

**DURBAN UNIVERSITY OF TECHNOLOGY**

**INVESTIGATING THE IMPERATIVES OF RESEARCH  
TRANSFORMATION AT A UNIVERSITY OF TECHNOLOGY  
IN SOUTH AFRICA**

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TRANSFORMATION AT A UNIVERSITY OF TECHNOLOGY  
IN SOUTH AFRICA**

Submitted in fulfilment for the requirements of the  
degree of Doctor of Philosophy in Management Sciences  
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at the Durban University of Technology

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## DECLARATION

I, Chandrakala Daya Jinabhai, hereby declare that:

- i. The research reported in this thesis, except where otherwise indicated, is my original research and has not been submitted for any degree or examination at any other University.
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CD JINABHAI

Signature:

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## ABSTRACT

This case study investigated the imperative of research transformation amongst academics at the selected Mangosuthu University of Technology (MUT) in South Africa, considering its low ranking of research output amongst 26 public higher education institutions (HEIs) by the South African Department of Higher Education and Training.

The research problem for this case study was designed to investigate the main mitigating factors and barriers that inhibited academic careers of staff at this institution to transform to become productive researchers from a system dynamics perspective. Hence, the significance of this study was to address one of the three pillars of HEIs in terms of its research transformation and research productivity at this institution. Furthermore, this case study established how environmental dynamics holistically influenced academic staff to engage or not engage in research transformation. This was despite lucrative financial benefits offered, namely, research funding and study leave including other concrete incentives associated with research transformation. This was initiated for academic staff to *inter alia*, improving staff qualifications towards Master's and Doctoral qualifications, conference presentations, technology transfer and knowledge production, and publications in accredited journals to produce the anticipated measured research output. Whilst there are a few prolific researchers within a few departments, it is alarmingly short in its endeavour towards attaining DHET research output goals and research transformation holistically at MUT.

The aim of this study was to explore and develop an original system dynamics causal loop model with various components underscored by critical systems thinking and its impact of the holistic study *per se*. The research design for this study adopted a qualitative interpretative paradigm linked to system dynamics and the variables of the Causal Loop Diagram Model with an Interviewing Schedule. Thus, data was collected using a semi-structured interviewing schedule with open-ended questions in sync with a qualitative research design. Individual interviews were conducted with five academic staff members from each of the three faculties. Additionally, interviews with a focus group of six participants with similar interests were also included for the interviews. The key variables of the Causal Loop Model were tabulated and linked to research

transformation from the participants at MUT. The data analysis collected from the interviews and policy documents were analysed under each of the research questions. Both participants' reflections and institutional factors were also assimilated for the data analysis, *vis-à-vis*, research transformation at MUT.

The findings revealed several individual and institutional factors contributing to low research transformation at this institution, namely, a small number of academic staff with PhDs, an uneven staff to student ratio, heavy workloads on teaching staff with limited time to engage in research productivity, unawareness of available incentives, lack of retention strategies of talented staff, poaching of academic staff, the interpretation of sabbatical leave and mentoring and supervision support initiatives.

Furthermore, the study found several enablers aligned to research capacity building initiatives and critical factors to support a research culture at this institution. The main recommendations suggested were, *inter-alia* a buy-into research transformation by Executive Management and academic staff, improvement of vertical qualifications, supplementing academic support staff and tutors, employment of additional retired research professors, offering of structured mentoring and supervision assistance, specific training related to research productivity, review of the teaching workloads, implementation of sabbatical leave and retention policies. Finally, this case study has shown empirical evidence for further research opportunities related to research transformation in the higher education sector that could interface with the perceptions of research productivity and accelerate research outputs in peer reviewed accredited journals.

**Keywords:** research transformation, research productivity, research-led universities, research informed UoTs, systems thinking, system dynamics, causal loop feedback.

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## **ACRONYMS**

CAS	Complex Adaptive Systems
CESM	Classification of Educational Subject Matter
CHE	Council of Higher Education
CLD	Causal Loop Diagram
CPUT	Cape Peninsula University of Technology
CSH	Critical Systems Heuristics
CU	Comprehensive universities
CUT	Central University of Technology
DHET	Department of Higher Education and Training
DUT	Durban University of Technology
EACEP	Existing Academics capacity enhancement programme
FPP	Future Professors Programme
HDI	Historically disadvantaged institution
HE	Higher Education
HEI	Higher Education Institution
HELMP	Higher Education Leadership and Management Programme
HEQC	Higher Education Quality Committee
HOD	Head of Department
HR&D	Human Resources and Development
IR	Industrial Revolution
MUT	Mangosuthu University of Technology
NCHE	National Commission on Higher Education
NDP	National Development Plan
NESP	Nurturing emerging scholars programme
NGAP	New Generation of Academics Programme
NRF	National Research Foundation
NSFAS	National Student Financial Aid Scheme
OECD	Organisation for Economic Corporation and Development
PQM	Programme Qualification Mix
PSET	Post-School Education and Training
RDG	Research Development Grant
RSA	Republic of South Africa
SA	South African
SA DHET	South African Department of Higher Education and Training
SA HE	South African Higher Education
SATN	South African Technology Network
SD	System Dynamics



SLP	Short Learning Programmes
SODA	Strategic options development and analysis
SSAUF	Staffing South Africa's Universities Framework
SSEP	Supplementary Staff Employment Programme
SSM	Soft Systems Methodology
TDG	Teaching and Development Grant
TLDC	Teaching and Learning Development Centre
TUT	Tshwane University of Technology
UCDP	University Capacity Development Programme
UCDG	University Capacity Development Grants
UoT	University of Technology
USDP	University Staff Development Programme
VSM	Viable systems modelling
VUT	Vaal University of Technology
4IR	Fourth industrial revolution

# **CHAPTER ONE**

## **INTRODUCTION AND OVERVIEW OF THE STUDY**

### **1.1 INTRODUCTION**

The landscape of Higher Education Institutions (HEIs) in South Africa has made noteworthy changes in terms of transformation post-1994 to redress past imbalances. According to Badat (2010), there has been a wide array of transformation-oriented initiatives, post-1994, seeking to effect institutional changes, *inter alia*:

- ❖ the definition of the purposes and goals of higher education;
- ❖ extensive policy research, policy formulation, adoption, and implementation in the areas of governance, funding, academic structure, programmes and quality assurance;
- ❖ the enactment of new laws and regulations, and
- ❖ major restructuring and reconfiguration of the HE institutional landscape.

These initiatives have often tested the capacities and capabilities of the state and HEIs and have affected the pace, nature and outcomes of transformation. The ultimate aim of post-1994 transformation in HEIs was the development towards offering a single coherent system of quality education to all South Africans that would contribute to economic, social and technological advancements of this new country (Bozalek and Boughey 2012).

### **1.2 BACKGROUND TO THE STUDY**

#### **1.2.1 Global environment**

According to Boulton and Lucas (2011), governments globally consider HEIs holistically as major contributors to the accomplishments of many national priorities. Furthermore, it is through research transformation and research productivity that universities generate new opportunities in teaching, profiling their graduates with the requisite knowledge sources for economic, social, cultural and utilitarian benefits valued by society. However, Deem, Mok and Lucas (2008) contend that funding for

research transformation at universities is a challenging issue when attempting to engage and compete globally on research ranking with limited resources. Moreover, Aghion, Dewatripont, Hoxby, Mas-Colell and Sapir (2010) attest that research transformation can be improved at European and American countries when sufficient autonomy and competition are provided to ameliorate University research funding. Additionally, Aghion *et al.* (2010) maintain that when universities operate with sufficient autonomy, they become better at research transformation when the level of funding distributed by merit-based competition is higher. In this way, Aghion *et al.* (2010) state that government enables universities to utilise their funding and autonomy better and respond more productively to local competition (Aghion *et al.* 2010).

