $n^2 = 1.793$; Cut-off parameter: Wald-Wolfowitz bi-variate runs test ($Z < 1.96$ at $p < 0.05$)

In Table 6.31 the mean value for both the Academic sample respondents (n^1) and the Administrative sample respondents (n^2) are reported as $Z < 1.96$ at $p < 0.05$. The standard deviation ($\sigma^2 = 1.801$) for the Academic sample respondents (n^1) was significantly close to the mean ($\mu = 1.882$) indicating that the responses for this group were highly consistent with the mean. The standard deviation ($\sigma^2 = 1.722$) and the mean ($\mu = 1.793$) for the Administrative sample

respondents (n^2) reflected similar results These results of the Wald-Wolfowitz bi-variate runs test show that both independent sample groups perceived that the relationship between knowledge creation at the DUT and monitoring the external economic environment was mutually dependent. These results are consistent with the research findings reported by Mostert and Snyman (2007:110) on the importance of monitoring the impact of economic factors in the South African HE sector. Mostert and Snyman (2007:111) contend that HE institutions that monitor economic factors are able to plan proactively.

H_0^{24} There is a mutually dependent relationship between knowledge creation at the DUT and social factors originating from the external environment.

TABLE 6.32 KNOWLEDGE CREATION AT THE DUT AND SOCIAL FACTORS IN THE EXTERNAL ENVIRONMENT (n = 272)

Statements 46 and 16	Value n^1	Value n^2	Cases
Mean (μ)	1.911	1.873	
Standard deviation (σ^2)	1.872	1.421	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 1.911, Wald-Wolfowitz bi-variate runs test n^2 = 1.873; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.32 depicts that both Academic sample group (n^1) and Administrative sample group (n^2), reported at Z < 1.96 (p < 0.05) that there is a mutual dependency between knowledge creation at the DUT and monitoring the social factors originating in the external environment. The reported standard deviation (σ^2 = 1.872) for the Academic sample respondents (n^1) was significantly closer to the mean (μ = 1.911) than that of the Administrative sample respondents (n^2), which indicates that the responses of the Academic sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. The results shown in Table 6.32 are supported by research findings reported by Du

Plessis (2005:191) on the impact that social factors have on the strategic planning and monitoring of the services and programmes offered in South African HE institutions. Du Plessis (2005:192) found that HE institutions that monitored social factors were able to deliver programmes that incorporated the social challenges that the external customer was facing.

H_0^{25} There is a mutually dependent relationship between knowledge creation at the DUT and external technological factors.

TABLE 6.33 KNOWLEDGE CREATION AT THE DUT AND EXTERNAL TECHNOLOGICAL FACTORS (n = 272)

Statements 46 and 24	Value n^1	Value n^2	Cases
Mean (μ)	1.941	1.875	
Standard deviation (σ^2)	1.927	1.842	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 1.941, Wald-Wolfowitz bi-variate runs test n^2 = 1.875; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.33 shows that both independent sample groups reported at Z < 1.96 (p < 0.05) that there is a mutual dependency between knowledge creation at the DUT and monitoring the technological factors in the external environment. A very high level of mutual dependency is reported by both independent sample group respondents, namely, the reported standard deviation (σ^2 = 1.927) for the Academic sample respondents (n^1) was significantly close to the mean (μ = 1.941) and the reported results for the Administrative sample respondents (n^2) are very similar with a standard deviation of σ^2 = 1.842 and a mean of μ = 1.875. The results shown in Table 6.33 are supported by research conducted by Sousa and Van Dierendonck (2010:236), who investigated the impact of technology on knowledge creation in the HE sector at selected European universities. Their research revealed that at HE institutions that emphasised the

importance of technology in knowledge creation and incorporated technology in their academic programmes reported a higher level of customer satisfaction both amongst internal staff and external customers.

H_0^{26} There is a mutually dependent relationship between knowledge creation at the DUT and legal factors established in the external environment.

TABLE 6.34 KNOWLEDGE CREATION AT THE DUT AND LEGAL FACTORS ESTABLISHED IN THE EXTERNAL ENVIRONMENT (n = 272)

Statements 46 and 15	Value n^1	Value n^2	Cases
Mean (μ)	2.144	2.325	
Standard deviation (σ^2)	2.018	1.992	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 2.144, Wald-Wolfowitz bi-variate runs test n^2 = 2.325; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.34 depicts that both independent sample groups reported at Z > 1.96 that there is no mutual dependency between knowledge creation at the DUT and monitoring the legal factors in the external environment. The mean test statistic (μ = 2.144) for the Academic sample respondents (n^1) was more than the Z test statistic cut-off value of 1.96. Similarly, the mean test (μ = 2.325) for the Administrative sample respondents (n^2) was also higher than the Z test cut-off value of 1.96. Hence, both the Academic independent sample respondents (n^1) and the Administrative independent sample respondents (n^2) reported that knowledge creation is not dependent upon the legal factors in the external environment. In addition, the reported standard deviation (σ^2 = 2.018) for the Academic sample respondents (n^1) was significantly closer to the mean (μ = 2.144) than that of the Administrative sample respondents (n^2), which indicates

that the responses of the Academic sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. The results shown in Table 6.34 correspond with research conducted by Van Zyl (2014:1671), who investigated the South African legislative influences on the service delivery and knowledge creation of HE institutions in South Africa. Van Zyl (2014:1671) reports that the complexity and ever-changing nature of the South African legislative environment contributes to the difficulty of monitoring and incorporating this environmental factor into the planning conducted at South African HE institutions, thus corroborating the research findings.

H_0^{27} There is a mutually dependent relationship between knowledge creation at the DUT and environmental factors such as ethics and social responsibility.

TABLE 6.35 KNOWLEDGE CREATION AT THE DUT AND ENVIRONMENTAL FACTORS ESTABLISHED IN THE EXTERNAL ENVIRONMENT SUCH AS ETHICS AND SOCIAL RESPONSIBILITY (n = 272)

Statements 46 and 12	Value n^1	Value n^2	Cases
Mean (μ)	2.476	2.698	
Standard deviation (o^2)	2.109	2.502	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 2.476, Wald-Wolfowitz bi-variate runs test n^2 = 2.698; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.35 shows that both independent sample groups reported at Z > 1.96 that there is no mutual dependency between knowledge creation at the DUT and monitoring the external environmental factors such as ethics and social responsibility. The mean test statistic (μ = 2.476) for the Academic sample respondents (n^1) was more than the Z test statistic cut-off value of 1.96. Similarly, the mean test (μ = 2.698) for the Administrative sample respondents

(n^2) was also higher than the *Z* test cut-off value of 1.96. Both the Academic independent sample respondents (n^1) and the Administrative independent sample respondents (n^2) reported that knowledge creation is not dependent upon the environmental factors in the external environment. In addition, the reported standard deviation (σ^2 = 2.502) for the Administrative sample respondents (n^2) was significantly closer to the mean (μ = 2.698) than that of the Academic sample respondents (n^1), which indicates that the responses of the Administrative sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. These findings correspond with research conducted by Chmielewska-Muciek and Sitko-Lutek (2013:1366) on the perceptions of academic and administrative staff at selected HE institutions in Germany, Switzerland and Belgium on the dependency of knowledge creation on social responsibility and ethics. The researchers found that social responsibility and ethics underscored by a constantly evolving environment based on societal values resulted in respondents reporting a lack of mutual dependency between knowledge creation at the selected HE institutions and environmental factors which HE institutions cannot control (Chmielewska-Muciek and Sitko-Lutek; 2013:1367).

6.8.2 Section 2: The Knowledge Management Drivers Analysis of Hypothesis Testing of Knowledge Management Drivers related to the Exploratory Framework at DUT

H_0^{28} There is a significant correlation between technology as a Knowledge Management supply driver to promote Knowledge Management at DUT and the availability of sufficient infrastructure at the institution.

TABLE 6.36 TECHNOLOGY AS A KNOWLEDGE MANAGEMENT SUPPLY DRIVER TO PROMOTE KNOWLEDGE MANAGEMENT AT THE DUT AND THE AVAILABILITY OF SUFFICIENT INFRASTRUCTURE AT THE INSTITUTION (n = 272)

Statements 24 and 60	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	47.927	16	0.00711
Likelihood Ratio	43.187	16	0.00085
Linear-by-Linear Association	8.119	1	0.00512
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8411		

* Pearson's Chi-Square = 47.927, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8411, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.36 displays that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant. There is a highly significant correlation between technology as a KM supply driver to promote KM at the DUT and the availability of sufficient infrastructure at the institution. Similar findings were reported in research conducted by Milton (2010:103), who investigated the significance of sufficient infrastructure at HE institutions in the UK and the impact thereof on supporting technology as a KM supply driver. Milton (2010:104) reports that at HE institutions where sufficient infrastructure were reported both staff and students perceived technology to be a key supply driver for KM. However, at HE institutions where there were insufficient or outdated technological infrastructures, respondents reported that they believed that KM supply drivers were inhibited and constrained.

H_0^{29} There is a significant difference between the institutional brand as a Knowledge Management supply driver to enhance Knowledge Management and the image of DUT in the South African Higher Education sector.

TABLE 6.37 INSTITUTIONAL BRAND AS A KNOWLEDGE MANAGEMENT SUPPLY DRIVER TO PROMOTE KNOWLEDGE MANAGEMENT AND THE IMAGE OF DUT IN THE SOUTH AFRICAN HIGHER EDUCATION SECTOR (n = 272)

Statements 13 and 38	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	46.009	16	0.00432
Likelihood Ratio	42.768	16	0.00109
Linear-by-Linear Association	3.788	1	0.00014
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.7911		

* Pearson's Chi-Square = 46.009, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.7911, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.37 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient test ($r_s > 0.7$) are highly significant. There is a highly significant difference between the institutional brand as a KM supply driver to promote KM at the DUT and the image of DUT in the South African HE sector. Research conducted by Marshall (2009:135) on the importance of branding in the United States of America's HE sector revealed similar findings. Marshall (2009:136) reported that HE institutions that publicised their brand and focused on the image of the institution to be regarded as academic centres of excellence, reported a significantly higher level of success when implementing KM as opposed to HE institutions who disregarded institutional branding.

H_0^{30} There is a significant relationship between customer service becoming a key Knowledge Management demand driver at the institution and customer feedback being used to make significant changes to Knowledge Management at the DUT.

TABLE 6.38 CUSTOMER SERVICE BECOMING A KNOWLEDGE MANAGEMENT DEMAND DRIVER AT THE INSTITUTION AND USING CUSTOMER FEEDBACK TO MAKE SIGNIFICANT CHANGES TO KNOWLEDGE MANAGEMENT AT THE DUT (n = 272)

Statements 9 and 57	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	51.338	16	0.01882
Likelihood Ratio	47.105	16	0.01007
Linear-by-Linear Association	5.187	1	0.00332
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8612		

* Pearson's Chi-Square = 51.338, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8612, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.38 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient result ($r_s > 0.7$) are highly significant. There is a highly significant relationship between customer service becoming a key KM demand driver at the institution and customer feedback being used to make significant changes to KM at the DUT. Similar research findings have been reported by Issa, Isaias and Kommers (2014:45), who investigated the impact of customer service and customer feedback becoming key KM demand drivers in the South African HE UoT sector. Issa, *et al.* (2014:45) found that the HE UoTs that emphasised customer service and monitored customer feedback were able to make proactive changes to the planning and implementation of KM.

H_0^{31} There is a significant correlation between change management being regarded as a key Knowledge Management demand driver at the DUT and the institution adapting to external environmental competition in the Higher Education sector.

TABLE 6.39 CHANGE MANAGEMENT AS A KEY KNOWLEDGE MANAGEMENT DEMAND DRIVER AT THE DUT AND THE INSTITUTION ADAPTING TO EXTERNAL ENVIRONMENTAL COMPETITION IN THE HIGHER EDUCATION SECTOR (n = 272)

Statements 120 and 23	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	24.173	16	0.07221
Likelihood Ratio	19.671	16	0.08298
Linear-by-Linear Association	9.204	1	0.08328
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.6184		

* Pearson's Chi-Square = 24.173, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.6184, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.39 reveals that both the Pearson's Chi-Square test result ($p > 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s < 0.7$) produced a non-significant result. The Pearson's Chi-Square value of 24.173 is less than the χ^2 cut-off value of 26.296, whilst the Spearman's Rank Order Correlation Co-efficient of 0.6184 is less than the r_s cut-off value of 0.7. As depicted in Table 6.39, the test statistics show that there is no significant relationship between change management being regarded as a key KM demand driver at the DUT and the institution adapting to the external environmental competition in the HE sector, hence the hypothesis is rejected. This result is concurrent with the research conducted by Jacobs (2008:877), who investigated the impact of change management as a KM demand driver, in assisting South African HE institutions to adapt to the highly competitive HE sector environment. Jacobs (2008:880) concluded that there was no significant relationship between incorporating change management as a KM demand driver in the South African HE sector to ensure that an institution is well equipped to deal with the ever-evolving competitive HE environment. According to Jacobs (2008:880), the competitive nature of the South African HE environment has undergone such rapid changes in the past two decades that HE institutions find it challenging to align change management with the evolving competitive environment.

6.8.3 Section 3: Intellectual Capital

Analysis of Hypothesis Testing of Intellectual Capital linked to the Exploratory Framework at the DUT

The Pearson's Chi-Square test result and the Spearman's Rank Order Correlation Co-efficient test were selected to test the relationships between Section 3 of the Exploratory Framework (Figure 4.1) and Sections 1 and 2. In addition, for this analysis the Quade Test statistic was used to determine the significant importance perceived by the two independent sample groups, namely, the Academic sample respondents and the Administrative sample respondents, for each of the four parts of Section 3 of the Framework (Figure 4.1).

H_0^{32} There is a significant relationship between Intellectual Capital at the DUT and monitoring the external Higher Education environment in which the institution operates.

TABLE 6.40 INTELLECTUAL CAPITAL AT THE DUT AND MONITORING THE EXTERNAL ENVIRONMENT IN WHICH THE INSTITUTION OPERATES (n = 272)

Statements 61 and 26	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	50.914	16	0.00899
Likelihood Ratio	46.104	16	0.00121
Linear-by-Linear Association	13.545	1	0.00139
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8217		

* Pearson's Chi-Square = 50.914, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8217, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.40 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient result ($r_s > 0.7$) are very highly significant for the hypothesis tested. There was a very highly significant

relationship between IC and monitoring the external HE environment in which the DUT operates. The results in Table 6.40 are reinforced by research findings conducted by Javadein, Ramazani and Keshavarzi (2013:545), who investigated the implementation of IC at HE institutions in India and the value of monitoring the external environment in which the institutions operates. Javadein, *et al.* (2013:546) reported that those HE institutions that integrated IC and the external environmental factors reported a significantly higher success rate with the implementation of IC.

H_0^{33} There is a significant correlation between Intellectual Capital and Knowledge Management drivers at the institution.

TABLE 6.41 INTELLECTUAL CAPITAL AND KNOWLEDGE MANAGEMENT DRIVERS AT THE DUT (n = 272)

Statements 61 and 26	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	37.283	16	0.00032
Likelihood Ratio	34.826	16	0.00021
Linear-by-Linear Association	3.664	1	0.00039
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.7519		

* Pearson's Chi-Square = 37.283, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.7519, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.41 reveals that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) produced significant results. The results showed that there was a significant correlation between IC and KM drivers at the DUT. The results in Table 6.41 are supported by research findings reported by McIntyre, Dalkir, Paul and Kitambo (2015:13), who found that the implementation of IC in the Canadian HE environment was supported by the identification and monitoring of KM drivers.

Similar findings have also been reported by Easterbury-Smith and Lyles (2011:90), who conducted research at both public and private HE institutions in the United Kingdom. The researchers reported that HE institutions perceived the monitoring of IC to be less time consuming when KM drivers were monitored and incorporated into strategic planning.

In addition to the Pearson's Chi-Square test result and the Spearman's Rank Order Correlation Co-efficient, the Quade Test statistic was selected as a non-parametric test to determine whether the two independent sample groups regarded five or less items as being significantly similar in importance or dissimilar to an independent variable (Gorard, 2006:69). The Quade Test statistic (Table 6.42) was calculated for each of the four parts of Section 3: The Intellectual Capital of the Exploratory Framework (Figure 4.1), namely, Learning and Growth Perspective, Internal Perspective, Customer Perspective and Financial Perspective, were tested by computing the analysis of the two independent sample groups in the study (Academic sample respondents and the Administrative sample respondents). When the Quade Test statistic is $F > 1.96$ at $p < 0.05$, it indicated that the two independent sample groups reported a significant difference of importance for a selected item, whilst the Quade Test statistic of $F < 1.96$ ($p > 0.05$) showed that the two independent sample groups agreed on the importance of the selected item (De Leeuw, 2005:241).

TABLE 6.42 THE QUADE TEST FOR SECTION 3: INTELLECTUAL CAPITAL OF THE EXPLORATORY FRAMEWORK (n = 272)

Part of Section 3: Intellectual Capital	Statements	T^1	T^2	F test (*F*)	Likelihood ratio	Asymp. Sig. (2-sided)
Part 1: Learning and Growth Perspective	52	118	154	3.824	1.221	0.01671
Part 2: Internal Perspective	44	118	154	1.841	1.873	0.24333
Part 3: Customer Perspective	9	118	154	1.901	1.752	0.61524
Part 4: Financial Perspective	86	118	154	3.737	1.009	0.00322

* Quade Test cut-off parameter ($F > 1.96$ at $p < 0.05$); T^1 = Academic staff; T^2 = Administrative staff

Table 6.42 shows the results for the Quade Test for the four parts of Section 3 of the Exploratory Framework (Figure 4.1). The Quade Test statistic for Part 1, namely, the Learning and Growth Perspective of Section 3 of the Framework, revealed that there was a highly significant difference of importance reported between the two independent sample groups, namely, the Academic sample respondents (T^1) and the Administrative sample respondents (T^2) at $F > 1.96$ at $p < 0.05$. Similarly, the Quade Test statistic for Part 4, namely, the Financial Perspective of Section 3 of the Exploratory Framework, revealed a similar finding at $F > 1.96$ at $p < 0.05$. Therefore, Table 6.42 shows a highly significant difference of importance reported by both the Academic sample respondents (T^1) and the Administrative sample respondents (T^2) for Part 1 (Learning and Growth Perspective) and Part 4 (Financial Perspective) of Section 3 of the Exploratory Framework. These results shown in Table 6.42 are in concordance with the research findings reported by Mazutis and Slawinski (2008:445), who conducted a study on the implementation of IC at private HE institutions in Germany. The researchers found that there was a significant difference in the importance associated with the Learning and Growth Perspective and the Financial Perspective of IC amongst Academic and Administrative staff respectively.

Academic staff associated greater importance to the Learning and Growth Perspective, whilst Administrative staff perceived the Financial Perspective to be of greater value to the institution. Similar research findings have been reported in the South African context by Ramaligela and Moletsane (2013:149), who investigated the Learning and Growth Perspective and the Financial Perspective of IC at selected HE institutions. The researchers reported a significant difference between Academic and Administrative staff pertaining to the importance that they assigned to the indicators relating to the Learning and Growth Perspective and the Financial Perspective of IC. Ramaligela and Moletsane (2013:150) found that during IC monitoring more attention should be paid to address the different functions of Academic and Administrative staff at a HE institution in order for IC to be implemented successfully.

The Quade Test statistics (Table 6.42) for Part 2: Internal Perspective and Part 3: Customer Perspective for Section 3 of the Exploratory Framework (Figure 4.1) revealed insignificant results for both the Academic sample respondents (T^1) and the Administrative sample respondents (T^2) at $F < 1.96$ at $p > 0.05$. Therefore, both the Academic and Administrative respondents regarded the Internal Perspective and the Customer Perspective of Section 3 of Exploratory Framework to be of moderate importance. Research conducted by Acemoglu, Egorov and Sonin (2010:1534) on the Internal Perspective and the Customer Perspective of IC at selected HE institutions in Sub-Sahara Africa reported similar findings, namely, that both Academics and Administrative staff regarded these two perspectives to be of equal importance when monitoring IC at the institutions.

6.8.4 Section 4: Institutional Strategy

Analysis of Hypothesis Testing of Institutional Strategy related to the Exploratory Framework at DUT

The Pearson's Chi-Square test result and the Spearman's Rank Order Correlation Co-efficient test were selected to determine the relationship between Section 4: Institutional Strategy and Section 3: Intellectual Capital of the Exploratory Framework (Figure 4.1).

H_0^{34} There is a significant relationship between institutional strategy and Intellectual Capital at the DUT.

TABLE 6.43 INSTITUTIONAL STRATEGY AND INTELLECTUAL CAPITAL AT THE DUT (n = 272)

Statements 59 and 53	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	46.201	16	0.00943
Likelihood Ratio	42.944	16	0.00432
Linear-by-Linear Association	13.102	1	0.00003
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8419		

* Pearson's Chi-Square = 46.201, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8419, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.43 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s > 0.7$) are highly significant for the hypothesis tested. There is a highly significant relationship between institutional strategy at the DUT and IC. The results in Table 6.43 are supported by research findings reported by Fitzgerald (2014:109), who investigated the integration of IC when developing institutional strategies at four HE institutions in the United States of America, namely, at the University of New York, Cornell University, Princeton University and .the University of Pennsylvania. Fitzgerald (2014:110) found that at those HE institutions where

IC and institutional strategy were integrated during the institutional strategic planning processes, respondents reported that the implementation of IC was faster and resulted in greater acceptance amongst staff.

The researcher also conducted the Wald-Wolfowitz bi-variate runs test, which is a non-parametric statistical test to contrast the mean statistic of two independent sample groups to determine the perceived value for the selected variables of interest (De Leeuw, 2005:240). The two independent sample groups, namely, the Academic Staff and the Administrative Staff, were compared to establish whether the sample respondents in each group regarded the relationships between selected variables to be mutually dependent or independent.

The variables selected in the Wald-Wolfowitz bi-variate runs test were the five components identified in Section 4: Institutional Strategy of the Exploratory Framework (Figure 4.1), namely, KM audits, Institutional Strategic Plan, KM strategy, KM implementation processes and KM workers. Each of the five components were compared to institutional strategy, which various South African researchers such as Muller (2006:203), Sirayi and Nawa (2014:1648) and Wilson-Strydom (2014:65) regard as the primary focus area when planning to implement KM and IC in a HE institution. The statistical results for the Wald-Wolfowitz bi-variate runs tests for these five components are presented and discussed below by way of hypothesis testing.

H_0^{35} There is a mutually dependent relationship between institutional strategy at the DUT and Knowledge Management audits.

TABLE 6.44 INSTITUTIONAL STRATEGY AT THE DUT AND KNOWLEDGE MANAGEMENT AUDIT (n = 272)

Statements 59 and 27	Value n^1	Value n^2	Cases
Mean (μ)	2.954	2.763	
Standard deviation (σ^2)	2.655	2.329	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 2.954, Wald-Wolfowitz bi-variate runs test n^2 = 2.763; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.44 shows that both independent sample groups reported at Z > 1.96 that there was no mutual dependency between institutional strategy at the DUT and KM audits. The mean test statistic (μ = 2.954) for the Academic sample respondents (n^1) was more than the Z test statistic cut-off value of 1.96. Similarly, the mean test (μ = 2.763) for the Administrative sample respondents (n^2) was also higher than the Z test cut-off value of 1.96. Both the Academic independent sample respondents (n^1) and the Administrative independent sample respondents (n^2) reported that institutional strategy was not dependent upon conducting KM audits. Furthermore, the reported standard deviation (σ^2 = 2.655) for the Academic sample respondents (n^1) was significantly closer to the mean (μ = 2.965) than that of the Administrative sample respondents (n^2), which indicates that the responses of the Academic sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. Various authors emphasise the value of KM audits when conducting institutional planning such as Radaelli, Mura, Spiller and Lettieri (2011:344) and Dlamini and Adams (2014:127). However, research conducted by Mohaeka and Mahao (2015:47) found that employees often could not fathom the value of KM audits, since most institutions failed to conduct these KM audits on a regular basis. Mohaeka and Mahao (2015:48) also concluded that employees did not associate KM audits with the development of the institutional strategy due to a lack of communication from top management.

H_0^{36} There is a mutually dependent relationship between institutional strategy at the DUT and institutional strategic plans.

TABLE 6.45 INSTITUTIONAL STRATEGY AT THE DUT AND INSTITUTIONAL STRATEGIC PLANS (n = 272)

Statements 59 and 37	Value n^1	Value n^2	Cases
Mean (μ)	1.435	1.487	
Standard deviation (σ^2)	1.401	1.399	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 1.435, Wald-Wolfowitz bi-variate runs test n^2 = 1.487; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.45 highlights that the mean test results for both independent sample groups, namely, the Academic sample respondents (n^1) and the Administrative sample respondents (n^2) showed a mutually dependent relationship (Z < 1.96 at p < 0.05) between institutional strategy at the DUT and institutional strategic plans. The standard deviation (σ^2 = 1.401) for the Academic sample respondents (n^1) was significantly close to the mean (μ = 1.435) indicating that the responses for this group were highly consistent with the mean. The standard deviation (σ^2 = 1.399) and the mean (μ = 1.487) for the Administrative sample respondents (n^2) reflected similar results. The results shown in Table 6.45 are reinforced by research conducted by Dumay (2009:495), who investigated the acceptance of institutional strategic plans amongst different levels of institutional staff at selected HE institutions in the United Kingdom. Dumay (2009:495) concluded that at those institutions where a clear alignment was reported between institutional strategy and institutional plans, top management reported a higher success rate when implementing strategic plans across the institution and at different campuses.

H_0^{37} There is a mutually dependent relationship between institutional strategy and Knowledge Management strategy at the DUT.

TABLE 6.46 INSTITUTIONAL STRATEGY AT THE DUT AND KNOWLEDGE MANAGEMENT STRATEGY (n = 272)

Statements 59 and 36	Value n^1	Value n^2	Cases
Mean (μ)	1.921	1.474	
Standard deviation (o^2)	1.833	1.093	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 1.921, Wald-Wolfowitz bi-variate runs test n^2 = 1.474; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.46 displays the mean test results for both independent sample groups, namely, the Academic sample respondents (n^1) and the Administrative sample respondents (n^2) and shows a mutually dependent relationship (Z < 1.96 at p < 0.05) between institutional strategy at the DUT and KM strategy. The reported standard deviation (o^2 = 1.833) for the Academic sample respondents (n^1) was significantly closer to the mean (μ = 1.921) than that of the Administrative sample respondents (n^2), which indicates that the responses of the Academic sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. These results are concurred with research findings reported by Van der Walt, Potgieter and Wolhuter (2013:49) on the value of integrating KM strategies with the institutional strategy in the South African HE environment. Van der Walt, *et al.* (2013:50) also found that Academic staff were more supportive towards the need to integrate KM strategies and institutional strategies than the Administrative staff. The researchers also found that Academic staff perceived an integrated strategy as more effective than a stand-alone institutional strategy and KM strategy, while Administrative staff regarded the institutional strategy and the KM strategy to be embedded (Van der Walt, *et al.,* 2013:51).

H_0^{38} There is a mutually dependent relationship between institutional strategy at the DUT and Knowledge Management implementation processes.

TABLE 6.47 INSTITUTIONAL STRATEGY AND KNOWLEDGE MANAGEMENT IMPLEMENTATION PROCESSES AT THE DUT (n = 272)

Statements 59 and 34	Value n^1	Value n^2	Cases
Mean (μ)	1.851	2.115	
Standard deviation (σ^2)	1.683	1.981	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 1.851, Wald-Wolfowitz bi-variate runs test n^2 = 2.115; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.47 displays that the mean test results for the Academic sample respondents (n^1) show a highly mutual dependent relationship (Z < 1.96 at p < 0.05) between the institutional strategy and KM implementation processes at the DUT. However, the mean test results for Administrative sample respondents (n^2) produced a non-significant result (Z > 1.96) with a reported standard deviation of σ^2 = 1.981 and mean of μ = 2.115. Chissale and Cross (2014:14) conducted research at HE institutions in Mozambique and found that administrative employees reported no difference between KM implementation processes and strategic implementation processes at the relevant HE institutions. However, the academic staff also emphasised the need for institutional strategies and KM strategies to be separated in order to allow staff to evaluate the implementation of KM (Chissale and Cross, 2014:15).

H_0^{39} There is a mutually dependent relationship between institutional strategy and knowledge workers at the DUT.

TABLE 6.48 INSTITUTIONAL STRATEGY AND KNOWLEDGE MANAGEMENT WORKERS AT THE DUT (n = 272)

Statements 59 and 31	Value n^1	Value n^2	Cases
Mean (μ)	2.339	2.588	
Standard deviation (σ^2)	2.104	1.831	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 2.339, Wald-Wolfowitz bi-variate runs test n^2 = 2.588; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (Z < 1.96 at p < 0.05)

Table 6.48 shows that both independent sample groups reported at Z > 1.96 that there was no mutual dependency between the institutional strategy at the DUT and knowledge workers. The mean test statistic (μ = 2.339) for the Academic sample respondents (n^1) was more than the Z test statistic cut-off value of 1.96. Similarly, the mean test (μ = 2.588) for the Administrative sample respondents (n^2) was also higher than the Z test cut-off value of 1.96. Both the Academic sample respondents (n^1) and the Administrative sample respondents (n^2) reported that the institutional strategy is not dependent upon knowledge workers. Notably, the reported standard deviation (σ^2 = 2.104) for the Academic sample respondents (n^1) was significantly closer to the mean (μ = 2.339) than that of the Administrative sample respondents (n^2), which indicates that the responses of the Academic sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. The results in Table 6.48 correspond with research conducted by Chauraya (2014:11) on the perceptions of staff at selected HE institutions in India on the value and contribution that knowledge workers make towards the institutions achieving their objectives. Chauraya (2014:12) found that the term knowledge worker was generally unfamiliar amongst both academic and administrative staff. Similar findings were reported by Davenport (2013:15), who found that in the United Kingdom, the top management from various HE institutions failed to reinforce the value and importance of developing and recognising KM workers as contributing directly towards the institutional strategy.

6.8.5 Section 5: Knowledge Management Enablers
Analysis of Hypothesis Testing of Knowledge Management Enablers linked to the Exploratory Framework at DUT

The Pearson's Chi-Square test result and the Spearman's Rank Order Correlation Co-efficient were selected to test the relationships between Section 4 and Section 5 of the Exploratory Framework (Figure 4.1).

H_0^{40} There is a significant relationship between Knowledge Management enablers at the DUT and the institutional strategy.

TABLE 6.49 KNOWLEDGE MANAGEMENT ENABLERS AT THE DUT AND THE INSTITUTIONAL STRATEGY (n = 272)

Statements 44 and 59	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	44.019	16	0.00054
Likelihood Ratio	42.604	16	0.00032
Linear-by-Linear Association	9.139	1	0.00012
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8387		

* Pearson's Chi-Square = 44.019, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8387, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.49 shows that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient result ($r_s > 0.7$) are highly significant. There is a highly significant relationship between KM enablers and the institutional strategy at the DUT. Ponnuswamy and Manohar (2014:8) conducted research on the impact of KM enablers on the successful implementation of institutional strategies in the Indonesian HE sector. The researchers found that those institutions where KM enablers were emphasised, the respondents reported that the institutional strategy was well received amongst staff.

In addition, the Quade Test statistic (Table 6.50) was used to determine the significant difference of importance perceived by the two independent sample groups, namely, the Academic sample respondents and the Administrative sample respondents, for each of the three components of Section 5: Knowledge Management Enablers of the Exploratory Framework (Figure 4.1), namely, the Leadership and Management component, the Institutional Culture component and the Technological Infrastructure component. As explained by De Leeuw (2005:241), a Quade Test statistic of $F > 1.96$ at $p < 0.05$ indicates that the two independent sample groups reported a significant difference of importance for a selected item, whilst the Quade Test statistic of $F < 1.96$ ($p > 0.05$) indicates that the two independent sample groups agreed on the importance of the selected item.

TABLE 6.50 THE QUADE TEST FOR SECTION 5: KNOWLEDGE MANAGEMENT ENABLERS OF THE FRAMEWORK (n = 272)

Component of Section 5: Knowledge Management Enablers	Statements	T^1	T^2	F test (*F*)	Likelihood ratio	Asymp. Sig. (2-sided)
Leadership and Management	125	118	154	1.943	1.932	0.8182
Institutional Culture	114	118	154	3.234	3.097	0.0045
Technological Infrastructure	60	118	154	1.634	2.032	0.3445

* Quade Test cut-off parameter ($F > 1.96$ at $p < 0.05$); T^1 = Academic staff; T^2 = Administrative staff

Table 6.50 shows the results for the Quade Test for the three components of Section 5: Knowledge Management Enablers of the Exploratory Framework (Figure 4.1). The Quade Test statistic for two components, namely, Leadership and Management and Technological Infrastructure, in Section 5 of the Exploratory Framework (Figure 4.1) revealed insignificant results ($F < 1.96$ at $p > 0.05$). Both the Academic sample respondents (T^1) and the Administrative

sample respondents (T^2) agreed that Leadership and Management, as well as Technological Infrastructure, were of similar importance as KM enablers at the DUT. These findings are similar with the research conducted by Muller (2012:19) on the perceptions of staff at HE institutions on the contribution that leadership and management plays towards enabling KM at technical colleges in Namibia. Muller's (2012:20) findings revealed that at those HE institutions where leadership and management emphasised KM, the successful implementation thereof was reported by the respondents. However, at institutions where the leadership and management cadre took KM for granted, the respondents indicated less commitment towards the implementation of KM (Muller, 2012:21).