Furthermore, Deem, Mok and Lucas (2008) emphasise that governments in Europe and Asia are conducting wide-ranging reviews and introducing strategies to restructure their higher education systems to boost their global University ranking towards becoming “world-class” universities through research transformation. Their ultimate intention is to reform measures to increase their research productivity by promoting University research networks and international collaboration thereby aiming at a higher ranking in the global University association.

### **1.2.2 Developed countries and HE trends**

Sursock, Smidt and Davies' (2010) expound that European universities in developed countries consider themselves as knowledge-based institutions that create new knowledge via research productivity which is transferred through teaching and innovation. Moreover, in knowledge-driven societies, critical success factors are the imperatives to establish integration between research productivity, teaching and innovation and the reinforcement of these links in the knowledge chain (Sursock, Smidt and Davies' 2010). Sursock, Smidt and Davies' (2010) assertion supported by Wessner (2013) maintains that a crucial element in the upsurge of the United States as a technological powerhouse has resulted in the collaboration between industry and a nexus with first-class research universities. The opinion of Wessner (2013) is shared by Perkmann, Tartari, McKelvey, Autio, Broström, D'este, Fini, Geuna, Grimaldi and Hughes (2013) and Witty (2013). Furthermore, Wessner (2013) points out that the fundamental success of innovation clusters, for example, in the Silicon Valley and the

Research Triangle of North Carolina are local universities with a long-established mission of stimulating economic development through research productivity by emerging and transferring technology to local industry, thereby stimulating the foundation of new businesses in University-centred incubators and science parks.

Becker, Cummins, Davis, Freeman, Hall and Ananthanarayanan (2017) assert that much emphasis is placed on research productivity over teaching as one of the criteria for promotion which impacts on quality learning experiences, necessitating academic staff to create a balance between the two and pursue relevant professional development with limited budgets. A Gallup survey conducted on members of Executive Management at American colleges and universities in Becker *et al.* (2017) revealed that 64% of them prioritised teaching roles over academic roles, whereas only 1% considered research productivity as an important responsibility. A further perspective highlighted by Becker *et al.* (2017) is the appointment of the majority of academic staff on a contract or part-time basis versus a permanent basis since the former had lower level of academic engagement, higher turnover and insufficient teaching quality, whilst academics with long term contract or permanent positions were assessed predominantly on their research productivity rather than teaching capabilities. Kim (2009) shares the viewpoint of Becker *et al.* (2017) and concede that more foreign academic staff in the United Kingdom were employed on flexible contracts.

### **1.2.3 Developing countries and HE challenges**

SA HEIs can initiate collaborative research projects with other African countries and other developing countries, for example, Brazil, Russia, India, China and South Africa (BRICS) (DHET 2014). Ziderman and Albrecht (2013) state that higher education in developing countries is of concern, especially with the increasing demand for access by students. According to Ziderman and Albrecht (2013), higher education is regarded as a mechanism of economic development. Consequently, there are pressures to create more graduates and research opportunities in technological and scientific studies. Furthermore, Ziderman and Albrecht (2013) stress that quality education includes providing better use of updated technology including computer facilities, adequate library resources, internship prospects, research capabilities and tutoring

options. However, this translates to the importance of recruitment and retention of talented academic staff to ensure that students receive quality education that is technologically relevant for the industry.

Additionally, Macfarlane (2011) points out that the increasing influence of the German model of higher education and the Doctoral degree as a qualification for academic staff had become a custom for HEIs in the United Kingdom for almost three decades. Furthermore, Macfarlane (2011) explains that research productivity was never a traditional part of the academic pursuit of the former UK polytechnics and some of the older universities. The opinion of Macfarlane (2011) is also shared by Du Pré (2010) and Johnson and Louw (2014) regarding minimal inclination towards research productivity of former Technikons (renamed Universities of Technology) in South Africa.

#### **1.2.4 African universities**

Sehoole and De Wit (2014) report that the challenges and opportunities confronted by emerging and developing African countries in the 21<sup>st</sup> century was to acknowledge their own roles and strategies in the global environment. Furthermore, Berman (2011) and Sehoole and De Wit (2014) maintain that HEIs play a pivotal role in knowledge production through research productivity, capacity building and fulfilment of the socio-political and economic development needs of their regions, including teaching and learning as well as creating research collaboration across borders with other developing partnerships to boost global competitiveness.

Teferra and Knight (2008) report that research productivity in HEIs are knowledge gateways of the world and are being revitalised, retooled and reconfigured purposefully to address national developmental goals with an international dimension and to enhance global competitiveness (Sehoole and De Wit 2014). Teferra and Knight (2008) postulate that it is vital for universities to produce graduates that promote social cohesion by evolving citizens as critical thinkers with the ability to surpass local allegiances and to approach global problems as citizens of the global environment. Moreover, Teferra and Knight (2008) argue that in order to develop research capacities at African universities, additional funds were required, and the University Executive

Management needs a strategy on how to utilise scarce resources to develop rational research agendas in collaboration with local and global partners.

### **1.2.5 South Africa as a developing country: traditional, comprehensive and UOTs**

South Africa as a developing country introduced many relevant and related government policy documents post-1994. This initiative was prompted to ensure that HEIs showed a reflective and ethical responsibility to persevere and sustain a high level of economic growth, develop a new knowledge base to ensure economic change and compete in the international arena in its quest for excellence.

The White Paper on Higher Education by the DHET (2013b) identifies the roles of all SA public universities as producing graduates with high-level skills for the labour market, and as centres of research excellence and innovation to ensure that South Africa operates and competes in a technologically advanced global environment for sustainability. Furthermore, The White Paper on Higher Education by DHET (2013b) emphasises that to achieve South Africa's developmental goals, the associated scientific knowledge production emanating from research productivity in the HE sector must increase to boost the quality of life of the society and to fortify the economy.

Since the democratic dispensation in South Africa in 1994, the National Commission on Higher Education (NCHE) transformed the new HE framework for diversification within a single coordinated HE system that acknowledged current institutional missions and capacities, addressed distortions created by the apartheid legacy and reacted to emerging regional and national needs (NCHE 1996). This resulted in the proclamation of the Higher Education Act No. 101 (Department of Education 1997) and thereafter confirmation by the National Plan on Higher Education (NPHE) (Department of Education 2001b). According to DHET (2013b), the aim was to create a unified SA post-school education with a diversity of institutional types, missions and identities, social and educational purposes and goals, institutional sizes, modes of provision, admission requirements, articulation within the sector, academic standards as appropriate to specified goals and programme qualifications.

The NPHE in the Department of Education (2001a) differentiated three institutional types according to the proposed programme differentiations, namely, traditional universities, Universities of Technology (formerly Technikons) and comprehensive universities (CU) that were hybrids of traditional universities and UoTs. Furthermore, traditional research-led universities would focus on niche areas of 'traditional' general formative and professional undergraduate and postgraduate programmes. On the other hand, UoTs would focus on career-oriented programmes mainly at certificate, undergraduate and diploma levels, Bachelor of Technology (B.Tech) degrees and subject to the statutory bodies' approval, offer a limited number of postgraduate programmes (i.e. Master's and Doctorates in Technology) in identified areas of strength whereas CUs would offer a combination of programmes from traditional universities and UoTs (Omal and Akala 2018). The B.Tech programmes at UoTs were phased out and replaced with the Advanced and Postgraduate programmes aligned to the Higher Education Qualifications Sub-framework (HEQSF) (Department of Higher Education and Training 2013). One of the key characteristics of the HEQSF was to facilitate qualification articulation across the HE system and assist students to identify potential advancement courses, especially in the context of lifelong learning (Department of Higher Education and Training 2013) (hereafter referred to as DHET).