The Quade Test statistic for Institutional Culture revealed a highly significant difference of importance ($F > 1.96$ at $p < 0.05$) amongst both the Academic sample respondents (T^1) and the Administrative sample respondents (T^2) respectively. These results are similar to the research findings reported by Brewer and Brewer (2010:332), who investigated the perceived contribution of institutional culture as a KM enabler in the HE sector of the Netherlands. Brewer and Brewer (2010:332) found that since institutional culture is multi-faceted, respondents disagreed on the significance thereof as a KM enabler. Similar findings were also reported by Dima (2014:134), who conducted a longitudinal study pertaining to institutional culture as a KM enabler in selected HE institutions in Switzerland, Italy, Germany and Spain.

6.8.6 Section 6: Strategic Human Resource Management

Analysis of Hypothesis Testing of Strategic Human Resource Management linked to the Exploratory Framework at DUT

The Pearson's Chi-Square test result and the Spearman's Rank Order Correlation Co-efficient were selected to test the relationships between Section 6, Strategic Human Resource Management (SHRM) and Section 4, Institutional Strategy, in the Exploratory Framework (Figure 4.1).

H_0^{41} There is a significant correlation between Strategic Human Resource Management at the DUT and the institutional strategy.

TABLE 6.51 STRATEGIC HUMAN RESOURCE MANAGEMENT AT THE DUT AND THE INSTITUTIONAL STRATEGY (n = 272)

Statements 124 and 59	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	52.933	16	0.00109
Likelihood Ratio	45.509	16	0.00087
Linear-by-Linear Association	3.658	1	0.00001
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.8416		

* Pearson's Chi-Square = 52.933, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.8416, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.51 highlights that both the Pearson's Chi-Square test result ($p < 0.05$) and the Spearman's Rank Order Correlation Co-efficient result ($r_s > 0.7$) are very highly significant. There is a highly significant correlation between SHRM and the institutional strategy at the DUT. These results are supported with research conducted by Divala (2014:1959) on the contribution of Strategic Human Resource Management (SHRM) towards the institutional strategy of South African HE institutions. Divala (2014:1960) reported that respondents emphasised the value of integrating SHRM with the institutional strategy. Similarly, Mouton (2010:3) reported that since the mergers of various South African HE institutions, the contribution of SHRM has become more important

when HE institutions plan and implement their institutional strategies. Mouton (2010:10) emphasised the value of SHRM to ensure that the HE institution had sufficient Human Capital (HC) to meet its academic and administrative needs.

The researcher also conducted the Wald-Wolfowitz bi-variate runs test on selected variables in Section 6, namely, policy planning, business partnering and two-way communication when compared to SHRM. The two independent sample groups, namely, the Academic Staff and the Administrative Staff, were compared to establish whether the sample respondents in each group regarded the relationships between these selected variables to be mutually dependent or independent.

H_0^{42} There is a mutually dependent relationship between Strategic Human Resource Management at the DUT and policy planning.

TABLE 6.52 STRATEGIC HUMAN RESOURCE MANAGEMENT AT THE DUT AND POLICY PLANNING (n = 272)

Statements 124 and 117	Value n^1	Value n^2	Cases
Mean (μ)	2.209	2.387	
Standard deviation (σ^2)	2.092	2.118	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 2.209, Wald-Wolfowitz bi-variate runs test n^2 = 2.387; Cut-off parameter: Wald-Wolfowitz bi-variate runs test ($Z < 1.96$ at $p < 0.05$)

Table 6.52 shows that both independent sample groups reported at Z > 1.96 that there was no mutual dependency between the SHRM at the DUT and policy planning. The mean test statistic (μ = 2.209) for the Academic sample

respondents (n^1) was more than the *Z* test statistic cut-off value of 1.96. Similarly, the mean test (μ = 2.387) for the Administrative sample respondents (n^2) was also higher than the *Z* test cut-off value of 1.96. Both the Academic sample respondents (n^1) and the Administrative sample respondents (n^2) reported that SHRM is not dependent upon policy planning. The standard deviation (o^2 = 2.092) for the Academic sample respondents (n^1) was close to the mean (μ = 2.209) indicating that the responses for this group were moderately consistent with the mean. The standard deviation (o^2 = 2.118) and the mean (μ = 2.387) for the Administrative sample respondents (n^2) reflected similar results. These findings correspond with research conducted by Bedell, Floyd, Nicols and Ellis (2007:51), who investigated the relationship between SHRM and policy development in selected HE institutions in the USA. Bedell, *et al.* (2007:52) found that policy planning and development was driven by government legislation, which allowed for minimal consideration of SHRM at these selected HE institutions in the USA.

H_0^{43} There is a mutually dependent relationship between Strategic Human Resource Management at the DUT and the Human Resource Management department being regarded as a business partner.

TABLE 6.53 STRATEGIC HUMAN RESOURCE MANAGEMENT AT THE DUT AND HUMAN RESOURCE MANAGEMENT DEPARTMENT BEING REGARDED AS A BUSINESS PARTNER (n = 272)

Statements 124 and 123	Value n^1	Value n^2	Cases
Mean (μ)	1.931	1.857	
Standard deviation (o^2)	1.633	1.298	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test n^1 = 1.931, Wald-Wolfowitz bi-variate runs test n^2 = 1.857; Cut-off parameter: Wald-Wolfowitz bi-variate runs test (*Z* < 1.96 at p < 0.05)

Table 6.53 displays that the mean test results for both independent sample groups, namely, the Academic sample respondents (n^1) and the Administrative sample respondents (n^2) showed a mutually dependent relationship ($Z < 1.96$ at $p < 0.05$) between SHRM at the DUT and the HRM department being regarded as a business partner at the institution. The reported standard deviation ($\sigma^2 = 1.633$) for the Academic sample respondents (n^1) was significantly closer to the mean ($\mu = 1.931$) than that of the Administrative sample respondents (n^2), which indicates that the responses of the Academic sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. These results are similar to the research findings reported by Nyamupangedengu (2014:2072) on the HE sector of Botswana. Nyamupangedengu (2014:2073) conducted a comparative study between selected HE institutions in Botswana where HRM departments were regarded as business partners as opposed to those institutions where HRM departments were perceived as administrative departments. Nyamupangedengu (2014:2073) found that the success of SHRM was dependent upon the HRM department being regarded as a business partner by both top management and employees at the selected HE institutions.

H_0^{44} There is a mutually dependent relationship between Strategic Human Resource Management at the DUT and two-way communication at the institution.

TABLE 6.54 STRATEGIC HUMAN RESOURCE MANAGEMENT AND TWO-WAY COMMUNICATION AT THE DUT (n = 272)

Statements 124 and 35	Value n^1	Value n^2	Cases
Mean (μ)	1.686	1.762	
Standard deviation (σ^2)	1.285	1.693	
Number of Runs (maximum 10)	5	5	
***Z* (confidence interval p < 0.05)**	1.96	1.96	
N of Valid Cases	118	154	
Total Valid Cases (n^1+n^2)			272

* Wald-Wolfowitz bi-variate runs test $n^1 = 1.686$, Wald-Wolfowitz bi-variate runs test $n^2 = 1.762$; Cut-off parameter: Wald-Wolfowitz bi-variate runs test ($Z < 1.96$ at $p < 0.05$)

Table 6.54 highlights that the mean test results for both independent sample groups show a mutually dependent relationship ($Z < 1.96$ at $p < 0.05$) between SHRM and two-way communication at the DUT. The computed standard deviation ($\sigma^2 = 1.693$) for the Administrative sample respondents (n^2) was significantly closer to the mean ($\mu = 1.762$) than that of the Academic sample respondents (n^1), which indicates that the responses of the Administrative sample respondents were found to be more consistent in the Wald-Wolfowitz bi-variate runs test. These results are consistent with the research findings reported by Salim and Sulaiman (2011:120) on the importance of two-way communication to reinforce SHRM in selected Malaysian organisations.

6.8.7 Section 7: Human Capital Scorecard

Analysis of the Hypothesis Testing of the Human Capital Scorecard related to the Exploratory Framework at DUT

The Pearson's Chi-Square test result and the Spearman's Rank Order Correlation Co-efficient were selected to test the relationships between Section 7, Human Capital Scorecard, and Section 6, SHRM, in the Framework (Figure 4.1).

H_0^{41} There is a significant relationship between the Human Capital Scorecard at the DUT and Strategic Human Resource Management.

TABLE 6.55 HUMAN CAPITAL SCORECARD AT THE DUT AND STRATEGIC HUMAN RESOURCE MANAGEMENT (n = 272)

Statements 72 and 124	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	24.273	16	0.09337
Likelihood Ratio	19.863	16	0.09921
Linear-by-Linear Association	5.207	1	0.00021
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.6322		

* Pearson's Chi-Square = 24.273, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.6322, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.55 reveals that both the Pearson's Chi-Square test result ($p > 0.05$) and the Spearman's Rank Order Correlation Co-efficient ($r_s < 0.7$) produced a non-significant result. The Pearson's Chi-Square value of 24.273 is less than the χ^2 cut-off value of 26.296, whilst the Spearman's Rank Order Correlation Co-efficient of 0.6322 is less than the r_s cut-off value of 0.7. Therefore, it may be deduced that there is no significant relationship between the HC Scorecard at the DUT and SHRM. The results depicted in Table 6.55 correspond with the research findings presented by Stumpf (2010:5) on the effectiveness of the HC Scorecard as a SHRM tool in the HE sector in selected Sub-Sahara African countries. Stumpf (2010:5) reported that the HC Scorecard was very seldom used effectively in the HE sector, due to the complexities in measuring HC. Similar research findings were reported by Bennet and Bennet (2014:42), who concluded that HE institutions in New Zealand repeatedly steered away from using the HC scorecard as a SHRM tool, since the reported job profiles of academic and administrative staff were difficult to measure.

In the Exploratory Framework for the DUT (Figure 4.1), the HC Scorecard (Section 7) recognises both academic and support staff at the institution. The Quade Test statistic (Table 6.56) was used to determine the significant importance perceived by the two independent sample groups, namely, the Academic sample respondents and the Administrative sample respondents (support staff), for each of the four components of Section 7: HC Scorecard of the Exploratory Framework (Figure 4.1), namely, leverage knowledge to improve quality and performance, create the long term value of knowledge held by employees, develop a learning institution focusing on competencies and life-long learning, and develop a workforce mind-set to promote KM. When the Quade Test statistic is $F > 1.96$ at $p < 0.05$, it indicates that the two independent sample groups, namely, the Academic sample group and the Administrative sample group, reported a significant difference of importance for a selected item, whilst the Quade Test statistic of $F < 1.96$ ($p > 0.05$) showed that the two independent sample groups agreed on the importance of the selected item (De Leeuw, 2005:241).

TABLE 6.56 THE QUADE TEST FOR THE COMPONENTS RELATED TO THE HUMAN CAPITAL SCORECARD OF THE EXPLORATORY FRAMEWORK (n = 272)

Component of Section 7: Human Capital Scorecard	Statement	T^1	T^2	F test (*F*)	Likelihood ratio	Asymp. Sig. (2-sided)
Leverage knowledge to improve quality and performance	91	118	154	1.902	1.879	0.0781
Create long term value of knowledge held by employees	116	118	154	1.493	1.302	0.5862
Develop a learning institution focusing on competencies and life-long learning	109	118	154	1.232	1.022	0.6016
Develop a workforce mind-set to promote KM	120	118	154	1.063	1.008	0.7829

* Quade Test cut-off parameter ($F > 1.96$ at $p < 0.05$); T^1 = Academic staff; T^2 = Administrative staff

Table 6.56 shows the results for the Quade Test for the four components of Section 7 of the Exploratory Framework (Figure 4.1). The Quade Test statistic for all four components in Section 7 of the Framework (Figure 4.1) revealed highly significant results of $F < 1.96$ at $p > 0.05$. Both the Academic sample respondents (T^1) and the Administrative sample respondents (T^2) reported that all four components had a significant difference of importance when implementing the HC Scorecard at the DUT. The findings revealed that the two independent sample groups felt very strongly that the components of the HC scorecard as shown in Section 7 of the Exploratory Framework (Figure 4.1) should be adapted based on the nature of the two independent sample groups, namely, the Academic sample group (T^1) and the Administrative sample group (T^2) respectively. These findings are consistent with a longitudinal study conducted by Stevenson and Bauer (2014:14) on the implementation of the HC Scorecard at four selected HE institutions in the United States of America.

The researchers found that the successful implementation of the HC Scorecard required an adaptive approach since the job profiles and functions of academic and administrative staff in the HE sector were different. Stevenson and Bauer (2014:15) also reported that at HE institutions where a one size fits all approach was used for the HC Scorecard, the respondents indicated that the HC Scorecard was perceived as a punitive HRM tool.

6.8.8 Analysis of the Components of the Human Capital Wheel of the Exploratory Framework with Formulated Hypotheses

The Pearson's Chi-Square test result and the Spearman's Rank Order Correlation Co-efficient were selected to test the relationships between Human Resources Information Systems (HRIS) and the availability of HR policies and procedures in the inner-hub of the Human Capital Wheel in the Framework (Figure 4.1).

H_0^{42} There is a significant correlation between Human Resource Information Systems at the DUT and the availability of Human Resource policies and procedures.

TABLE 6.57 HUMAN RESOURCE INFORMATION SYSTEMS AT DUT AND AVAILABILITY OF HUMAN RESOURCE POLICIES AND PROCEDURES (n = 272)

Statements 48 and 51	Value	df	Asymp. Sig. (2-sided)
Pearson's Chi-Square	23.118	16	0.09453
Likelihood Ratio	21.221	16	0.09988
Linear-by-Linear Association	4.801	1	0.00009
χ^2	26.296		
N of Valid Cases	272		
Spearman's Rank Order Correlation Co-efficient	0.6173		

* Pearson's Chi-Square = 23.118, df = 16, Cut-off parameter: Pearson's Significance ($p < 0.05$); Spearman (r_s) = 0.6173, Cut-off parameter: Spearman Significance ($r_s > 0.7$)

Table 6.57 reveals that both the Pearson's Chi-Square test result ($p > 0.05$) and the Spearman's Rank Order Correlation Co-efficient result ($r_s < 0.7$) produced a non-significant result. The Pearson's Chi-Square value of 23.118 is less than the χ^2 cut-off value of 26.296, whilst the Spearman's Rank Order Correlation Co-efficient of 0.6173 is less than the r_s cut-off value of 0.7. Therefore, it may be deduced that there is no significant correlation between the HRIS at the DUT and the availability of HR policies and procedures. The results depicted in Table 6.57 correspond with research findings presented by Mohope (2014:1994) on the effective and efficient utilisation of HRIS in the South African HE sector. Mohope (2014:1995) found that in the South African HE sector there was a lack of efficient use of HRIS. Similarly, Gcaza and Urban (2014:24) conducted research on the accessibility of HR policies and procedures and found that in the South African HE sector employees reported that HR policies and procedures were difficult to access via the institution's HRIS.

The outer-hub of the HC Wheel (Figure 4.1) consists of circular configurations of two levels. Level One, which contains eight prominent spokes of the HC Wheel, namely, rules, values, symbols, norms, empower, ethics, attitudes and beliefs. Each of the Level One outer-hub of the HC Wheel (Figure 4.1) is directly connected to Level Two, which contains the HRM activities that are required to successfully implement KM and IC at the DUT.

The researcher conducted the Friedman Two-way analysis of Variance by Ranks statistical test on Level One of outer-hub of the Human Capital wheel in Exploratory Framework (Figure 4.1). The purpose of this non-parametric statistical test was two-folded, namely, to determine the concordance (agreement) or discordance (disagreement) between the two independent sample groups when more than five items are listed and to provide the ranking of the items (Giovanni, 2005:124). The Friedman test statistic of $X^2(2) < 2.89$ at $p < 0.05$ as depicted in Table 6.58 indicates that both independent sample groups were in concordance on the importance of the selected item, whilst $X^2(2) > 2.89$ represents discordance with the importance of the item. According to Giovanni (2005:125), the results of the Friedman Two-way analysis of

Variance by Ranks statistical test can also be used to determine the importance that the two independent sample groups assigned to each item by conducting the *F* Crit - Value (*F* Crit < 1) that has a range between 0 and 1. A statistical range closer to zero indicates that the two independent sample groups ranked the item higher than a selected response rate closer to 1.

TABLE 6.58 FRIEDMAN TWO-WAY ANALYSIS OF VARIANCE BY RANKS FOR LEVEL ONE ITEMS OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Level One - Outer-Hub Spokes	Statements	K^1	K^2	df	*F* Crit - Value (R 0-1)	$X^2(2)$ (Upper Tail test)	Asymp. Sig. (2-sided)
Spoke A: Rules	103	118	154	2	0.0309	2.732	0.0051
Spoke B: Values	114	118	154	2	0.0659	2.981	0.0788
Spoke C: Symbols	13	118	154	2	0.0287	2.709	0.0023
Spoke D: Norms	126	118	154	2	0.0202	2.642	0.0031
Spoke E: Empower	78	118	154	2	0.0722	3.021	0.0861
Spoke F: Ethics	121	118	154	2	0.0896	3.224	0.0971
Spoke G: Attitude	67	118	154	2	0.0836	3.121	0.0854
Spoke H: Beliefs	79	118	154	2	0.0533	2.973	0.0742

* Friedman Two-way analysis of Variance by Ranks test statistic ($X^2(2)$); Friedman cut-off parameter ($X^2(2) < 2.89$ at $p < 0.05$); Critical Value to determine ranking (*F* Crit < 1) – Range (R 0-1); df = 2; K^1 = Academic staff; K^2 = Administrative staff

Table 6.58 reveals the results for the Friedman Two-way analysis of Variance by Ranks statistical test for Level One items of the outer-hub of the Human Capital Wheel in the Exploratory Framework (Figure 4.1). The results revealed

that the two independent sample groups, namely, the Academic sample group (K^1) and the Administrative sample group (K^2), were in concordance with three of the eight spokes of Level One of the outer-hub of the Human Capital Wheel ($X^2(2) < 2.89$ at $p < 0.05$), namely, Spoke A: Rules, Spoke C: Symbols and Spoke D: Norms. These results are correlated with a study conducted by Rafaeli and Worline (2000:75) on the impact of organisational culture when implementing HC at selected HE Institutions in Canada. Rafaeli and Worline (2000:75) found that institutional rules, symbols and norms were reported by the respondents as formalised processes at the HE institution. Furthermore, the researchers reported that employees perceived these variables to be the social order and collective expectations of the HE institution over which individuals had insignificant control.

Furthermore, Table 6.58 shows that the two independent sample groups (K^1 and K^2) were in discordance with five of the eight spokes of Level One of the outer-hub of the Human Capital Wheel at $X^2(2) > 2.89$ ($p > 0.05$), namely, Spoke B: Values, Spoke E: Empower, Spoke F: Ethics, Spoke G: Attitude and Spoke H: Beliefs. Research conducted by Rajalakshmi and Wahidabanu (2011:367) on the implementation and monitoring of HC in the HE sector in India, revealed that individual perceptions on variables such as values, ethics and beliefs varied significantly amongst employees based on cultural differences and individual expectations.

The two independent sample groups, namely, the Academic sample group (K^1) and the Administrative sample group (K^2) reported the following ranking based on the *F* Crit - value of the Friedman statistical test presented from the highest ranked item to the lowest ranked item, namely, Spoke D: Norms, followed by Spoke C: Symbols, Spoke A: Rules, Spoke H: Beliefs, Spoke B: Values, Spoke E: Empower, Spoke G: Attitude and Spoke F: Ethics.

The Friedman Two-way analysis of Variance by Ranks statistical test is regarded as an omnibus test, that is, it presents the overall differences, but do not pinpoint which of the two independent sample groups was in greater discordance (Giovanni, 2005:124). In order to address the latter concern, the Wilcoxon Ranked Sum Test was conducted on the discordance items based on the Friedman Two-way analysis of Variance by Ranks statistical test ($X^2(2) > 2.89$ at $p > 0.05$) shown in Table 6.58. The Wilcoxon Rank Sum test statistic cut-off point was 0.0167 at $p < 0.05$. A Wilcoxon Rank Sum test statistic of $W < 0.0167$ indicates the degree of discordance for a selected item for each of the two independent sample groups, namely, the Academic sample group (Q^1) and the Administrative sample group (Q^2). The test statistic for these computations are analysed and shown in Table 6.59 below.

TABLE 6.59 WILCOXON RANK SUM TEST FOR LEVEL ONE OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL FOR THE FIVE DISCORDANCE VARIABLES (n = 272)

Level One - Outer-Hub Spokes (Discordance) (see Table 6.58)	Statements	Independent Sample Groups (Q^1 and Q^2)	Wilcoxon Test statistic ($W < 0.0167$)	Asymp. Sig. (2-sided)
Spoke B: Values	114	Q^1 Q^2	0.0148 0.0096	0.0051 0.0009
Spoke E: Empower	78	Q^1 Q^2	0.0023 0.0097	0.0006 0.0031
Spoke F: Ethics	121	Q^1 Q^2	0.0108 0.0079	0.0089 0.0082
Spoke G: Attitude	67	Q^1 Q^2	0.0091 0.0104	0.0004 0.0024
Spoke H: Beliefs	79	Q^1 Q^2	0.0154 0.0123	0.0083 0.0002

* Wilcoxon Rank Sum Test cut-off parameter ($W < 0.0167$ at $p < 0.05$) Q^1 = Academic staff; Q^2 = Administrative staff

Table 6.59 shows the Wilcoxon Rank Sum test statistics for the degree of discordance items presented by the two independent sample groups, namely, the Academic sample group (Q^1) and the Administrative sample group (Q^2). A higher degree of discordance was reported by the Academic sample group (Q^1) for Spoke E: Empower and Spoke G: Attitude, whist the Administrative sample group (Q^2) reported a higher degree of discordance with Spoke B: Values, Spoke F: Ethics and Spoke H: Beliefs. Although there are differing perspectives between the two independent groups, these results could also be attributed to other situational factors in each HE institution. However, these results correspond with research conducted by Ndlovu (2014:2049) on the adaptation of HRM policies and procedures based on the different functions and roles of the academic and administrative staff in the HE sector.

The Level One outer-hub of the HC Wheel in the Exploratory Framework (Figure 4.1) is directly connected to Level Two, which contains the HRM activities that are required to successfully implement KM and IC at the DUT. In addition to the non-parametric tests applied for other hypotheses tested in the study, the researcher also used the Kendall Rank Correlation Test, commonly referred to as Kendall's tau co-efficient, for statistical analysis of the few remaining components and their respective variables contained within the Exploratory Framework but related to the Level One outer-hub of the Human Capital Wheel with the Level Two outer-hub comprising of the identified item inter connected to each numbered Spoke (Level One) and allowed for hypothesis testing to compute their respective values. The reason for this is that the data was available and it would have been wasted if they were not analysed and reported.

Thus, it should be noted that the researcher conducted further hypotheses testing using the Kendall tau test, simply because the data captured related to both Level One and Level Two of the Outer-hub (i.e. the items that fell under each Spoke) shown in the Human Capital Wheel of the Exploratory Framework (Figure 4.1) as it was on hand. This also included hypothesis testing of the singular items in Level One of the Outer Spoke connected to the variables in Level Two of each spoke in the Exploratory Framework to facilitate further analysis.

For clarity purposes, the Kendall tau co-efficient is a non-parametric hypothesis test for statistical dependence (also referred to as association) based on the tau co-efficient, which is used for two or more independent sample groups. There are three types of tau co-efficient statistical tests, namely, tau-a co-efficient, which is used to determine the dependence for small sample size groups of less than 10 respondents; tau-b co-efficient is used for computing the dependence of large independent sample size groups, whilst tau-c is used to compare the dependence of more than two items (DePoy and Gilson, 2008:103-110). Therefore, the researcher selected the Kendall's tau-b co-efficient to determine the dependence between the items of the Level One outer-hub and the corresponding items shown in Level Two of the outer-hub of the Human Capital Wheel in the Exploratory Framework (Figure 4.1) for the two independent sample groups, namely, the Academic sample group and the Administrative sample group.

Dellinger and Leech (2007:317) emphasise that the purpose of the Kendall tau-b co-efficient test is to investigate the possible association between two variables and therefore the H^0 hypothesis should always state that there is no association between the two variables. Giovanni (2005:131-132) explains that the statistical range for the Kendall tau-b co-efficient is between -1 and 1. When the Kendall tau-b co-efficient produces a positive correlation ($0 < 1$ at $p<$

0.05), it signifies that the ranks of both the variables are increasing. On the other hand, the negative correlation (-1 > 0 at p>0.05) indicates that as the rank of one variable increased, the rank of the other variable decreases. The value of zero indicates the absence of association between the two variables.

The researcher deemed it fit to use this test as this section related to both the independent sample groups (i.e. the academic staff and the administrative staff) in such a manner that the Kendall tau-b test gave meaningful comparable results for both groups. Moreover, each of the Levels and their variables in the Outer Hub were summarised in a numbered table with the hypotheses generated to test for significance as well computing the correlations of the variables contained in each component and their variables. It would have proved a futile exercise to show each hypotheses separately as it would have proved repetitive and too lengthy, since the Kendall tau-b test was used for this section only with the same headings. Thus, using the Kendal tau-b test proved to be a valuable exercise as it produced statistically meaningful results for the variables in each Spoke in the overall analysis of circular Wheel of the Exploratory Framework developed. These summarised results are shown in Tables with the hypotheses formulated. Thus, each of the items in Level One of the Outer-hub was compared to the items of Level Two of the Outer-hub for the Human Capital Wheel in the Exploratory Framework (Figure 4.1) using the Kendall tau-b co-efficient test and are presented below.

TABLE 6.60 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE A: RULES AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke A and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke A (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho^{43} There is no significant association between rules and strategic human resource planning at the DUT	103	123	118	0.0782	154	0.0851	0.00341
Ho^{44} There is no significant correlation between rules and job profiling at the DUT	103	119	118	0.0331	154	0.0226	0.03981
Ho^{45} There is no significant association between rules and job benchmarking at the DUT	103	95	118	-0.0431	154	-0.0226	0.08791
Ho^{46} There is no significant correlation between rules and total remuneration management at the DUT	103	70	118	0.0983	154	0.0912	0.0004

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; T^b = 0 <1 at p < 0.05 indicates positive association / correlation; T^b = -1 > 0 at p > 0.05 indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

Table 6.60 shows the Kendall tau-b Rank Correlation Co-efficient results for Spoke A: Rules of Level One of the outer-hub and the four items in Level Two of the outer-hub, namely, Strategic Human Resource Planning, Job Profiling, Job Benchmarking and Total Remuneration Management, for the Human Capital Wheel (Figure 4.1). The two independent sample groups, namely the Academic sample group (X^1) and the Administrative sample group (Y^1) reported a highly significant association between rules and strategic human resource

planning (SHRM) at the DUT for Hypothesis 43 shown as Ho^{43} in Table 6.60 ($T^b = 0 < 1$ at $p < 0.05$). These results correspond with the research findings of Mostert and Snyman (2007:115), who found that the presence of organisational rules have a positive impact on developing and implementing SHRM.

For Ho^{44} (Hypothesis 44) in Table 6.60 above both independent sample groups reported a moderately significant correlation ($T^b = 0 < 1$ at $p < 0.05$) between rules and job profiling at the DUT. These results are similar to the research findings reported by Mouton (2010:14) on the correlation of institutional rules and job profiling at selected South African universities. According to Mouton (2010:14), if institutional rules were not clearly communicated and implemented, job profiling at the selected South African HE universities then it could lead to role ambiguity if they were not conducted on a regular basis.

Table 6.60 depicts that for Ho^{45} (Hypothesis 45) both the Academic sample group (X^1) and the Administrative sample group (Y^1) reported that there was no significant association between rules and job benchmarking at the DUT. Therefore, the null hypothesis was accepted at $T^b = 0 > 1$ at $p > 0.05$, since both independent sample groups reported a Kendall tau-b statistic test result of less than zero at $p > 0.05$. This result for Ho^{45} is similar to research conducted in the United Kingdom at selected HE institutions where job benchmarking was reported as an uncontrollable variable by the participating HE institutions in the study (Muller, 2012:103-104).

The Kendall tau-b test result at $T^b = 0 < 1$ at $p < 0.05$ for Ho^{46} (Table 6.60) depicts a very highly significant correlation between rules and total remuneration management at the DUT. Both of the independent sample groups, namely, the Academic sample group (X^1) and the Administrative sample group (Y^1) regarded rules to have a positive correlation with total remuneration management at the DUT as reflected by the Kendall tau-b test

results being in very close proximity to T^b = 1. Similar findings have been reported by Chiucchi (2008:224), who conducted a longitudinal study on the impact of organisational rules on the effectiveness of total remuneration management at selected organisations in San Francisco.

TABLE 6.61 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE B: VALUES AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke B and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke B (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho^{47} There is no significant association between values and talent acquisition management at the DUT	114	101	118	0.0723	154	0.0701	0.00412
Ho^{48} There is no significant correlation between values and the hiring process at the DUT	114	87	118	-0.0331	154	-0.0226	0.07452
Ho^{49} There is no significant association between values and the selection process at the DUT	114	85	118	-0.0224	154	-0.0198	0.09114

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; T^b = 0 <1 at p < 0.05 indicates positive association / correlation; T^b = -1 > 0 at p > 0.05 indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

Table 6.61 depicts the Kendall tau-b Rank Correlation Co-efficient results for Spoke B: Values of Level One of the outer-hub and the three items in Level Two of the outer-hub, namely, Talent Acquisition Management, Hiring Process and Selection Process for the Human Capital Wheel (Figure 4.1). The two independent sample groups, namely, the Academic sample group (X^1) and the

Administrative sample group (Y^1) reported a significant association ($T^b = 0 < 1$ at $p < 0.05$) between values and talent acquisition management at the DUT. Similar findings were reported by Michaels, Handfield-Jones and Axelrod (2001:109-113) relating to a study conducted at selected HE institutions in the United States of America, which showed that the ability of a HE institution to attract suitably talented applicants was dependent upon the perceived values that the institution aspired to and communicated to the public.

The two independent sample groups, namely, the Academic sample group (X^1) and the Administrative sample group (Y^1), reported that there was no significant association for Ho^{48} and Ho^{49} at $T^b = 0 > 1$ at $p > 0.05$ respectively. Therefore, both independent sample groups perceived that there is no correlation between values in relation to the hiring and selection processes at the DUT, since both independent sample groups reported a Kendall tau-b statistic test result of less than zero at $p > 0.05$ for Ho^{48} and Ho^{49}. These results were comtradictory to a study conducted by Milovanović (2011:34), who reported that there was a significant correlation between the values of selected HE institutions in Germany and the hiring and selection processes applied. However, in the South African context, Mngoma (2014:2) reported findings that concurred with the Kendall tau-b test results shown in Table 6.61 for Ho^{48} and Ho^{49}. Mngoma (2014:2) found that in the South African context the hiring and selection processes that were applied at HE institutions were strongly dependent upon government legislation, as opposed to institutional values.

Table 6.62 below displays the Kendall tau-b Rank Correlation Co-efficient results for Spoke C: Symbols of Level One of the outer-hub of the Human Capital Wheel (Figure 4.1) and the four items in Level Two of the outer-hub, namely, Contract, Compensation Package, Socialisation and Social Networks. For Ho^{50} in Table 6.62 both independent sample groups, namely, the Academic sample group (X^1) and the Administrative sample group (Y^1) reported ($T^b = 0 > 1$ at $p > 0.05$) that there was no significant association between symbols and the contract of employment at the DUT. Therefore, the two independent sample groups did not perceive any correlation between these two items

reflected in the Human Capital Wheel. Hence, the null hypothesis was accepted at $T^b = 0 > 1$ at $p > 0.05$, since both independent sample groups reported a Kendall tau-b statistic test result of less than zero at $p > 0.05$. These results correspond with the research findings reported by Rafaeli and Worline (2000:78). These researchers found that symbols in organisational culture and the contract of employment were often perceived by employees to be independent, due to the standardisation of employment contract procedures.