Additionally, Dlamini (2016) explains that CUs were established with mergers of traditional universities and Technikons to increase access, *inter alia*, to research productivity and capacity as a result of consolidating institutional resources and knowledge capacity.

#### **1.2.6 South African UoTS**

Universities of Technology (UoTs) in South Africa are a "new kid" or "new generation University" in the higher education sector, having changed its nomenclature from Technikon to the status of a University of Technology from 2002 onwards. Moreover, Du Pré (2010) reports that Technikons focused on educational programmes that were technologically career-driven with a regular system of industry advisory boards attached to each programme. Furthermore, Garraway and Winberg (2019) attest that a distinctive characteristic of the former Technikons was a unique workplace-oriented identity providing access to students with lower admission requirements than the

traditional universities. The programmes offered at the former Technikons provided students with some form of structured work-integrated learning (WIL) that exposed them to industry, which enhanced their opportunities for employment immediately after graduation.

However, the status of the new UoTs as decreed lacked such clarity since no prerequisites for changing from Technikon to UoTs were identified. According to Bunting and Cloete (2004), Du Pré (2009) and Du Pré (2010), some of the proposed characteristics of the UoTs were, *inter alia*, excellence in teaching, WIL and industry partnerships, entrepreneurship, centres of excellence in research and innovation and adding value to the economy at regional, national and international levels. However, Garraway and Winberg (2019) report that most SA UoTs desire to achieve the status of German Technische Universitäten or the American Institutes of Technology; but lack the historical evolution, research excellence and prestigious reputation of these institutes.

### **1.2.7 Challenges of UOTs/MUT**

Mtshali and Sooryamoorthy (2019) report that the transformation of Technikons to UoTs as an addition to the higher education system was one of the reforms in the post-apartheid era in South Africa that at the time did not have a tradition to sustain a research profile. Several authors reported that the challenges carried forward from the Technikons to UoTs were, *inter alia*, a lack of research culture, limited infrastructure resources, lack of academic leadership at the Head of Department levels (originally recruited from industry) and very few staff had acquired PhD qualifications to conduct research (McKenna 2009; Breier and Herman 2017; Mtshali and Sooryamoorthy 2019; Sobuwa and McKenna 2019).

Du Pré (2010) notes that UoTs are perceived by society either according to the scientific knowledge it produces through research or on its knowledge transfer capabilities through teaching and learning in addition to the efficacy of technology it generates. Dyason, Lategan and Mpako-Ntusi (2010) concur with the viewpoint of Du Pré (2010) and amplify that UoTs should relentlessly endeavour through research



transformation to create, generate and manage innovative knowledge transfer to the broader society.

Mangosuthu Technikon, established in 1979, is the youngest Technikon in the public higher education sector. Mangosuthu Technikon did not merge with any other institution and changed its nomenclature to Mangosuthu University of Technology (MUT) in 2007. MUT attracts talented students who are in the main academically underprepared and hail from either disadvantaged rural areas or economically under-resourced backgrounds. In 2018, the Vice-Chancellor admitted that one of the major challenges confronting MUT was its poor research output indicators in the higher education sector which placed them at the bottom of the ranking order (Malaza 2018). Several annual DHET reports on the evaluation of the universities' research outputs corroborate with the opinion of Malaza (2018).

### **1.3 DEFINITIONS OF KEY TERMS**

The following explanations are provided for key terminology used throughout this study to ensure consistency and uniformity.

#### **1.3.1 Higher Education (HE)**

Higher Education (HE) means all learning programmes offered at universities after the completion of secondary education whether in private or public institutions. These institutions of learning must be registered in accordance with the provisions of the National Qualifications Framework Act, 2008, (Act No. 67 of 2008), as a qualification or part qualification on Higher Education Qualifications Sub-framework (Higher Education Amendment Bill 2015) (Republic of South Africa 2009). Additionally, HE or universities are reflected as one of the oldest types of academic institutions in the world.

#### **1.3.2 University of Technology (UoTs)**

Some Technikons merged with traditional universities and were categorised CUs whilst most former Technikons, either merged or unmerged, in South Africa were renamed Universities of Technology (Department of Education 2001a).

### **1.3.3 Academic staff**

Academic staff means “any person appointed to teach and or to conduct research at a public HEI and any other employee designated as such by the council of the institution” (Republic of South Africa 1997b: 4).

### **1.3.4 Research output**

The South African Department of Higher Education and Training’s research output policy (DHET 2015a: 4) defines research output as “textual output where research is understood as original, systematic investigation undertaken to gain new knowledge and understanding”. Furthermore, a fundamental prerequisite of all recognised research outputs must be peer-reviewed as a measurement of quality. All public HEIs are required annually to submit their subsidy claims to DHET for major research outputs of the preceding year.

### **1.3.5 Research productivity**

According to DHET (2015a), research productivity is encouraged and refers to major types of research output rewarded in the form of published articles in accredited journals, scholarly books and book chapters and approved published conference proceedings by HEIs.

### **1.3.6 Research transformation**

Transformation at South African Universities is manifold and has diverse elements. According to Pandor (2018), the concept of transformation refers to a desired change in the post-apartheid era in the South African HE sector and transformation is commonly used by various stakeholders, researchers and policymakers. Furthermore, the South African Human Rights Council (2017) in the post-apartheid era refer to transformation impacting all aspects of the public higher education sector such as “governance, management and leadership, reasonable access and academic success of students, institutional equity, institutional cultures, progressive and inclusive of teaching and learning, research and knowledge systems, and the political economy of higher education funding.”

Additionally, the White Paper on Higher Education Transformation (DHET 1997), emphasises that transformation in a post-apartheid era is not a choice for the South African Higher education sector when referring to its structures, values and culture in a newly adopted single democratic governance system to redress past inequalities. Originally, Mangosuthu University of Technology (MUT) was established as a Technikon recognised as a historically disadvantaged institution whose research output over the years had been listed in the lowest ranks of the higher education sector by DHET's evaluation of universities research output.

Hence, the context of this case study focuses on one of the pillars of HEIs, namely, research transformation towards a positive trajectory for change at MUT and to be inclusive in the higher education sector in the post-apartheid era in South Africa.

### **1.3.7 Research-led University**

Research-intensive, research-led, research-orientated, “world-class” University (Altbach 2003), the “scientific” University (Barnett 2011) or the “flagship” University (Douglass 2014) are often expressions utilised in the extant literature when mentioning universities with high research outputs and a culture of research excellence, and are well-resourced and listed on the world rankings (Douglass 2014). According to DHET (2013b), research-intensive universities in South Africa were identified as undertaking “cutting-edge” research and identified as core valuable assets that should contribute competitively to the knowledge and global economy. Furthermore, DHET (2017) highlights that one of the characteristics of a research-intensive University is indicated by the growth in postgraduate enrolments and graduations in Master's and PhDs. In this case study, research-led University refers primarily to traditional universities in South Africa where the allocation for research resources are well endowed and ranked highly by the South African Department of Higher Education and Training based on their research output and research productivity.