TABLE 6.62 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE C: SYMBOLS AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke C and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke C (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho^{50} There is no significant association between symbols and the contract of employment at the DUT	13	103	118	-0.0743	154	-0.0512	0.07124
Ho^{51}There is no significant correlation between symbols and the compensation package at the DUT	13	70	118	0.0654	154	0.0698	0.0219
Ho^{52} There is no significant association between symbols and socialisation at the DUT	13	99	118	0.0956	154	0.0835	0.00114
Ho^{53} There is no significant association between symbols and social networks at the DUT	13	26	118	0.0916	154	0.0905	0.0003

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; $T^b = 0 < 1$ at $p < 0.05$ indicates positive association / correlation; $T^b = -1 > 0$ at $p > 0.05$ indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

Both the Academic sample group (X^1) and the Administrative sample group (Y^1) reported a significant correlation ($T^b = 0 < 1$ at $p < 0.05$) between symbols and the compensation package at the DUT as reflected for Ho^{51} in Table 6.62 above. Similar research findings were reported by Roche (2013:214), who found that employees associated the compensation package offered by the employer as a symbol of recognition by the organisation for the contribution and value that the employee made towards the organisational objectives.

In Table 6.62 both independent sample groups, namely, the Academic sample group (X^1) and the Administrative sample group (Y^1) reported a highly significant association between symbols and socialisation at the institution (Ho^{52}) and symbols and social networks at the DUT (Ho^{53}) respectively. The Kendall tau-b test results shown in Table 6.62 for both independent sample groups (X^1 and Y^1) show a very close proximity to 1 for Ho^{52} and Ho^{53} respectively. These results are corroborated with the research findings reported by Rennie and Morrison (2013:67-70), who investigated the impact of institutional symbols relating to socialisation and social networks at selected HE institutions in the United States of America. Rennie and Morrison (2013:67-70) reported that respondents perceived institutional symbols to have a strong association with both socialisation programmes offered at the selected HE institutions, as well as formal social networks that had been established.

Table 6.63 below reveals the Kendall tau-b Rank Correlation Co-efficient results for Spoke D: Norms of Level One of the outer-hub of the Human Capital Wheel (Figure 4.1) and the two items in Level Two of the outer-hub, namely, Placement and Onboarding. Both independent sample groups, namely, the Academic sample group (X^1) and Administrative sample group (Y^1) reported no significant association ($T^b = 0 > 1$ at $p > 0.05$) between norms and placement at the DUT, i.e. Ho^{54}. Hence, the null hypothesis was accepted at $T^b = 0 > 1$ at $p > 0.05$, since both independent sample groups reported a Kendall tau-b statistic test result of less than zero at $p > 0.05$.

TABLE 6.63 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE D: NORMS AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke D and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke D (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho^{54} There is no significant association between norms and placement at the DUT	126	96	118	-0.0543	154	-0.0312	0.0822
Ho^{55} There is no significant correlation between norms and onboarding at the DUT	126	99	118	0.0971	154	0.0966	0.0001

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; $T^b = 0 < 1$ at $p < 0.05$ indicates positive association / correlation; $T^b = -1 > 0$ at $p > 0.05$ indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

However, for Ho^{55} both independent sample groups (X^1 and Y^1) reported a highly significant correlation ($T^b = 0 < 1$ at $p < 0.05$) between norms and onboarding at the DUT, since the Kendall tau-b test results were extremely close to 1 at $p < 0.05$. The results depicted in Table 6.63 are divergent with research findings reported by Salim and Sulaiman (2011:121), who conducted research on the impact of norms and standards on the placement and onboarding of employees in selected organisations in India. The researchers found that norms or standards applied at these selected organisations had no correlation with the placement of employees. However, according to Salim and Sulaiman (2011:122), during the onboarding stage in the selected organisations, respondents reported a very high correlation between norms and standards affecting the ability of employees to adapt to the organisation and the job requirements.

TABLE 6.64 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE E: EMPOWER AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke E and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke E (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho^{56} There is no significant association between empowerment and individual development plans at the DUT	78	74	118	-0.0433	154	-0.0513	0.0829
Ho^{57} There is no significant correlation between empowerment and formal / informal training at the DUT	78	77	118	0.0631	154	0.0526	0.0025
Ho^{58} There is no significant association between empowerment and intrapreneurship at the DUT	78	114	118	-0.0012	154	-0.0006	0.1954

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; T^b = 0 <1 at p < 0.05 indicates positive association / correlation; T^b = -1 > 0 at p > 0.05 indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

Table 6.64 shows the Kendall tau-b Rank Correlation Co-efficient results for Spoke E: Empower of Level One of the outer-hub of the Human Capital Wheel (Figure 4.1) and the three items in Level Two of the outer-hub, namely, Individual Development Plans, Formal and Informal Training and Intrapreneurship. The two independent sample groups, namely, the Academic sample group (X^1) and the Administrative sample group (Y^1) respectively, reported for Ho^{56} that there was no association (T^b = 0 > 1 at p > 0.05) between empowerment and individual development plans at the DUT. Consequently, the null hypothesis was accepted at T^b = 0 >1 at p > 0.05, since both independent

sample groups reported a Kendall tau-b statistic test result of less than zero at $p > 0.05$. These results showed an opposing view with various authors such as Selden (2008:114), Seyede (2011:268) and Keengwe and Maxfield (2015:46) that regard empowerment and individual development plans as strongly related. However, Lombard and Kloppers (2015:5) conducted research at selected HE institutions in South Africa on the role and importance of individual development plans to empower employees. These researchers found that at those HE institutions where individual development plans were being used, respondents regarded such plans as merely a lip-service or a means of identifying current training and development needs.

For Ho^{57} in Table 6.64 both independent sample groups (X^1 and Y^1) reported a moderately significant correlation ($T^b = 0 < 1$ at $p < 0.05$) between empowerment and formal / informal training at the DUT. Similar research results were reported by Lundgren, Scheckle and Zinn (2015:13) relating to the perceived relevance of formal and informal training offered at selected South African HE institutions to empower employees to adapt to the rapidly changing HE environment.

The results in Table 6.64 for Ho^{58} showed that both of the independent sample groups, namely, the Academic sample group (X^1) and Administrative sample (Y^1), reported that there was no significant association ($T^b = 0 > 1$ at $p > 0.05$) between empowerment and intrapreneurship at the DUT. The Kendall tau-b results for the responses of both independent sample groups (X^1 and Y^1) were very close to -1, which indicates a highly negative association. These results for Ho^{58} in Table 6.64 are corroborated with research findings reported by Mabanga (2007:3) that selected HE institutions in South Africa were failing to encourage intrapreneurship amongst their employees, whilst this trend was emphasised at selected HE institutions in Malaysia, India and Australia.

TABLE 6.65 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE F: ETHICS AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke F and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke F (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho^{59} There is no significant association between ethics and coaching at the DUT	121	130	118	-0.0673	154	-0.0568	0.0736
Ho^{60} There is no significant correlation between ethics and communication at the DUT	121	35	118	-0.0012	154	-0.0017	0.1983
Ho^{61} There is no significant association between ethics and conflict resolution at the DUT	121	117	118	-0.0093	154	-0.0019	0.1942
Ho^{62} There is no significant correlation between ethics and team management at the DUT	121	108	118	-0.0576	154	-0.0492	0.0781
Ho^{63} There is no significant correlation between ethics and change management at the DUT	121	120	118	-0.0014	154	-0.0008	0.1972

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; T^b = 0 <1 at p < 0.05 indicates positive association / correlation; T^b = -1 > 0 at p > 0.05 indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

Table 6.65 displays the Kendall tau-b Rank Correlation Co-efficient results for Spoke F: Ethics of Level One of the outer-hub of the Human Capital Wheel (Figure 4.1) and the five items in Level Two of the outer-hub, namely, Coaching, Communication, Conflict Resolution, Team Management and Change Management. Both independent sample groups, namely, the Academic sample

group (X^1) and the Administrative sample group (Y^1) reported similar results for all five items in Level Two of the outer-hub of Spoke F: Ethics. In all instances the results computed in Table 6.65 for the null hypotheses were therefore accepted, since the Kendall tau-b test results for Ho^{59} to Ho^{63} reflected no significant association ($T^b = 0 > 1$ at $p > 0.05$) between the selected items identified in the hypotheses, namely, coaching, communication, conflict resolution, team management and change management at DUT respectively. Similar research findings were reported by Madileng (2014:2034), who explored perceptions amongst respondents at selected South African HE institutions pertaining to ethics related to coaching and team management. According to research conducted by Mailore (2014:2) on ethics related to communication and change management at selected HE institutions in South Africa, respondents reported a negative correlation between these variables, which were similar to the results reflected in Table 6.65 above.

Table 6.66 below the Kendall tau-b Rank Correlation Co-efficient results for Spoke G: Attitude of Level One of the outer-hub of the Human Capital Wheel (Figure 4.1) and the four items in Level Two of the outer-hub, namely, Performance Management, Reward, Recognition and Corrective Action. Both independent sample groups, namely, the Academic sample group (X^1) and the Administrative sample group (Y^1) reported similar results for all four items in Level Two of the outer-hub of Spoke G: Attitude. The Kendall tau-b test results in all instances computed in Table 6.66 reflected no significant association ($T^b = 0 > 1$ at $p > 0.05$) between the selected items identified in the hypotheses, namely, Ho^{64} to Ho^{67} respectively. Therefore, both the Academic sample respondents (X^1) and the Administrative sample respondents (Y^1) reported no association or correlation between Attitude and Performance Management, Reward, Recognition and Corrective Action respectively at the DUT.

TABLE 6.66 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE G: ATTITUDE AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke G and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke G (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho[64] There is no significant association between attitude and performance management at the DUT	67	102	118	-0.0418	154	-0.0468	0.0796
Ho[65] There is no significant correlation between attitude and reward at the DUT	67	70	118	-0.0312	154	-0.0019	0.1883
Ho[66] There is no significant association between attitude and recognition at the DUT	67	88	118	-0.0293	154	-0.0013	0.1887
Ho[67] There is no significant correlation between attitude and corrective action at the DUT	67	103	118	-0.0490	154	-0.0483	0.1281

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; T^b = 0 <1 at p < 0.05 indicates positive association / correlation; T^b = -1 > 0 at p > 0.05 indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

These results in Table 6.66 above are supported with research findings conducted by Hulsekopf (2014:113-114) on the attitudes of respondents at the University of Cape Town to performance management and corrective action. Similarly, research conducted by Jacobs (2008:873) found that respondents at selected HE institutions in South Africa reported a negative correlation between attitude and rewards and recognition respectively.

Table 6.67 below reflects the Kendall tau-b Rank Correlation Co-efficient results for Spoke H: Beliefs of Level One of the outer-hub of the Human Capital Wheel (Figure 4.1) and the four items in Level Two of the outer-hub, namely, Career Planning, Work/Life Balance, Growth Opportunities and Talent Management. Both independent sample groups, namely, the Academic sample group (X^1) and the Administrative sample group (Y^1) reported similar results for all four items in Level Two of the outer-hub of Spoke H: Beliefs, which are highlighted in Table 6.67 below.

TABLE 6.67 KENDALL TAU-B RANK CORRELATION CO-EFFICIENT FOR SPOKE H: BELIEFS AND THE CORRESPONDING ITEMS IN LEVEL TWO OF THE OUTER-HUB OF THE HUMAN CAPITAL WHEEL OF THE EXPLORATORY FRAMEWORK (n = 272)

Hypotheses for Spoke H and the Corresponding Items in Level Two of the Outer-hub of the Human Capital Wheel	State-ment for Spoke H (Level One of the Outer-hub)	State-ment for Item (Level Two of the Outer-hub)	Acade mic sample group (X^1)	Kendall tau-b test statistic (T^b)	Admini-strative sample group (Y^1)	Kendall tau-b test statistic (T^b)	Asymp. Sig. (2-sided)
Ho^{68} There is no significant association between beliefs and career planning at the DUT	79	102	118	-0.0648	154	-0.0519	0.0752
Ho^{69} There is no significant correlation between beliefs and work / life balance at the DUT	79	70	118	-0.0731	154	-0.0529	0.0793
Ho^{70} There is no significant association between beliefs and growth opportunities at the DUT	79	88	118	-0.0193	154	-0.0423	0.1487
Ho^{71} There is no significant correlation between beliefs and talent management at the DUT	79	103	118	-0.0290	154	-0.0193	0.1652

* Kendall tau-b rank correlation co-efficient (Range = -1 to 1; $T^b = 0 < 1$ at $p < 0.05$ indicates positive association / correlation; $T^b = -1 > 0$ at $p > 0.05$ indicates negative association / correlation) X^1 = Academic staff; Y^1 = Administrative staff

Both the Academic sample respondents (X^1) and the Administrative sample respondents (Y^1) reported no association or correlation between Beliefs and Career Planning, Work/Life Balance, Growth Opportunities and Talent Management respectively at the DUT at $T^b = 0 > 1$ ($p > 0.05$) for the hypotheses identified in Table 6.67 above. The Kendall tau-b test results (Table 6.67) are corroborated with research conducted by Johnson and Cooper (2014:104) regarding respondents' individual beliefs relating to career planning and work/life balance activities at the Vaal University of Technology. Furthermore, Kruger and Johnson (2011:273) highlighted that respondents at selected HE institutions in New Zealand reported a negative correlation between individual beliefs and talent management.

6.9 LIMITATIONS TO THE STUDY

The limitations to the study were minimal bar those that are reported ethically in the context of the study as highlighted below:

- Eight questionnaires were discarded as they were incomplete and could not be used for the overall empirical analysis of the data.

- Generally, in Humanities research, where a quantitative research design using a structured precoded close ended questionnaire is used, the data is generally in ordinal or nominal format. This therefore negated the use of the more powerful and robust parametric tests. Therefore, the researcher endeavoured to use two non-parametric tests for the hypotheses to give the empirical analysis a degree of scientific rigour. Moreover, different non-parametric tests were used to test for significance of the hypotheses formulated as well as testing various hypotheses related to the Exploratory Framework developed for this study.

- The length of the precoded closed ended questionnaire administered to the sample respondents were fairly comprehensive and the researcher deemed it fit to focus on a quantitative analysis only. Hence, no qualitative component (or the use of a mixed methods approach) was included and no interviews were conducted as this would have proved a futile exercise given the large amount of data that was captured and analysed using the quantitative paradigm for this study and the fact that this was an in-house investigation at the DUT in KwaZulu-Natal.

- Another constraint was that the analyses of the data was time consuming given the almost longitudinal nature of the study and the large amount of data that was elicited from the questionnaire responses (sample responses from seven campuses) given the high response rate. Further, the researcher engaged in a comprehensive statistical analysis of the Exploratory Framework model and its components to prove its tenability by way of numerous hypotheses testing. This was a rigorous exercise on its own but it served a meaningful purpose to give the current empirical findings credibility and a degree of authenticity of the statistically computed results.

- The inclusion of two independent sample groups at the DUT (i.e. the Administrative staff and the Academic staff respectively) made it difficult for the researcher and the Statistician to conduct any further types of differentiated statistical tests. Thus, in the main, for each hypothesis, two non-parametric tests were employed with deliberate intent to test for significance. This gave the statistically computed results of each group in the analysis, comparable test values either in concordance or discordance with the perceptions of the respondents. Further, it also facilitated the interpretation of the test results in order to correlate any divergent views in a scientific and meaningful manner. It should be noted that the sample respondents were already differentiated into two independent groups as shown in Chapter 5.

6.10 CONCLUSION

This chapter presents the analysis of the data and a detailed discussion of the findings arising from the empirical analysis of the responses obtained from the data captured. The results are presented in six sections based on the measurement instrument and the Exploratory Framework (Figure 4.1). The results for Section A involved the use of descriptive statistics for the general information and the demographic variables using Microsoft Excel. For Section B to Section E, the researcher presented the results in the form of frequencies and percentages for the initial statements in a summarised format and reported accordingly in this Chapter. The analysis of the data involved the use of some complex non-parametric tests using SPSS version 21 for Windows including those statistical tests selected for hypotheses testing for the relevant section which yielded significant results. Other non-parametric tests were also used for the numerous hypotheses formulated to test the tenability of the Exploratory Framework (Figure 4.1) developed and aligned to the major variables in the Framework. Relevant non-parametric statistical test were also selected to provide an in-depth analysis presented by the responses of the two independent sample groups, namely, the Academic sample group and the Administrative sample group, in the study in order to provide a more robust analysis on the tenability of the Exploratory Framework. The next chapter presents the conclusions and tentative recommendations arising from the empirical analysis of the data, conclusion and suggestions for future research.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION

This chapter presents the conclusion and recommendations drawn from the empirical findings. A quantitative research design was adopted for this study. The aim of the study was to develop an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for a selected University of Technology (UoT) in South Africa. The Durban University of Technology (DUT) was used as a case study for the in-house investigation. The empirical analysis involved some 71 hypotheses formulated for this study of which some 51 hypotheses were solely devoted to the Exploratory Framework developed for DUT. A pre-coded closed ended questionnaire using the 5-point Likert Scale was distributed using the personal method of data collection to the selected sample respondents (320) identified from the target population of 1874 employees at the DUT. This included both academic (118) and administrative staff (202) from all seven campuses of DUT. The questionnaire comprised of 5 Sections, each under a specific theme related to the topic as well as the testing of the variables and components of the Exploratory Framework (Figure 4.1).

The analysis of the data was conducted using the Statistical Package for Social Sciences (SPSS) version 21 for Windows and although 280 questionnaires were returned by the sample respondents, 8 questionnaires were discarded as they were incomplete. Therefore, the final questionnaire returns equated to n = 272, namely, 118 questionnaires from the Academic Staff grouping and 154 questionnaires from the Administrative Staff, which elicited a high response rate of 85%. The researcher solicited the services of an expert statistician who used the SPSS version 21 for Windows to test the tenability of the Exploratory Framework for the DUT as well as testing the various hypotheses for the other

Sections and the variables. It should be mentioned that the completed thesis was language edited by a competent Language Editor. More importantly, after the thesis was completed, the researcher solicited the services of a Senior Librarian to conduct a TURNITIN exercise for any form of plagiarism. The TURNITIN program produced a highly significant value of a minimal 16%. This could have been further reduced as TURNITIN program identified secondary authors for similar theoretical viewpoints.

7.2 CONCLUSION

The main aim of this study was to develop an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for a selected University of Technology in South Africa, namely, the DUT. The empirical analysis conducted under each of the 5 Sections and sub themes of the questionnaire was rigorous in nature given the intensity of the data produced. The nature of the data accessed in this study was in ordinal form, which negated the application of the more powerful parametric testing under the ambit of inferential statistics. However, a variety of robust non-parametric tests were also used for the numerous hypotheses formulated to test the tenability of the Exploratory Framework developed (Figure 4.1) and aligned to the major variables in the Exploratory Framework. There were many significant findings that emerged from the comprehensive empirical analysis of the data. Moreover, these findings were also corroborated by other authors and researchers who conducted similar studies and their findings were contextualised for the results of the current study. Hence, the Exploratory Framework developed for this study proved its tenability and scientific worth. However, the researcher expresses caution as these findings may not be generalised to other UoTs in the HE sector as it was an in-house investigation pertaining to one specific entity, namely, the DUT and situational factors may differ in each UoT.

7.3 REFLECTIONS AND EVALUATION

7.3.1 Contribution by Dut to a Knowledge-Based Economy

The findings revealed that the 81.25% of the sample respondents agreed that the DUT was adding value to the Knowledge-based Economy of KwaZulu-Natal, whilst 84.19% of the respondents reported that the Institution was contributing towards the economic welfare of stakeholders in the province. There was evidence to suggest that respondents considered employees to be the main source of competitive advantage at the DUT, yet conversely also believed that the Institution was not attempting to retain its talented staff.

7.3.2 Sharing Of Knowledge

There was significant empirical evidence that suggested that the respondents regarded the DUT as a centre of learning and knowledge creation and that the knowledge that originated from the employees at the Institution contributed towards Knowledge Management (KM). However, other empirical findings also highlighted that knowledge was not shared amongst employees at the DUT, and that the institution failed to draw from the competencies and expertise of staff, whilst open communication channels were reportedly discouraged.

7.3.3 Importance of Intellectual Capital

Further empirical findings suggested that in relation to Intellectual Capital (IC), the respondents felt that the institution undervalued intangible assets such as employee competence and 79.05% of the respondents reported that IC was not monitored effectively at the DUT. Both groups of respondents (i.e. the academic staff and administrative staff groups respectively) strongly emphasised that external customers were not given the opportunity to rate the services offered at the DUT and that the employees were not actively involved in problem-solving to improve service delivery at the Institution.

7.3.4 Valuing Human Capital

There was ample empirical evidence to suggest that Human Capital (HC) at the DUT required attention from top management, since the majority of the respondents (92.17%) perceived that there was a lack of commitment amongst employees towards the Institution since employees were regarded as a cost factor by top management. The vast majority of the sample respondents (94.12%) felt that the Human Resource (HR) Department was not regarded as a business partner by line managers, whilst 94.13% of the respondents were of the opinion that concrete HE strategic planning was lacking at the DUT.

7.3.5 Benefits of Exploratory Framework Developed

The main finding of this study revealed that the Exploratory Framework developed (Figure 4.1) had several benefits to address identified concerns amongst the sample respondents at the DUT. Therefore, the Exploratory Framework could tentatively serve as the strategic intervention or guidelines for the DUT to address the planning, implementation and monitoring of KM, IC and HC at the Institution. The Exploratory Framework focuses on a reciprocal relationship and elements of the systems theory to assist the DUT with its strategic intent. Further, although DUT was the main focus of this study, the findings may prove useful to other Higher Education (HE) Universities of Technology (UoTs) in South Africa, to address KM, IC and HC challenges in the light of a constantly changing South African HE landscape.

7.4 RECOMMENDATIONS

The main recommendations of this study are elicited from the rigorous analysis of empirical findings. These recommendations are presented based on the 5 sections of the pre-coded questionnaire (Annexure B) and the Exploratory Framework developed (Figure 4.1) for the DUT.

7.4.1 SECTION A: RECOMMENDATIONS BASED ON RESULTS PERTAINING TO THE GENERAL INFORMATION AND DEMOGRAPHIC PROFILE OF THE SAMPLE RESPONDENTS

7.4.1.1 Monitoring of the Employment Structure

It is suggested that top management should be aware and monitor the structure of employment at the DUT in relation to open-ended, full time employment and fixed term contracts, which is often described as a-typical non-standard employment. The type of employment could influence the expectations of employees with regards to working conditions, as well as the costs incurred by the Institution by possible high levels of labour turnover. Monitoring of the employment structure could allow the DUT to identify and retain scarce skills.

7.4.1.2 Equity between Gender and Age Profiles

Top management should also monitor the gender profile at the DUT, since the distribution of male and female employees may affect the expectations and needs of employees relating to job satisfaction, work/life balances and career planning. It is suggested that top management should also observe trends in the age breakdown of DUT employees on a regular basis, since this may have an impact on the sharing and development of explicit knowledge at the Institution, as well as succession and retirement planning for both the Academic and Administrative staff respectively.

7.4.2 SECTION B: RECOMMENDATIONS RELATED TO THE KNOWLEDGE-BASED ECONOMY AT THE DUT

7.4.2.1 Knowldege Based Economy Drivers

It is suggested that top management at the DUT should continue to accentuate the value that the Institution was making towards the Knowledge-based Economy in KwaZulu-Natal, whilst underscoring the positive impact that the DUT was generating towards the economic welfare of stakeholders in the province. Notably, the DUT is regarded as an industry leader in the HE sector in KwaZulu-Natal. Therefore, top management should continue to emphasise the existing customer loyalty towards the DUT as a student cantered Institution offering high quality education as part of its mission ethos in South Africa.

7.4.2.2 Service Delivery and Environmental Challenges

It is recommended that top management should monitor service delivery at the Institution on a regular and continuous basis by means of acquiring customer feedback to identify and address customer-service related inefficiencies. Top management should also examine the environmental challenges and the competitive environment in which the institution operates, since the DUT may be more susceptible to competition within the HE sector of KwaZulu-Natal. The latter would also allow the DUT to respond to market challenges in a pre-emptive style, whilst providing the institution with a competitive advantage. Furthermore, it is proposed that top management should closely track the trends, innovations and development of technology relating to customer service delivery at the DUT in the HE sector, which could have a positive impact on the monitoring, integration, evaluation and sharing of information amongst staff and customers alike. Since service-delivery is identified as an important component of the Knowledge-based Economy in KwaZulu-Natal and regarded as a crucial driver, top management should constantly endeavour to monitor environmental challenges and develop appropriate strategies to remain competitive in the context of constantly evolving globalisation issues.

7.4.3 SECTION C: RECOMMENDATIONS PERTAINING TO KNOWLEDGE MANAGEMENT AND RELATED THEMES AT THE DUT

7.4.3.1 Impact of Knowledge Management

It is suggested that top management should continue to emphasise that DUT is constantly creating new knowledge and is therefore regarded as a centre of learning and knowledge creation in KwaZulu-Natal. Furthermore, it is imperative that top management recognises that Knowledge Management (KM) is rapidly evolving. This phenomenon also has a multiplier effect on strategic planning initiatives at DUT. Moreover, in the light of the previous reported observation by respondents, it is recommended that top management at the DUT should also encourage the sharing of knowledge amongst both the Academic and Administrative employees at the institution.

7.4.3.2 Sharing Best Practices

It is recommended that top management should encourage the sharing of best practices at DUT amongst both Academic and Administrative staff respectively. The sharing of best practices at the Institution may also address the concerns expressed by the respondents relating to a lack of mutual interaction amongst staff. Therefore, it is incumbent upon top management that the sharing of information may also enable positive perceptions amongst staff relating to the reported lack of open communication channels at the DUT. In addition, knowledge sharing by top management may also encourage knowledge-awareness, reinforce the importance of Knowledge Management (KM) amongst staff and facilitate its integration into the culture of the Institution (Evans, 2003:75)

7.4.3.3 Utilising Staff Competencies

It should be noted that both the Academic and Administrative respondents respectively expressed their concerns that top management often overlooked internal knowledge, skills and expertise of the employees within the Institution. Therefore, it is recommended that top management should endeavour to draw from the competencies and expertise of the staff at the DUT, which may also address the reported lack of employee engagement, commitment and job satisfaction amongst the employees as this will positively make staff being recognised, valued and utilised optimally at the DUT.

7.4.3.4 Access to Institutional Policies

It is suggested that top management should create the opportunity and awareness amongst staff pertaining to the access of institutional policies, which may address the reported lack of synergy between information sharing, employee commitment and other processes at the DUT. The basis of this strategy could also prove useful for the DUT in developing, implementing and evaluating Institutional performance related to knowledge management.

7.4.4 SECTION D: RECOMMENDATIONS RELATING TO INTELLECTUAL CAPITAL AND RELATED THEMES AT THE DUT

7.4.4.1 Reinforcing the Value of Human Capital

It is recommended that top management should reinforce the value of their human capital at the Institution, which could be addressed by achievement or recognition awards for staff in both the Academic and Administrative sectors. In addition, these achievements should be publicised internally and externally, which may address the negative perceptions expressed by the respondents that

DUT undervalues its intangible assets, i.e. human capital. Hence, the onus is on top management to encourage active involvement in problem-solving amongst both the Academic and Administrative staff at the Institution. Further, top management should endeavour to reward staff to improve service delivery and its human capital so that this important facet could be encouraged and recognised at all times.

7.4.4.2 Provision of Infrastructure

It is recommended that since customer-care in the HE sector has become a necessity due to government legislation, top management of DUT should introduce an audit system to address the provision of adequate infrastructure concerns expressed by respondents that inhibit customer-care and service delivery.

7.4.4.3 Addressing Training and Development Needs

It is recommended that top management of DUT should introduce pre-emptive measures to identify, develop and assist employees to adapt to the rapidly evolving and changing technological environment that has become a focal point in society and for knowledge creation. This in turn could address the concerns expressed by respondents that the training and development programmes offered by the Institution have added minimal value in alleviating the challenges that employees reportedly face in their jobs related to technological innovations. It is acknowledged that top management of DUT encourages employees to expand their know-how in areas related to their current jobs. However, it is suggested that specific training and development programmes should be tailored to the challenges that are unique to different functional units or areas at the Institution, *vis-à-vis*, the academic and administrative staff sectors respectively.

7.4.5 SECTION E: RECOMMENDATIONS RELATING TO HUMAN CAPITAL AND RELATED THEMES AT THE DUT

7.4.5.1 Employee Re-Induction Programmes

The majority of respondents reported that the induction programme offered at the DUT was comprehensive and informative. Therefore, it is suggested that top management should introduce re-induction for all DUT employees, which may address the concerns expressed by the respondents, that there was a perceived lack of commitment by the Institution and the reported presence of a work culture that represents an unsupportive work atmosphere and the general metonia of staff of the lack of a conducive environment to work in. It is further suggested that innovative induction programmes may reinforce a positive ethos amongst all staff at DUT.

7.4.5.2 Total Remuneration Management

It is recommended that top management should closely monitor job benchmarking, which may address the concerns by both the Academic and Administrative respondents pertaining to the fairness of the remuneration system at the DUT. In addition, top management should explore the introduction of total remuneration management, which could assist in retaining scarce skills at the Institution which should underscore the importance of human capital and job design in order to promote DUT as an employer of choice.

7.4.5.3 Developing a Leadership Pipeline at DUT

It is proposed that top management should make a concerted effort to identify its human capital and retain valued staff at the DUT. This intervention should be reinforced with a well-defined and strategically planned leadership pipeline. These interventions could then ameliorate the perceived lack of career pathing, succession planning, leadership development, individual development plans and the haphazard approach to performance management at the DUT.

7.4.5.4 Human Resources as a Business Partner

It is suggested that top management should reinforce the importance of the role of the Human Resource (HR) department at the DUT. This should be seen as an imperative to ensure that HR is perceived by Academic and Administrative staff as a business partner and a significant strategic contributor towards enabling the institution to achieve its stated objectives.

7.4.6 RECOMMENDATIONS RELATING TO THE FORMULATION OF THE HUMAN CAPITAL EXPLORATORY FRAMEWORK AT THE DUT

Arising from the comprehensive empirical analysis of the findings, the following tentative recommendations in relation to the formulation of an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for the DUT are suggested:

7.4.6.1 Environmental Scanning

It is suggested that top management should constantly engage in environmental scanning. This will allow DUT to closely monitor the external environmental factors, namely, political factors, economic factors, social factors, technological factors, legal factors, ethics and social responsibility. This will also allow top management of DUT to have the requisite knowledge of the needs of the Institution's stakeholders, knowledge of the environment and the ability to apply this knowledge effectively. In addition, environmental scanning could enable the DUT to adapt faster to change.

7.4.6.2 Identifying DUT Supply Drivers

It is recommended that top management of DUT should identify significant knowledge management supply drivers relevant to the specific role and function of the institution within KwaZulu-Natal. The research findings highlight the critical supply drivers that should be identified, emphasised and monitored at the Institution including, *inter alia*, technology, infrastructure, the DUT brand and image.

7.4.6.3 A Proactive Approach to Intellectual Capital

It is proposed to top management of DUT that identifying and monitoring the external environmental factors and knowledge management supply drivers will enable the development and implementation of intellectual capital (IC) in both the Academic and the Administrative ambits respectively. Furthermore, it is recommended that top management should adopt a proactive approach when developing and implementing IC at the DUT, since the Academic respondents associated greater importance to the Learning and Growth Perspective of Intellectual Capital (IC), whilst the Administrative respondents perceived the Financial Perspective to be of greater value to the institution. These perceptions expressed by the respondents may also be valuable when developing intellectual capital indicators for the DUT.

7.4.6.4 Integrated Strategic Management

It is suggested that Knowledge Management (KM) and Intellectual Capital (IC) should be reinforced by top management when planning, developing, implementing and evaluating the DUT's institutional strategy. Top management should encourage the value of KM audits in both the Academic and the Administrative ambits respectively at the DUT. Furthermore, it is proposed that

Knowledge Management (KM) should become an integral component of institutional strategic plans and implementation processes. This should be accentuated further by the identification and monitoring of KM enablers at the DUT. This could include strategic drivers, such as leadership and management development and establishing an institutional culture that embraces Knowledge Management (KM) and Intellectual Capital (IC).

7.4.6.5 Emphasis on Strategic Human Resource Management at the DUT

It is recommended that top management should emphasise the value of Strategic Human Resource Management (SHRM) at the DUT. This will ensure that the Institution has sufficient human capital (HC) to meet its academic and administrative needs amidst an increasing emphasis on customer needs. This intervention by top management may also change the perceptions reported by the respondents that the HR department is not regarded as a business partner and a significant strategic contributor at the DUT. In addition, SHRM could also benefit the Institution in the planning, development and implementation of a Human Capital Scorecard tailor-made for the Academic and Administrative employees respectively at the DUT.