### **1.3.8 Research-informed University**

Applied research and research informed are terms synonymous to UoTs whereby their research is of an applied nature with industry links to ensure the relevance of their programmes (Du Pré 2010). Furthermore, most UoT graduates are acquainted with

the functioning of industry, by providing them with some form of work-integrated learning (WIL) before graduation. Moreover, graduates can apply their research skills to identify the problems and needs of society and industry and find solutions to these problems (Du Pré 2010).

In this case study, research-informed University refers to the research output of UoTs in South Africa where the allocation for research resources are limited due to low research outputs. Furthermore, the South African Department of Higher Education and Training publishes and ranks the research output of traditional universities, especially previously historically white institutions at the top of the list, followed by CUs, whilst historically black universities and UoTs are at the bottom of the ladder as a consequence of low research productivity.

### **1.3.9 Executive Management**

In this case study, Executive Management at MUT refers to the Vice-Chancellor and Principal assisted by the Deputy Vice-Chancellors, the registrar, the chief financial officer, senior directors and the Deans of the faculties who are responsible for strategic leadership and the operational management of the MUT.

### **1.3.10 Systems Thinking**

Sterman (2006) postulates that systems thinking as a philosophy is gaining momentum globally for its inclination to address complex problem situations. A systems thinking approach examines an organisation's structure holistically to ensure integration of different parts of a system influencing one another within a whole, maximisation of resources, activities, processes and policies as well as linking the parts to create efficient processes (Sterman 2006).

In this case study, the utilisation of systems thinking is to circumvent a reductionist approach and empower academics as knowledge seekers, creators and visionaries to think bigger and better and to provide long term solutions holistically that will make a significant impact on research transformation at MUT and its improved contribution towards research output in the Higher Education sector. The goal is to recognise and understand the current status of MUT related to research transformation and succeed

in changing the mental models and behaviour of academic staff and the system holistically.

### **1.3.11 System Dynamics**

System dynamics is one of the approaches of systems thinking to understand and solve complex problems in a holistic manner. According to Forrester (1993), system dynamics is designed to model the nonlinear behaviour of constantly changing complex systems applicable to dynamic problems arising in a wide array of disciplines namely, business management, politics, economics, education, engineering, environmental change, medicine and other fields. As a precursor, Forrester (1993) asserts that the methodology in system dynamics provides the basis for analysing how actions and reactions cause and influence each other and its impact on the system as a whole. This is done by determining the variables and creating multiple causal feedback loops (either balancing or reinforcing) which influence each other in complex ways to solve problems.

In this case study, a qualitative system dynamics methodology was utilised to stimulate the mental models of the participants interviewed and their perceptions of the problem being investigated. Additionally, examination of pertinent documents and archival data was envisaged to add value to the study holistically.

## **1.4 PROBLEM STATEMENT**

According to Badat (2010), the purpose of HEIs is to provide knowledge, innovation and research skills to strengthen social, scientific and economic development to enable all its citizens and country to prosper both locally and globally for future sustainability. However, coming from an apartheid era, the majority of the South African population was deprived of access to tertiary education freedom because of the draconian education system pre-1994.

The tripartite roles of HEIs are teaching and learning, research (both attract funding and subsidy income) and community engagement. According to (DHET 2013a), South African HEIs need an improved trajectory towards research productivity, especially in

low research-intensive universities. One of the contributing factors of dismal research productivity reported by DHET (2013a) was the low staff qualifications of academic staff without Master's and Doctorates degrees.

The total research output of SA UoTs between 2006 and 2010 as per Table 1.1 indicates that MUT's total research output as a percentage of total public HEI's was 0.1% in accredited journals, books/book chapters and approved published conference proceedings, which is far below its counterparts. These statistics are further supported by the DHET reports on the evaluation of the universities' research output index released each year from 2013 to 2018 which indicated that the Mangosuthu University of Technology was the last ranked out of 23 public HEIs in South Africa (currently 26). It must be noted that MUT was expected to merge with Natal Technikon and ML Sultan Technikon. However, MUT remained independent and was the only institution that did not merge with any other public HE institution for reasons unknown. This could be one of the consequences for the low research output at MUT since merged public HEIs would have consolidated their staff complement as well as aggregated their research output.

**TABLE 1.1 TOTAL RESEARCH OUTPUT OF UoTs FOR THE PERIOD 2006 - 2010**

UoTs	2005	2006	2007	2008	2009	2010
TUT	1.2%	1.3%	1.3%	1.7%	1.4%	1.9%
CPUT	0.9%	0.8%	0.6%	1.0%	1.4%	1.6%
DUT	0.3%	0.4%	0.5%	0.3%	0.5%	0.5%
VUT	0.2%	0.3%	0.2%	0.2%	0.4%	0.5%
CUT	0.4%	0.5%	0.4%	0,3%	0,4%	0,4%
MUT	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%

**SOURCE:** (DHET 2011: 16). Adapted.

South Africa, as a developing country, together with the changes in the higher education landscape since the advent of democracy resulted in the massification of higher education, characterised by a rapid increase in student enrolment. The massification of education is further emphasised by Mohamedbhai (2008), contending

that it is a global phenomenon, emanating from prevailing issues such as the democratisation of education, the advent of the knowledge economy and globalisation.

In the South African context, the massification of student enrolment in public HEIs increased from 473 000 in 1993 to approximately 799 388 in 2008 (Badat 2010). Whereas by the 2013 academic year, the total student headcount enrolment at the 23 established SA public universities reached 983 698 which included both full-time and part-time students for contact and distance studies (DHET 2016b). The ultimate national aim was to increase the total headcount enrolments to 1.62 million by 2030 as envisaged by the National Development Plan [NDP] (National Planning Commission 2012) and the White Paper for Post-School Education and Training (DHET 2013b).

Targeting access to previously disadvantaged learners in South Africa has created its own challenges by not providing historically disadvantaged institutions (HDIs) the requisite support and resources timeously (Msila 2006). Institutional massification also impacted MUT when student enrolment surged within a short period from 5 700 in 2000 to 10 100 in 2006 (Cloete 2008). As a result of this rapid enrolment growth with no additional requisite resources, the Minister of Higher Education advised MUT to maintain a target headcount enrolment of 10 000 for 2010 with an acceptable capped headcount enrolment target of 11 500 students in 2015 to 12 500 students by 2019 (MUT 2014).

For the period 2000 to 2006, MUT's total permanent academic staff decreased gradually despite increased student enrolment. As a consequence, this placed immense pressure on existing staff to carry additional teaching workloads, deliver the same courses in the day as well as in the evening to maintain consistency in delivery, notwithstanding the associated administrative burden. Moreover, the staff/student ratio remained well above the national target at 1:44 (Cloete 2008), whilst in 2012 the staff/student ratio decreased to 1:40 which was still far above the institutional average of 1:28 (DHET 2015b). This is the highest student to staff ratio in the public higher education sector for contact students. This resulted in academic staff having little or no time dedicated to pursuing vertical qualifications, research transformation and community engagement.

The research problem for this case study was designed to investigate the main mitigating factors and barriers that inhibit academic careered staff at the MUT to transform to become productive researchers from a system dynamics perspective. Furthermore, this case study established how MUT's environmental dynamics holistically influenced academic staff to engage or not engage in research transformation. This was despite incentivised financial benefits for research development grants, agency funding, study leave (Bernhardt, Andrew and Walker 2011) including other genuine incentives associated with research transformation, *inter alia*, improving staff qualifications towards Master's and Doctoral qualifications, innovations, conference presentations, technology transfer, and knowledge production, to produce the anticipated research output. Whilst there are a few prolific researchers within a few departments, it is insufficient towards research transformation and the growth trajectory of research outputs at MUT holistically.