7.4.6.6 Value of the Human Resource Information System

It is recommended that top management should emphasise the value of a well administered Human Resource Information System (HRIS), which will enable line management at the DUT to plan, acquire, engage, deploy, develop, lead, assess and retain human capital (HC) at the Institution. This is of particular importance in the light of an increasing demand on the KwaZulu-Natal UoT HE sector to deliver on the customer expectations driven by the Knowledge-based Economy. It is suggested that top management should introduce an integrated

Human Capital Framework for the DUT which recognises that institutional culture is entwined with the HRM activities of the Institution. Furthermore, it is imperative for top management to focus on an integrated HC Framework that will enable the DUT to address salient predictors that were raised as concerns by both the Academic and Administrative respondents, namely, values, empowerment, ethics, attitudes and beliefs in the empirical analysis of the Exploratory Framework developed.

7.4.6.7 Developing a Critical Scarce Skills Policy

The majority of the respondents (86.4%) were in agreement that DUT had no clear strategy to manage critical skills. Top management should develop a Critical Scarce Skills Policy with clear implementation initiatives related to DUT employees in both the Academic and Administrative ambits. The development and availability of a Critical Scarce Skills Policy could assist the Institution with Human Resource Planning. The majority of the respondents (94.13%) were in agreement that DUT failed to conduct Human Resource Planning on a regular basis. A Critical Scarce Skills Policy may also address the concerns raised by the majority of the respondents (87.86%) that when a post becomes vacant, it is not filled within a reasonable time, often resulting in disruptions in the workplace. If top management identified scarce skills at the Institution, it may also ensure that training and development offered at the DUT would be relevant to the employees' core job functions. In this regard, 87.87% of the respondents indicated that the training interventions were unrelated to their primary job functions, yet 84.19% of the respondents reported that in the last three years the complexity of their jobs became more demanding.

7.4.6.8 Formalising Mentorship Programmes

The majority of the respondents (99.27%) were in strong agreement that DUT was not using mentorship programmes to develop employees. It is proposed that top management should develop and introduce a formalised mentorship programme for both the Academic and Administrative staff at the Institution. A formalised mentorship programme may also address the respondents reported disagreement (97.06%) that the Institution recognises employees' skills and knowledge. Monyooe (2013:114) affirms that a formalised mentorship programme encourages both the mentor and the mentee to interact and share knowledge and expertise. Therefore, it is suggested that a formalised mentorship programme may encourage Line Managers/Heads of Departments at the Institution to share their knowledge, skills and expertise with employees, since 72.42% of the respondents stated that this was lacking at the DUT.

7.4.6.9 Formal Coaching Programmes

It is recommended to top management that a formal coaching programme should be established at the DUT to assist new employees in adapting to the working environment. The majority of the respondents (80.52%) reported that DUT failed to utilise coaching effectively to assist new employees in the workplace. Bezuidenhout (2011:88) highlighted that coaching not only allowed an employee to achieve specific personal goals, but was also regarded as a form of professional development, which may encourage employees to remain in the organisation. Therefore, a formalised coaching programme may address the concerns raised by 89.71% of the respondents that DUT was not making a concerted effort to retain its staff.

7.4.6.10 Proactive Change Management

The majority of respondents (87.87%) attested that change management was not emphasised at the DUT. Therefore, it is recommended that top management should identify best practices with regard to change management, such as identifying and training change agents acting as catalysts or potential ambassadors at the Institution, communicate change management at all Institutional levels, and provide constructive and continuous feedback on the change management interventions that had been initiated.

7.4.6.11 Structuring a Talent Management Programme

The majority of the respondents (73.53%) indicated that talent management was not emphasised at the DUT. Therefore, it is suggested that top management should introduce a structured Talent Management Programme for the DUT. This intervention is supported by Salim and Sulaiman (2011:118) that talent is the main source of value creation in an organisation. However, 81.25% of the respondents believed that the Institution merely regarded employees as a cost factor as opposed to adding value to the DUT. A structured Talent Management Programme for the DUT could also address the reported lack of succession planning as highlighted by 85.82% of the respondents. Keengwe and Maxfield (2015:38) also associated talent management with leadership development. However, a mere 12.49% of the respondents reported that the Institution focused on leadership development at a peripheral level. Hence, it may be beneficial for the DUT, if top management developed a holistic formalised structured talent management intervention coupled with a Leadership Development Continuum for all staff at the Institution.

7.4.6.12 Embracing Organisation Learning

It is proposed that top management should encourage an institutional culture that embraces organisational learning, which is reported as a key driver of both Knowledge Management (KM) and Intellectual Capital (IC) in the HE sector. However, the majority of the respondents (70.59%) were in concordance that DUT did not encourage organisational learning, whilst 93.76% of the respondents also reported a lack of informal learning at the Institution.

7.4.6.13 Creating a Culture of Trust

The majority of respondents (97.79%) perceived that there was a lack of trust amongst employees at the Institution. A lack of trust may result in demotivating employees, a perceived lack of job satisfaction and an increase in labour turnover. Therefore, it is proposed that top management should endeavour to build trust amongst DUT employees by means of creating a culture of trust and shared meaning for the Institution. The former may be achieved by integrating trust into the vision and values of the Institution, to focus on, *inter alia,* a collective collegial sprit, camaraderie, values and a strong sense of a shared vision, dissipating creative tensions and distrust. This should be encouraged at all times to create an organisational climate of mutual respect, trust, ethical behaviour and foster a conducive working environment underpinned by the ethos and culture of the Institution. More importantly, top management should consider all DUT employees as equal partners to pursue a collective unified purpose and empower them to make decisive strategic inputs that should be valued and appreciated.

7.4.6.14 Acceptability of the Exploratory Framework for DUT

The Exploratory Framework developed for the DUT proved its scientific acceptability by way of the numerous hypotheses tested in this study. Finally, the Exploratory Framework as a model for the DUT within the UoT sector with its commensurate outcomes and recommendations of the study may prove beneficial for future strategic interventions by top management of DUT.

7.5 DIRECTIONS FOR FUTURE RESEARCH

Since this in-house study dealt with the formulation of an Exploratory Framework of Human Capital linked to Intellectual Capital and Knowledge Management for the DUT, future research conducted in other Higher Education Institutions in South Africa could shed new emerging perspectives. The study identified the importance of monitoring Intellectual Capital (IC) at the DUT and further research on the development of an IC scorecard for the DUT and the South African HE UoT sector should be explored. It is also possible to conduct future research on the development of a Human Capital Scorecard for UoTs in the HE sector in South Africa. Future research could also focus on just one sector, either the academic or the administrative sector as a stand-alone entity in other HE Institutions in South Africa. This may then also facilitate the use of the mixed method research designs, i.e. both quantitative and qualitative research paradigms. The latter could include an Interviewing Schedule to solicit responses from key stakeholders by way of individual or focused group interviews in the HE Institution concerned. Thereafter, the analysis of the quantitative data could also be subjected to high powered parametric tests to give scientific and credible empirical results for the hypotheses tested.

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4000

Dear Participant

ASSISTANCE: QUESTIONNAIRE COMPLETION

I am a registered student at the Durban University of Technology in the Department of Human Resources Management. I am currently pursuing the Doctorate Degree in Human Resources Management in the Faculty of Management Sciences. My topic is titled: **Developing an exploratory framework of Human Capital linked to Intellectual Capital and Knowledge Management for a selected University of Technology in South Africa – A Case Study.** The focus of the study is on the Durban University of Technology. In order to successfully complete the latter part of my research, the secondary component deals with the empirical investigation. This involves the completion of a structured close ended questionnaire. You have been identified as one of the respondents that formed the sample for this study.

I shall be most grateful if you could please complete the attached questionnaire and return it to me by the 2015-07-31. The researcher will make arrangements to personally pick up the questionnaire. The questionnaire will take about 20 minutes to complete and only requires you to tick the relevant pre-coded response in an objective manner. Your participation is voluntary and you are at liberty to withdraw from answering this questionnaire at any time. Please rest assured that your responses will be treated with utmost confidentiality and no names will be divulged to any third party. The collated responses will be only used for statistical analysis. A brief summary of the main findings will be posted to you on completion of the project.

Your co-operation in assisting me with this important component of my study is highly appreciated and I look forward to a speedy return of the completed questionnaire. Please answer all the questions and do not leave any question or Likert scale statement blank. I have included a brief explanation of the key terminology relating to the concepts below to assist you when completing the questionnaire. If there are any queries, please do not hesitate to contact me at the above email address or via my cell phone. I take this opportunity to once again thank you for your kind assistance in completing this questionnaire in an informed and objective manner.

Sincerely

M. Lourens

_____

Mrs Melanie Lourens
Cell: 083 553 8640

D.C. Jinabhai

_____

Supervisor: Prof. D.C. Jinabhai
Contact Details: 031-3736798

SECTION A: GENERAL INFORMATION

Note: For this study, Institution refers to DUT and all its staff members, unless otherwise stated.

INSTRUCTIONS TO RESPONDENTS:

1. **Please select ONLY ONE response with a tick ✓ for each question.**
2. **Answer ALL the pre-coded questions in this section.**
3. **Please DO NOT leave any question blank.**

1. Please indicate whether you are a permanent or contract staff member at DUT:

1.1	Permanent	1
1.2	Contract	2
1.3	Any other:	3

2. Please indicate which ONE of the following is applicable to you:

2.1	Academic	1
2.2	Administrative	2

3. Please indicate your gender:

3.1	Male	1
3.2	Female	2

4. Please indicate your age group:

4.1	20-25 years	1
4.2	26-30 years	2
4.3	31-35 years	3
4.4	36-40 years	4
4.5	41-50 years	5
4.6	> 51 years	6

5. For how long have you been employed at this institution?

5.1	1-5 years	1
5.2	6-10 years	2
5.3	11-15 years	3
5.4	16-20 years	4
5.5	21-25 years	5
5.6	>26 years	6

6. Please indicate your highest level of qualification:

6.1	Matric	1
6.2	Diploma / Bachelor's degree	2
6.3	Honours degree / B.Tech	3
6.4	Masters	4
6.5	Doctorate	5

SECTION B: KNOWLEDGE-BASED ECONOMY

The knowledge-based economy is an expression coined to describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels, and the increasing need for ready access to all of these by the business and public sectors (OECD, 2005:71).

INSTRUCTIONS TO RESPONDENTS:

1. **Please select ONLY ONE response with a tick ✓ for each Likert Scale statement below.**
2. **Answer ALL the pre-coded statements in this section.**
3. **Please DO NOT leave any statement blank.**

KEY: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

		SD	D	N	A	SA
7.	DUT is adding value to the knowledge-based economy of KZN.	1	2	3	4	5
8.	DUT is contributing to the economic welfare of stakeholders in KZN.	1	2	3	4	5
9.	Customer service has become a key driver at DUT.	1	2	3	4	5
10.	Customer feedback is obtained in the department in which I work.	1	2	3	4	5
11.	Service delivery is monitored at DUT.	1	2	3	4	5
12.	Decisions at DUT are made in response to environmental challenges.	1	2	3	4	5
13.	The Institution's brand is well respected in KZN.	1	2	3	4	5
14.	DUT attempts to retain its staff.	1	2	3	4	5
15.	The Institution monitors its competitive environment.	1	2	3	4	5
16.	DUT is attempting to offer programmes that are increasingly being tailored to the needs of the customer.	1	2	3	4	5
17.	DUT values the relationships it has developed with its external stakeholders.	1	2	3	4	5
18.	Employees are DUT's main source of competitive advantage.	1	2	3	4	5
19.	Bureaucratic structures at the Institution impacts negatively on service delivery.	1	2	3	4	5
20.	In my opinion, the customer loyalty towards DUT is high.	1	2	3	4	5
21.	DUT is regarded as an industry leader in Higher education in KZN.	1	2	3	4	5
22.	DUT is characterised by a culture of openness / innovation.	1	2	3	4	5
23.	The Institution is more susceptible to competition than five years ago.	1	2	3	4	5
24.	Technology has had a positive impact on the service delivery at DUT.	1	2	3	4	5
25.	In the last five years, the links between DUT and the job market has been strengthened.	1	2	3	4	5

SECTION C: KNOWLEDGE-MANAGEMENT

Knowledge Management is the "collective phrase for a group of processes and practices utilised by organisations to increase their value by improving the effectiveness of the generation and application of their intellectual capital" (Marr and Chatzkel, 2004:224).

INSTRUCTIONS TO RESPONDENTS:

1. **Please select ONLY ONE response with a tick ✓ for each Likert Scale statement below.**
2. **Answer ALL the pre-coded statements in this section.**
3. **Please DO NOT leave any statement blank.**

KEY: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

		SD	D	N	A	SA
26.	Knowledge is shared by employees in the Institution.	1	2	3	4	5
27.	Each employee has original information (know-how) that contributes to DUT.	1	2	3	4	5
28.	Management shares information with employees.	1	2	3	4	5
29.	Institutional policies are easily accessible.	1	2	3	4	5
30.	Knowledge management at DUT begins with the employees.	1	2	3	4	5
31.	The Institution draws from its employees' competencies and expertise.	1	2	3	4	5
32.	I am allowed to update my knowledge regarding my current job on a regular basis.	1	2	3	4	5
33.	Knowledge management at the Institution is based on encouraging constant interactions amongst staff.	1	2	3	4	5
34.	DUT recognises that Knowledge Management is ever-changing.	1	2	3	4	5
35.	Open communication channels are encouraged at DUT.	1	2	3	4	5
36.	There is nothing that impedes knowledge sharing in the Institution.	1	2	3	4	5
37.	There are clear vision and mission statements for the Institution.	1	2	3	4	5
38.	Employees are aware of the importance of the Institution's name / image in the Higher Education sector.	1	2	3	4	5
39.	DUT can be regarded as a centre of learning / knowledge.	1	2	3	4	5
40.	Best practices at DUT are shared amongst employees.	1	2	3	4	5
41.	The Institution encourages information sharing with its external stakeholders.	1	2	3	4	5
42.	The Institution has a flexible organisational structure.	1	2	3	4	5
43.	Customer feedback is used to make significant changes in the manner in which tasks are executed at DUT.	1	2	3	4	5
44.	There is synergy at the Institution between information, employees and processes.	1	2	3	4	5
45.	DUT is producing knowledge to assist stakeholders with the economic growth of KZN.	1	2	3	4	5
46.	The Institution constantly creates knowledge.	1	2	3	4	5

SECTION D: INTELLECTUAL CAPITAL

Stewart (1997:4) defines Intellectual Capital as 'the sum of everything everybody in your company knows that gives you a competitive edge in the market place'.

INSTRUCTIONS TO RESPONDENTS:

1. **Please select ONLY ONE response with a tick ✓ for each Likert Scale statement below.**
2. **Answer ALL the pre-coded statements in this section.**
3. **Please DO NOT leave any statement blank.**

KEY: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

		SD	D	N	A	SA
47.	Employees are regarded as the Institution's most important asset.	1	2	3	4	5
48.	DUT has very efficient information systems.	1	2	3	4	5
49.	Employees at DUT are assisted in adapting to the fast technologically changing environment.	1	2	3	4	5
50.	The level of co-operation amongst employees at the Institution is high.	1	2	3	4	5
51.	The current systems at DUT allows for easy access to information.	1	2	3	4	5
52.	DUT encourages employees to expand their know-how in areas related to their current jobs.	1	2	3	4	5
53.	Knowledge at the Institution is well managed.	1	2	3	4	5
54.	Customers are given the opportunity to rate the service that they have received at the Institution.	1	2	3	4	5
55.	DUT can be termed "a learning environment for staff".	1	2	3	4	5
56.	In my opinion, the Institution under-values intangible assets (such as employee competence).	1	2	3	4	5
57.	DUT has established a customer-care approach.	1	2	3	4	5
58.	Employees at DUT are actively involved in problem-solving to improve service delivery.	1	2	3	4	5
59.	In my opinion, the Institution has sufficient processes and procedures to enhance service delivery.	1	2	3	4	5
60.	There is sufficient infrastructure at DUT to promote service delivery.	1	2	3	4	5
61.	The Institution's philosophy has a positive impact on its ability to take on a leadership role in the KZN Higher Education sector amidst political changes.	1	2	3	4	5
62.	The systems at DUT are sufficient to assist with information sharing.	1	2	3	4	5
63.	DUT has introduced a variety of training programmes for staff to enhance their service delivery.	1	2	3	4	5
64.	Employee satisfaction surveys relating to the service departments are conducted within the Institution.	1	2	3	4	5

SECTION E: HUMAN CAPITAL

"Human Capital combines knowledge, skills, innovativeness and the ability of employees to meet the tasks at hand" (Easterbury-Smith and Lyles, 2011:23).