### **1.5 AIM OF THE STUDY**

The aim of this study was to explore and develop a system dynamics causal loop model linked to research transformation from participants at a selected SA HEI, namely, the Mangosuthu University of Technology (MUT). Thus, the aim of the study was to promote research transformation amongst academic staff at MUT. For this case study, the selected participants' reflections and institutional factors were assimilated when leveraging research transformation at MUT.

### **1.6 RESEARCH QUESTIONS**

Whilst teaching and learning is the core business of any HEI, research and community engagement are intrinsic drivers to academia. The focus of all HEIs, especially the UoT sector in South Africa, is *inter alia*, on improvements of staff qualification, increasing post-diploma qualifications, increasing research productivity, producing Master's and PhD graduates, conference presentations, knowledge production, technology transfer, and research innovations. In a qualitative study, Creswell (2009) explains that researchers state research questions and not objectives or hypotheses. Therefore, the Research Questions for this study are:



- ❖ What are the contributing factors to the low research output at the MUT?
- ❖ What capacity-building initiatives are in place towards the advancement of research transformation for the MUT?
- ❖ What are the institutional enablers for academic research transformation at the MUT?
- ❖ What are the critical factors to support a research culture at the MUT?

The above questions are necessary for discussing the context of the research transformation at MUT, which was the only UoT that remained unmerged from the previous Technikon sector. According to Chetty (2010), MUT initially attended as observers during the merger of Natal Technikon and ML Sultan Technikon but later chose to withdraw from the merger process for reasons unknown. In KwaZulu-Natal, the Durban University of Technology (DUT) arose from the merger of ML Sultan Technikon (historically disadvantaged institution) and Natal Technikon (historically advantaged institution) in 2002 since these two Technikons resided virtually next to each other in central Durban. As a result of this merger, it was envisaged that DUT's research profile (in terms of consolidated research output) ranks far better in the University of Technology sector than that of the MUT which is central to this case study.

## **1.7 SIGNIFICANCE OF THE STUDY**

The significance of this study is to address one of the three pillars of the South African Department of Higher Education and Training (SA DHET) in terms of its measured research outputs and transformation at the MUT. The imperatives of active researchers amongst academics in the South African HEIs are multiplex, for example, research enhances the knowledge towards quality teaching and learning, moulds the graduate holistically to benefit society and the local and global community economically. Additionally, the expected significance of this study is to apprise MUT staff that the restructuring of the previous South African Technikons to Universities of Technology from 2003 to 2007 is inclusive of all the public South African Higher Education (SA HE) sector and its deliverable mandate.

Moreover, the mandate of the SA HE sector is inclusive of research productivity which was not of significance when Technikons were in existence. Additionally, research

output data released by DHET (2011) indicates that all the UoTs are lower ranked compared to traditional universities and CUs. The data released by DHET are also supported by Maphalla and Malan (2014) and indicated in Table 1.1. Thus, the significance of this study is to make an original contribution to the body of knowledge with the development of a qualitative system dynamics model using causal loops related to research transformation at the MUT. The significant archetypes are investigated in relation to systems thinking to view MUT holistically towards research transformation.

Public SA HEIs as non-profit institutions are expected to do more with fewer resources to operate in a knowledge-based economy. Therefore, this case study unfolds research transformation and research productivity as a multifaceted approach towards institutional improvement and enhancing value to all its stakeholders from a holistic systems thinking perspective. Furthermore, this case study determines the justification and improvement of the associated low research outputs at MUT. Moreover, it is contended that the development of a system dynamics model using causal looping as a framework will guide the leadership of the institution towards a paradigm shift to reposition itself to increase quality research productivity and nurture research capabilities amongst academic staff. More importantly, it is imperative that MUT's management acknowledges the current status of research output, and provide the requisite support, resources, regular monitoring and evaluation to boost its research transformation.

## **1.8 DELIMITATIONS, LIMITATIONS AND SCOPE OF THIS CASE STUDY**

This case study is delimited to a public higher education sector in South Africa and more specifically focuses on the Mangosuthu University of Technology (MUT), a historically disadvantaged institution located in the heart of Umlazi, a township in KwaZulu-Natal, South Africa. Hence, the delimitation of this case study is MUT and excludes other public HEIs, namely, traditional universities or CUs as well as other UoTs in South Africa since each institution has its own distinctiveness, challenges and complexities. Moreover, MUT has its own variable challenges regarding research transformation that this case study addresses.

The limitation of this case study is that the analysis of the qualitative data from purposive sampling at MUT cannot be generalised to the other 25 public universities in South Africa. However, the researcher was mindful not to generalise the analysis of the qualitative data pertaining to all the academics at MUT, but specifically reflect the observations, experiences and opinions of the selected participants.

## **1.9 A BRIEF OVERVIEW OF THE LITERATURE**

The literature review in this section begins with a dissection of factors that impede research transformation in public HEIs and specifically at MUT, followed by integrating systems thinking, system dynamics with causal loop diagramming.

### **1.9.1 Strategic attributes for research transformation**

The section of the literature review dealing with the key characteristics crucial for research transformation at a South African University of Technology (i.e., MUT) is founded on the belief that University research expansion in the whole of Africa is the foundation for an advanced and progressive national and continental future. Research at African and South African universities is considered a key element of a better future through the creation and expansion of a research community that is ready and equipped to rethink and restructure the aims, objectives, processes and structures of the University and society in their entirety.

For this to be achieved, the research culture at a University is of fundamental importance and can be realised through honest communication, commitment from leadership, management, all stakeholders and role-players through a closely cooperative and conducive environment. According to Tong and Arvey (2015), such possibilities are founded on systemic complexities that lead to inevitable changes of human resources, strategies, tactics and or even confined objectives.

Addressing the fundamental authenticities facing academics and researchers at MUT regarding research transformation, the questions and answers regarding major issues are explored beginning with the question of daily workloads associated with health-related issues and dissatisfaction. Furthermore, Ali and Farooqi (2014), Akob (2016), Erat, Kitapçı and ÇÖMEZ (2017), and Osifila and Aladetan (2020) concur that workload

has been directly and indirectly interconnected with work ethics, employee welfare, morale, stress, increased student enrolment, commitment, job satisfaction as well as an overall performance by academics at all organisational levels.

Several researchers internationally have indicated that heavy academic workload has been the root cause of stress and burnout, which have direct and indirect negative consequences on the health of an individual including high blood pressure, migraines, fatigue, insomnia, and irregular sleeping patterns amongst others (Kinman and Wray (2014); Suarthana and Riana (2016); Akob (2016); Oleforo, Efanga, Abaa and Akpan (2017); Harmsen, Helms-Lorenz, Maulana and van Veen (2018). Moreover, Karimi and Alipour (2011) and Ali and Farooqi (2014) confirm that these validities have shown that heavy workloads have been instrumental in the existence of social, physical, and psychological vulnerabilities and health problems including burnout and stress that on most occasions have negative effects on both teaching and research productivity of academic staff.

Student massification has become a reality in South Africa following the massive enrolment of poor- and lower-middle-class students at universities, which led to a wide array of challenges in terms of infrastructure, facilities, technology as well as financial and human resources development. Maringe and Sing (2014) and Dean and Wright (2017) concur that this has become a problem throughout Africa and has been accepted as an inevitable development imperative for the realisation of the industrial revolution (4IR) (Selyutin, Kalashnikova, Danilova and Frolova 2017). Songkaeo and Yeong (2016) affirm that the massive expansion of student enrolments, especially in Africa, has created associated challenges. These include limited financial, physical and human resources, the inability to meet increasing demands for access, competitiveness, increasing corporatism, leadership weaknesses, relevance and quality of offered programmes, limited innovation and research capabilities of knowledge production (Songkaeo and Yeong 2016). Importantly, the opinion of Songkaeo and Yeong (2016) is shared by Marginson (2017) who further claims that limited resources in historically black universities force high-quality and productive researchers and academics to leave for greener pastures.