INSTRUCTIONS TO RESPONDENTS:

1. **Please select ONLY ONE response with a tick ✓ for each Likert Scale statement below.**
2. **Answer ALL the pre-coded statements in this section.**
3. **Please DO NOT leave any statement blank.**

KEY: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

		SD	D	N	A	SA
65.	I am satisfied with my working conditions.	1	2	3	4	5
66.	I can rely on my peers when I need assistance in my job.	1	2	3	4	5
67.	Employees have a positive attitude towards the Institution.	1	2	3	4	5
68.	Leadership at the Institution emphasise the contributions of employees.	1	2	3	4	5
69.	I am committed to DUT.	1	2	3	4	5
70.	I believe the remuneration system at DUT is fair.	1	2	3	4	5
71.	The Institution cares about my career progression.	1	2	3	4	5
72.	Employee performance at DUT is monitored.	1	2	3	4	5
73.	Employees readily have access to training and development programmes.	1	2	3	4	5
74.	Employees at DUT have Individual Development Plans.	1	2	3	4	5
75.	The Institution offers a detailed induction programme for new staff.	1	2	3	4	5
76.	Employees at DUT have sufficient capabilities to successfully perform their duties.	1	2	3	4	5
77.	Training and development is regarded as crucial for all employees at the institution.	1	2	3	4	5
78.	My manager / supervisor / Head of Department allow me to be innovative in my job.	1	2	3	4	5
79.	The Institution promotes a culture of mutual respect.	1	2	3	4	5
80.	Employees at DUT are loyal.	1	2	3	4	5
81.	The Institution attempts to retain scarce skills employees.	1	2	3	4	5
82.	I can participate actively in decision-making at DUT.	1	2	3	4	5
83.	I avoid taking risks in my job.	1	2	3	4	5
84.	I am motivated to perform my duties on a daily basis.	1	2	3	4	5
85.	Succession planning is effectively used at the Institution.	1	2	3	4	5

SECTION E: HUMAN CAPITAL (continued)

INSTRUCTIONS TO RESPONDENTS:

1. **Please select ONLY ONE response with a tick ✓ for each Likert Scale statement below.**
2. **Answer ALL the pre-coded statements in this section.**
3. **Please DO NOT leave any statement blank.**

KEY: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

		SD	D	N	A	SA
86.	The Institution tends to regard employees as a cost factor.	1	2	3	4	5
87.	When a post becomes vacant, it is filled within a reasonable time allowing for minimal disruptions in the workplace.	1	2	3	4	5
88.	DUT recognises employees' knowledge and skills.	1	2	3	4	5
89.	The training and development offered at DUT is relevant to my core job functions.	1	2	3	4	5
90.	Employees are encouraged to focus on service delivery.	1	2	3	4	5
91.	Employees are equipped with knowledge and skills to adapt to the changing demands of the Higher Education sector.	1	2	3	4	5
92.	DUT has a clear strategy to manage critical skills.	1	2	3	4	5
93.	I believe the Institution is under-staffed.	1	2	3	4	5
94.	I have job autonomy.	1	2	3	4	5
95.	DUT is regarded as an employer of choice.	1	2	3	4	5
96.	There is a culture of participation prevalent at the Institution.	1	2	3	4	5
97.	Exceptional performance is recognised at DUT.	1	2	3	4	5
98.	The working atmosphere at the Institution is supportive.	1	2	3	4	5
99.	Re-induction is offered annually for existing employees at the Institution.	1	2	3	4	5
100.	DUT is more concerned about quantity instead of quality.	1	2	3	4	5
101.	DUT is able to attract sufficient applicants when a post is advertised.	1	2	3	4	5
102.	Employee performance is measured on the basis of results.	1	2	3	4	5
103.	In my opinion, the Institution's control over employee's tasks and duties are monitored by the line manager.	1	2	3	4	5
104.	My manager / supervisor / Head of Department creates the standards that I am expected to achieve.	1	2	3	4	5
105.	The power I have in my current job is based on my position and not my knowledge.	1	2	3	4	5
106.	I have limited decision-making power relating to my job.	1	2	3	4	5
107.	My manager / supervisor / Head of Department share his/her knowledge with me.	1	2	3	4	5
108.	Teams are created to achieve institutional objectives.	1	2	3	4	5

SECTION E: HUMAN CAPITAL (continued)

INSTRUCTIONS TO RESPONDENTS:

1. **Please select ONLY ONE response with a tick ✓ for each Likert Scale statement below.**
2. **Answer ALL the pre-coded statements in this section.**
3. **Please DO NOT leave any statement blank.**

KEY: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

		SD	D	N	A	SA
109.	Organisational learning is emphasised throughout DUT.	1	2	3	4	5
110.	Informal learning is encouraged in the Institution.	1	2	3	4	5
111.	Mentorship programmes are used at DUT to develop employees.	1	2	3	4	5
112.	Trust is prevalent at the Institution amongst employees.	1	2	3	4	5
113.	My manager / supervisor / Head of Department are willing to assist me as and when required.	1	2	3	4	5
114.	DUT encourages a culture of empowerment.	1	2	3	4	5
115.	The Institution focuses more on effectiveness than efficiency.	1	2	3	4	5
116.	Talent management is emphasised at DUT.	1	2	3	4	5
117.	The Institution's Human resource policies are well designed and not ambiguous.	1	2	3	4	5
118.	Individual and Team competencies are considered when tasks are allocated.	1	2	3	4	5
119.	Job design is conducted on a regular basis.	1	2	3	4	5
120.	Change management is embraced at DUT.	1	2	3	4	5
121.	Institutional values are based on ethics.	1	2	3	4	5
122.	Professionalism is encouraged at DUT amongst employees.	1	2	3	4	5
123.	The HR department is regarded as a business partner by line managers at the Institution.	1	2	3	4	5
124.	DUT conducts informed human resource planning on a regular basis.	1	2	3	4	5
125.	The Institution focuses adequately on leadership development.	1	2	3	4	5
126.	Employees at DUT are always willing to "go the extra mile".	1	2	3	4	5
127.	The pre-dominant role of the HR department is that of an administrative department.	1	2	3	4	5
128.	I can immediately / directly see the results of my job.	1	2	3	4	5
129.	In the last three years the complexity level of my job has become more demanding.	1	2	3	4	5
130.	DUT utilises coaching effectively to assist new employees in the workplace.	1	2	3	4	5

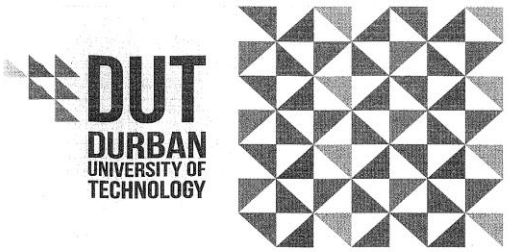
THANK YOU FOR YOUR CO-OPERATION.

SEKARAN AND BOUGIE'S LIST FOR SELECTING A SAMPLE SIZE FROM A GIVEN POPULATION SIZE

N	S	N	S	N	S
10	10	220	140	1 200	291
15	14	230	144	1 300	297
20	19	240	148	1 400	302
25	24	250	152	1 500	306
30	28	260	155	1 600	310
35	32	270	159	1 700	313
40	36	280	162	1 800	317
45	40	290	165	1 900	320
50	44	300	169	2 000	322
55	48	320	175	2 200	327
60	52	340	181	2 400	331
65	56	360	186	2 600	335
70	59	380	191	2 800	338
75	63	400	196	3 000	341
80	66	420	201	3 500	346
85	70	440	205	4 000	351
90	73	460	210	4 500	354
95	76	480	214	5 000	357
100	80	500	217	6 000	361
110	86	550	226	7 000	364
120	92	600	234	8 000	367
130	97	630	242	9 000	368
140	103	700	248	10 000	370
150	108	750	254	15 000	375
160	113	800	260	20 000	377
170	118	850	265	30 000	379
180	123	900	269	40 000	380
190	127	950	274	50 000	381
200	132	1 000	278	75 000	382
210	136	1 100	285	1 000 000	384

Source: Sekaran, U. and Bougie, R. (2014:268).

DUT'S INSTITUTIONAL RESEARCH ETHICS COMMITTEE (IREC APPROVAL) LETTER OF INFORMED CONSENT



Institutional Research Ethics Committee
Faculty of Health Sciences
Room MS 49, Mansfield School Site
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P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2900
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Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

2 June 2015

IREC Reference Number: **REC 30/15**

Mrs M Lourens
36 Woodpecker Circle
Yellowwood Park
Durban
4001

Dear Mrs Lourens

Developing an exploratory framework of Human Capital linked to Intellectual Capital and Knowledge Management for a selected University of Technology in South Africa- A Case Study

I am pleased to inform you that Provisional Approval has been granted to your proposal REC 30/15 subject to:

- Piloting of the data collection tool and
- Obtaining and submitting the necessary gatekeeper permission/s to the IREC.

Full approval is subject to meeting the above conditions.

The Proposal has been allocated the following Ethical Clearance number **IREC 048/15**. Please use this number in all communication with this office.

Approval has been granted for a period of two years, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's. In addition, you will be responsible to ensure gatekeeper permission.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Please note that you may continue with validity testing and piloting of the data collection tool. Research on the proposed project may not proceed until IREC reviews and approves the final document. If there are no changes to the data collection tool, kindly notify the IREC in writing.

Yours Sincerely

[redacted]

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY

2015 -06- 02

INSITUTUTIONAL RESEARCH ETHICS COMMITTEE
P O BOX 1334 DURBAN 4000 SOUTH AFRICA

NUMBER OF STUDENTS ENROLLED IN PUBLIC HIGHER EDUCATION INSTITUTIONS, BY MAJOR FIELD OF STUDY, QUALIFICATION TYPE AND INSTITUTION, IN 2012

Institution	Major Field of Study					Qualification Type						
	Science, Engineering and Technology	Business and Management	Education	All Other Humanities and Social Sciences	Total	Occasional Students	Undergraduate Certificates and Diplomas	Undergraduate Degrees	Postgraduate, Below Master's Level	Master's Degrees	Doctoral Degrees	Total
Cape Peninsula University of Technology	16 848	10 297	2 848	3 516	33 509	656	22 645	8 654	470	887	197	33 509
University of Cape Town	11 073	6 236	811	7 685	25 805	1 403	617	15 630	2 867	3 961	1 327	25 805
Central University of Technology, Free State	5 586	3 326	1 956	1 857	12 724	1	8 446	3 466	524	202	85	12 724
Durban University of Technology	11 723	8 782	867	3 503	24 875	0	19 177	5 131	0	468	99	24 875
University of Fort Hare	2 950	2 200	1 419	5 475	12 044	67	365	9 455	988	885	284	12 044
University of the Free State	8 946	7 221	9 019	7 190	32 375	1 883	5 679	17 941	4 149	2 192	531	32 375
University of Johannesburg	14 822	19 660	3 255	11 032	48 769	146	17 088	24 918	3 825	2 132	660	48 769
University of KwaZulu-Natal	15 733	7 737	7 638	10 757	41 864	1 190	3 370	27 856	3 404	4 418	1 626	41 864
University of Limpopo	10 755	4 491	1 058	5 945	22 249	8	525	18 566	1 218	1 743	189	22 249
Nelson Mandela Metropolitan University	9 170	9 481	3 281	4 665	26 597	589	11 079	11 164	1 285	2 028	452	26 597
North West University	11 707	9 465	25 394	12 187	58 752	179	18 040	26 316	10 341	2 828	1 048	58 752
University of Pretoria	23 494	9 084	16 453	8 476	57 508	492	4 726	31 148	12 723	6 559	1 860	57 508
Rhodes University	2 104	1 585	782	2 925	7 395	38	64	5 179	789	905	420	7 395
University of South Africa	39 570	129 443	72 113	95 160	336 286	14 307	83 943	199 392	32 217	5 254	1 173	336 286
University of Stellenbosch	13 189	5 933	1 566	6 822	27 510	989	36	16 480	3 625	5 072	1 308	27 510
Tshwane University of Technology	21 127	17 146	3 526	9 913	51 711	59	38 942	10 549	343	1 510	308	51 711
University of Venda	4 631	1 936	1 623	2 134	10 323	5	387	8 592	639	560	140	10 323
Vaal University of Technology	11 363	7 832	1	2 005	21 201	177	18 080	2 731	66	130	17	21 201
Walter Sisulu University	7 659	6 582	4 434	5 938	24 613	0	14 205	9 378	645	351	34	24 613
University of Western Cape	7 117	2 669	1 806	8 000	19 591	0	496	15 099	1 882	1 511	603	19 591
University of Witwatersrand	14 391	5 327	3 213	7 506	30 436	347	530	19 940	2 568	5 627	1 424	30 436
University of Zululand	3 000	2 218	5 546	5 670	16 434	101	2 312	12 571	933	338	179	16 434
Mangosuthu University of Technology	6 327	3 650	0	825	10 802	0	10 528	274	0	0	0	10 802
Total	273 282	282 299	168 608	229 184	953 373	22 637	281 280	500 430	85 501	49 561	13 964	953 373

Source: DHET (2014:6).

NUMBER OF STUDENTS WHO GRADUATED FROM PUBLIC HIGHER EDUCATION INSTITUTIONS BY MAJOR FIELD OF STUDY, QUALIFICATION TYPE AND INSTITUTION, IN 2012

Institution	Major Field of Study					Formal Qualification					
	Science, Engineering and Technology	Business and Management	Education	All Other Humanities and Social Sciences	Total	Undergraduate Certificates and Diplomas	Undergraduate Degrees	Postgraduate Below Master's Level	Master's Degrees	Doctoral Degrees	Total
Cape Peninsula University of Technology	3 309	2 857	752	975	7 892	4 552	2 923	267	126	24	7 892
University of Cape Town	2 673	1 757	365	1 943	6 737	208	3 330	1 921	1 080	198	6 737
Central University of Technology, Free State	1 203	906	639	411	3 159	1 691	1 122	320	21	5	3 159
Durban University of Technology	2 486	2 226	167	1 023	5 902	3 999	1 834	0	63	6	5 902
University of Fort Hare	582	512	379	1 106	2 578	106	1 640	606	183	43	2 578
University of the Free State	2 256	1 596	1 291	1 330	6 473	613	2 850	2 381	535	94	6 473
University of Johannesburg	3 147	4 936	1 032	2 296	11 410	3 647	5 238	1 986	430	109	11 410
University of KwaZulu-Natal	2 908	1 726	2 591	2 263	9 488	1 341	5 236	1 937	797	177	9 488
University of Limpopo	1 701	850	389	1 358	4 298	177	3 021	816	273	17	4 304
Nelson Mandela Metropolitan University	2 112	1 972	971	922	5 976	2 314	2 400	758	418	86	5 976
North West University	2 901	2 454	6 653	2 661	14 669	5 351	4 771	3 723	670	154	14 669
University of Pretoria	4 419	2 602	4 368	2 020	13 408	2 005	5 604	4 199	1 400	200	13 408
Rhodes University	598	485	295	919	2 297	49	1 286	664	231	67	2 297
University of South Africa	2 057	8 228	10 178	5 747	26 210	7 563	10 051	7 613	831	152	26 210
University of Stellenbosch	3 072	2 108	597	1 904	7 681	10	3 477	2 514	1 440	240	7 681
Tshwane University of Technology	4 073	3 824	800	2 060	10 757	7 404	2 989	133	187	44	10 757
University of Venda	807	281	309	367	1 764	92	1 380	263	25	4	1 764
Vaal University of Technology	1 636	2 022	0	272	3 930	2 877	1 006	0	45	2	3 930
Walter Sisulu University	1 233	1 581	782	1 230	4 826	2 751	1 777	251	45	3	4 827
University of Western Cape	1 445	578	369	1 315	3 705	202	2 122	955	351	75	3 705
University of Witwatersrand	2 615	1 506	955	1 733	6 809	329	3 545	1 651	1 134	150	6 809
University of Zululand	558	348	1 599	1 561	4 066	515	3 047	427	49	28	4 066
Mangosuthu University of Technology	1 058	691	0	202	1 951	1 858	93	0	0	0	1 951
Total	48 848	46 044	35 478	35 617	165 986	49 654	70 742	33 385	10 334	1 878	165 993

Source: DHET (2014:13).