Blatchford, Chan, Galton, Lai and Lee (2016) state that massification is the most important element of the perpetually rising academic staff/student ratio which has been shown as one of the major elements of high student failure rates. Furthermore, the Association of African Universities (AAU) (2016) reported that massification, especially in Africa and South Africa, has serious ramifications on teaching and learning and the necessity of employing additional research and academic staff. According to Kipchumba (2019), massification results in increased workload leading to academics' lack of motivation for research as larger classes in teaching and learning processes, individual student assessments, test and examination invigilation and marking, significantly limit the time for research.

Talent retention and development of academic and research staff at a University is fundamental to new knowledge production. Furthermore, talent retention and development become major challenges at several levels for University leadership as research production has been considered an important element for the success of the National Development Plan. This creates a serious problem especially for Universities of Technology facing a scarcity of highly qualified researchers with Master's and PhD qualifications. Additionally, Theron, Barkhuizen and Du Plessis (2014) and Habib (2016) argue that these prolific researchers leave the tertiary sector for better financial rewards by joining the private sector or research-led universities. Furthermore, Xing, Marwala and Marwala (2018) concede that highly productive researchers impact directly and indirectly on University benefits such as requiring additional financial support, international conferencing, conducive work environment, promotions to higher levels and other fringe benefits.

On-line teaching, an integral part of the 4IR process and development, has impacted on the teaching experience of all sectors of education as the foundation of the continuous transformation of knowledge at all levels during the COVID-19 pandemic. The COVID-19 pandemic has offered a wide variety of experiences and challenges in the HE sector, especially in developing countries. According to Ramsarghey (2021), the COVID-19 pandemic emphasised the need for both academics and students to adjust suddenly to a new norm of teaching and learning by incorporating digital teaching aids into virtual classrooms. Inevitably different conditions and circumstances

in terms of knowledge, understanding, skills, financial and intellectual, institutional and organisational capabilities have been instrumental in the success or failure of such processes, especially in terms of adopting technology at all levels. However, Yusuf and Nabeshima (2007) claim that the prospects of academic staff to equally serve the students as well as their ambitions to elevate themselves in the terrain of fresh and innovative knowledge production depends on themselves together with institutional support through intellectual and financial resources. University researchers thus are obligated to become acclimatised to new technological priorities through skills and knowledge leading to advancement and innovation, data science and omnipresent digital platforms that change the processes of knowledge production (De Reuver, Sørensen and Basole 2018).

### 1.9.2 Types of research output as per National Research Foundation (NRF)

The National Research Foundation (2017) defines research as an “original investigation undertaken to gain knowledge and/or enhance understanding.” To inculcate a research transformation agenda at South African HEIs and especially at MUT, it is crucial to understand what types of research activities can be recognised and attract funding. According to Table 1.2, the NRF (2017) illustrates what can be included and excluded as research.

**TABLE 1.2 NRF’S INCLUSION AND EXCLUSION OF RESEARCH**

<b>NRF INCLUDES the following as Research</b>	<b>NRF EXCLUDES the following as Research</b>
❖ the creation and development of the intellectual infrastructure of subjects and disciplines (e.g., through dictionaries, scholarly editions, catalogues and contributions to major research databases);	❖ routine testing and analysis of materials, components, instruments and processes, as distinct from the development of new analytical techniques and
❖ the invention or generation of ideas, images, performances and artefacts where these manifestly embody new or substantially developed insights; and	❖ the development of teaching materials and teaching practices that do not embody substantial original enquiry.
❖ enhancing prevailing knowledge to develop new or improved materials, devices, products, policies and processes.	

**Source:** (NRF 2017: 2). Adapted.

According to Table 1.3, the National Research Foundation (2017) recognises the following major types of research output as significant although not exhaustive, for all SA HEIs to take advantage of including MUT which is research informed:

**Table 1.3 TYPES OF RESEARCH OUTPUT RECOGNISED BY NRF**

No.	Types of research output
1	Peer-reviewed primary research articles in accredited journals.
2	Academic publications of original research in peer-reviewed journals (printed or electronic), including invited articles and review articles refereed papers in scientific journals that have rigorous editorial and refereeing policies.
3	Refereed full-length papers in conference proceedings and edited scholarly books will be assessed on their merits.
4	Publications such as a review in a high-profile journal
5	A book or chapter in a book aimed at the research community, indicate a researcher's standing in the field and are also important.
6	Books of scholarship: these must be research-based and independently refereed, and aimed at the research community, as opposed to teaching material.
7	Chapters in scholarly books aimed at the research community subject to being peer-reviewed.
8	Other forms of output, such as technical reports, are judged on their scientific merit, and the submission should always include information on the research content of such outputs.
9	Registered patents and refereed conference proceedings will be judged on their merits.
10	In addition to published outputs, other evidence of the standing of a researcher that is important includes invited talks at conferences, membership of editorial boards, book reviews, visiting professorships etc.
11	Technical reports which may be classified as primary, secondary or tertiary, depending on their nature and accessibility.

**SOURCE:** (National Research Foundation 2017: 4-6). Adapted.

In relation to Table 1.3, the National Research Foundation (2017) clarifies that an essential measurement in assessing research outputs is whether they are peer-reviewed; although publication in 'high impact' journals is noted, sometimes it may be opportune to publish in a specialist journal with a lower impact factor. The National Research Foundation (2017/18) annual report rates researchers in Table 1.4 in the following five broad categories:

**TABLE 1.4 BROAD CATEGORIES OF NRF RATED RESEARCHERS**

CATEGORY	TYPES OF RESEARCHERS
A	❖ Leading international researchers
B	❖ Internationally acclaimed researchers
C	❖ Established researchers
P	❖ Prestigious Awards (researchers younger than 35 years with a Doctorate qualification)
Y	❖ Promising young researchers (researchers younger than 40 years with a Doctorate qualification)

**SOURCE:** National Research Foundation (2017/18: 81). (Adapted).

As of 14 September 2018, MUT had three research professors, one in each Faculty. They all held executive positions with five-year contracts of which, two had recently resigned, leaving academic staff attempting research transformation in a vacuum.

The National Research Foundation's Annual report (National Research Foundation 2017/18) developed a concept document for a 'Framework on researcher pathways from Doctoral holder level to established researcher level'. Moreover, the NRF has also developed a policy and a framework on transformation to support postgraduate students. However, the scarcity of black South African world-leading researchers who went through the NRF capacity development pipeline, challenged the organisation to re-examine its approach to sustain black researchers for the future. Whilst researchers are funded, minimal effort was put into developing pathways from Doctoral students to emerging researchers, and from an emerging researcher to established researcher. It is envisaged that the NRF framework will outline the pathways that a researcher can aspire from Doctoral qualification to world leader with an impressive track record in publications.

### **1.9.3 Application of systems thinking towards research transformation**

Systems Thinking (ST) has been in existence for more than 50 years as a powerful research tool instrumental in the unity between theory and practice at all organisational levels (Jackson 2009). Its direct relationship with complexity theory has been instrumental in the analysis of tertiary educational institutions and their complexities



(Davis, Bryan, Li, Best, Hsu, Gomez, Vertes and Liu-Ambrose 2015; Tong and Arvey 2015).

Liang (2016) asserts that the complexity theory as an interdisciplinary theory utilised in the fields of strategic management and organisational studies. Moreover, complexity theory is an integral part of Complex Adaptive Systems (CAS) and has been utilised in the social and administrative sciences, as well as in biology, chemistry, physics, social, technical and economic domains (Albert, Kreutzer and Lechner 2015; Waddock, Meszoely, Waddell and Dentoni 2015).

Key ingredients in the above theories are the iceberg model based on the belief that observable realities and events are caused by mental models and systemic structures. These are instrumental in shaping behaviours, understanding empirical and theoretical commonalities, including inter-relationships among system components and the effects on the dynamic behaviours that arise, and the modelling of system dynamics diagrams (Binder, Vox, Belyazid, Haraldsson and Svensson 2004; Bureš 2017).

Another integral part of systems thinking has been the causal loop diagrams (CLD), a very significant and useful element of the empirical dimensions of systems thinking (Bureš 2017). However, Yearworth and White (2013) maintain that CLDs have been considered instrumental in the process of systems identification, beginning with the first step (the problem), the second (its examination), the third (analysis) and the final (solutions). Lich, Urban, Frerichs and Dave (2017) concur with Yearworth and White (2013) since CLDs represent the feedback loop structure of the system and are the foundation of the dynamic behaviour of the system.

The utilisation of systems theory and practice in this case study, with the analysis and understanding of complex institutional realities is instrumental in the effort to dissect the multiplicity of human and professional interactions through the application of feedback loops that accompany them within the context of the existing institutional complexities in a process of constant transformation (Liang 2016).

## **1.10 OVERVIEW OF THE RESEARCH METHODOLOGY AND DESIGN**

The research design refers to the approach the researcher adopts to rationally and logically assimilate the diverse components of a case study to ensure that s/he will be able to efficiently address the research problem. The research design for this study is the application of a qualitative system dynamics (SD) methodology with an interpretivist research paradigm. A qualitative holistic approach endeavours to explore a host of diverse dynamics that may negatively influence research transformation at MUT. Since this research topic was not investigated previously at the MUT, it is likely to provoke and stimulate expressive responses from the participants.

### **1.10.1 Primary data**

According to Flick (2009), Marshall, Cardon, Poddar and Fontenot (2013) and Walliman (2017), all qualitative research employs qualitative interviews with selected participants and focus groups as primary data sources including analysis of texts and documents.

### **1.10.2 Secondary data collection**

Additionally, the use of archival data in the form of historical data, reports, policies, annual reports, statistics from DHET and CHE related to research transformation at the MUT, was necessary not only to provide richness of the historical data but was also essential for triangulation.

### **1.10.3 Target population**

The target population for this study were all academic staff (205 at the end of the 2017 academic year) from the existing three faculties (Management Sciences, Natural Sciences and Engineering) of MUT located in Umlazi, Kwa-Zulu Natal.

### **1.10.4 Sampling technique**

Bless, Higson-Smith and Sithole (2013) explain sampling as the subset of the whole population which is investigated by a researcher and whose characteristics are generalised to the entire population. The purposive sampling method was applied as a non-probability sampling technique for the qualitative research design. According to Patton (2015), purposive sampling produces information-rich cases for in-depth study

in order to extract relevant issues for the purposive of inquiry specifically applicable to qualitative research. The advantage cited for sampling in relation to a qualitative design by Bless, Higson-Smith and Sithole (2013), compared to the collection of data on the whole population is that gathering data from a sample is less time-consuming since the cost of research is relative to the time spent on data collection. Moreover, sampling is a practical method of data collection if the population is large.

#### **1.10.5 Selection of the sample**

The population for this study were all academic staff from the three faculties of MUT occupying various positions, namely, lecturers, senior lecturers and heads of department. Selecting academic staff holding different positions was conducted to increase the variety of diverse responses and information available for this qualitative analysis (Carsten, Uhl-Bien, West, Patera and McGregor 2010).

Purposive sampling was applied for this case study to enable the researcher's judgement to identify participants who were best equipped to provide the necessary information from their distinctive viewpoints and to understand research transformation issues at MUT from their sole perspective. Individual interviews were initially conducted with five academic staff from each of the three faculties. Additionally, interviews with a focus group of six participants representing academic staff from the three faculties were undertaken with similar interests and agendas (Berg 2004). The focus group, independent from individual participants were interviewed to ensure validity, creditworthiness, trustworthiness and reliability of responses from the individual interviews to corroborate data for triangulation.

#### **1.10.6 Data collection method**

Data was collected from at least five academics from each of the three faculties at MUT, and a focus group of six academic staff (two from each Faculty) using an interviewing schedule (Annexure D) with open-ended questions, in sync with a qualitative research design. The researcher personally interviewed the participants and focus group with a recording device in her office or the participants' office for convenience. The unit of analysis was MUT academic staff, and the unit of observation was the feedback from the interview schedule.

### **1.10.7 Qualitative research design (Interviewing schedule)**

According to Lambert and Loiselle (2008), and Holloway and Wheeler (2010), qualitative researchers aim to understand people's lives as experienced and interpreted by them. Furthermore, Berg (2009) and Holloway and Wheeler (2010) acknowledge that the most common type of interviews used in qualitative research are semi-structured interviews in the form of predetermined open-ended interviewing schedule whereby the researcher is permitted to seek further clarification from the participants if the need arises to avoid any ambiguity and bias. Moreover, Holloway and Wheeler (2010) confirm that an interviewing schedule is formulated to collect similar types of data from all the participants and the focus group for sense-making of all the data.

During the interview, the researcher discussed the letter of information (Annexure A) to the participants and focus group assuring them of their anonymity and confidentiality of their responses during the semi-structured interviews with predetermined open-ended interviewing schedule (Annexure D). Furthermore, the researcher presented the consent forms (Annexures B and C) to the participants and focus group respectively to participate in the case study.

### **1.10.8 Pilot test**

Why conduct a pilot test of the interview? According to Jankowicz (2005), pilot testing is an essential process prior to conducting actual interviews during which the researcher identifies and resolves any ambiguities about the content, structure, and design of the questions the researcher intends to ask respondents. Therefore, a pilot interview test with a research professor prior to the start of the interview series was necessitated to verify the understanding of the questions and to modify the questions in the interviewing schedule wherever necessary.

### **1.10.9 Reliability, validity, generalisability and trustworthiness**

Bryman (2016) emphasises that reliability and validity are common terms utilised to assess the quality of research in quantitative studies. However, reliability and validity are interpreted differently for qualitative studies to obtain a deeper appreciation of the

research problem in its distinctive environment (Tolley, Ulin, Mack, Robinson and Succop 2016). Furthermore, Creswell (2009) and Leung (2015) maintain that qualitative research can be assessed in terms of reliability, validity, and generalisability in much the same manner as quantitative research. According to Merriam and Tisdell (2015), reliability for qualitative research refers to whether the results are consistent, dependable and sense-making with the triangulation of data collected for this case study. Leung (2015) attests that validity in qualitative research means “appropriateness” of the tools, processes and data as well as the rigour of interpretation of results and conclusions from the selected research participants of this case study (Lincoln, Lynham and Guba 2011).

Moreover, Merriam and Tisdell (2015) refer to generalisability as ways suitable to the philosophical underpinnings of qualitative research. Furthermore, Merriam and Tisdell (2015) reiterated that the common understanding of generalisability in qualitative research relates to the reader or user of the study. In other words, to what extent does the study’s findings apply to other people’s situations? Additionally, Merriam and Tisdell (2015) emphasise that in a qualitative study, the reader is unable to generalise in a statistical manner. Other concepts of qualitative research, for example, credibility, dependability, confirmability, transferability, trustworthiness and goodness are discussed in detail in Chapter Four.

#### **1.10.10 Analysis of the data**

Beuving and De Vries (2015) advocate that qualitative data analysis necessitate relentless going back and forth, or iterations, between problem, questions, evidence and theoretical ideas. Furthermore, Beuving and De Vries (2015) underscore that qualitative data orbits around the formulation and reformulation of essential concepts and relationships between these concepts as they emerge from empirical realities.

Data analysis would initially provide a comprehensive sense of all the interviews and thereafter conceptualise the data into meaningful segments, themes and sub-themes through an iterative process for integration into similar focus areas to elaborate on the findings.

It is envisaged that the data from this case study would assist in formulating strategies for the MUT to fast-track its research transformation agenda to meet the challenges imposed on HEIs by SA DHET. In addition, the data would strengthen the motivation to recommend Executive Management to leverage research activities by providing the requisite support, resources and an enabling environment to escalate research transformation and make a positive impact towards research output at this UoT and in the HEI sector as a whole.

#### **1.10.11 Ethical considerations and confidentiality**

Any research must take cognisance of ethical considerations especially when qualitative studies are undertaken due to their in-depth unstructured nature. According to Ritchie, Lewis, Nicholls and Ormston (2013), ethical research with broad consensus at a high level of abstraction encompasses, *inter alia*, worthwhile research, unreasonable demands on participants, the objectivity of the researchers, informed consent from participants, voluntary participation, confidentiality and anonymity of participants. These ethical considerations will apply to all participants and the focus group. Informed Consent was obtained from MUT's Research Ethics and Research Publications Committees prior to the commencement of the research being undertaken (Annexure F).

### **1.11 STRUCTURE OF THE STUDY INTO CHAPTERS**

**Chapter One:** This chapter provides an overview of this case study. It introduces the study, the problem statement, aim, research questions, significance of the study, a brief analysis of the relevant literature, and a summary of the research methodology guiding the overall study.

**Chapter Two:** Context and Background of MUT in the South African Higher Education Landscape. This chapter provides an overview and historical perspective of MUT in the South African Higher Education landscape. Furthermore, it provides the context of the current challenges pertaining to research transformation at MUT. The chapter ends with a rich picture of MUT integrating soft systems methodology as part of a systems thinking approach to analyse complex organisational problems.

**Chapter Three:** Literature Review. This chapter discusses literature in detail on research transformation at HEIs in South Africa. Detailed deliberations are on factors influencing research output, capacity building research initiatives, enablers for academic research transformation, critical factors to support a research culture, including literature on systems thinking and system dynamics approaches in Higher Education using different systemic lenses.

**Chapter Four:** Research Methodology and Design. This chapter discusses in detail the research methodology that was applied in this case study. It focuses on the techniques that were used for sample selection, data collection, data analysis, reliability and validity, trustworthiness, triangulation and ethical considerations. The chapter concludes with the inclusion of system dynamics as a mechanism to ascertain the causal loop feedback effect between and amongst the variables.

**Chapter Five:** Data Analysis and Findings. This chapter focuses on analysing the data collected from the interviews guided by the research methodology and discussion of the findings that emerged from the empirical work. Data analysis from interviews with participants were recorded and transcribed manually. Thereafter manual coding of qualitative data was undertaken through an iterative process by reading and re-reading texts to confirm the data into appropriate themes and sub-themes.

**Chapter Six:** presents the construction and interpretation of the qualitative system dynamics model using causal loop diagrams. The CLDs in fragments illustrate the feedback influences between the identified themes and variables from the data analysis. Moreover, this chapter exemplifies issues related to low research output and possible scenarios to promote research transformation at MUT.

**Chapter Seven:** is the discussion of the findings that emerged from the empirical work from a theoretical perspective. The combination of theory and practice attempts to make a significant contribution to the current situation regarding research transformation at MUT. Within this chapter, the researcher relates to the purpose of the study as well as published results from other studies examined in the literature review chapter to lend credibility to the findings and discusses applicable theories.

**Chapter Eight:** Conclusion and Recommendations. This final chapter concludes with a summary of the significant findings, conclusion and recommendations stemming from the empirical analysis and critical thematic findings of the study. This concluding chapter of the study revisits the research questions, delimitations and limitations of the study, and provides pertinent recommendations and directions for future research using System Dynamics modelling regarding research transformation specifically at UoTs.

## **1.12 CONCLUSION**

This chapter provided the background of this study, outline of the research problem, aim, significance of the study and an overview of literature and research methodology concerning research transformation at MUT. A theoretical framework formed the basis underpinning this study to respond to some of the challenges associated with inadequate research transformation at MUT. The next chapter provides an in-depth context and background underpinning the evolution of MUT and its associated challenges.



## **CHAPTER TWO**

### **CONTEXT AND BACKGROUND: A HISTORICAL PERSPECTIVE**

#### **2.1 INTRODUCTION**

This chapter provides an overview of the South African Higher Education landscape and the background of Mangosuthu University of Technology (MUT). Universities internationally, and nationally including South Africa are located and operate within several detailed and ever-changing circumstances determined by regional, national, continental, global, social, political, economic and financial realities. Traditional universities in South Africa, are research-driven, focused on research output and are central to 21<sup>st</sup> century knowledge economies (Altbach and Salmi 2011). The main function of universities is that of educating students in a range of fundamental scientific or scholarly disciplines to enable them to enter high-level professions. As a result, traditional universities trained basic scientists and researchers and therefore focused with the development of high-level researchers rather than with the mere application of knowledge.

However, in South Africa, the former Technikons (now renamed Universities of Technology) had a solid niche in providing career-oriented programmes (Du Pré 2010). Furthermore, the graduates from the former Technikons were prepared and equipped for the real world of work. Moreover, links with industry via Work Integrated Learning (WIL) confirms that the Technikon programmes remained relevant and current to ensure graduates transitioned seamlessly to industry for employment. Therefore, it was evident that the nature of applied research from Technikons (now UoTs) throughout the world have contributed extensively to the development of their countries and regional economies by preparing the graduates for the world of work (Chetty 2003; Du Pré 2010). Furthermore, these graduates are able to apply their research skills to identify problems and gaps in society and industry by finding solutions to these problems. Du Pré (2010) further asserts that in the present HE setting all universities in South Africa are equal; they differ only in their focus without prejudicing their mission.

The key priorities of HEIs are teaching and learning and innovative research instrumental in the production of knowledge for the benefit of industry as well as community engagement initiatives. HEIs are considered crucial national assets as they are sources of new thinking patterns, innovative and original in nature as the foundations of new knowledge. Within this context, the continuous well-researched knowledge production is founded on the approach of universities leading towards a balance between teaching and learning, research and community engagement and in the process becoming an integral part of the elevation of the existing condition in their surrounding communities (Boulton and Lucas 2011).

## **2.2 THE SOUTH AFRICAN HE LANDSCAPE**

It is universally acknowledged that the terrain of HEIs in South Africa has passed through major challenges at all levels, but have undergone significant strides in terms of transformation after 1994 in an attempt to redress past imbalances and inequalities. Badat (2010) and (Chantiri 2010) have eloquently described the colossal efforts leading to the transformation path that need to be briefly analysed in this section. Hence, institutional change has been the outcome of serious and protracted transformation-oriented initiatives over a long period that sought to transform the academic, teaching practice, infrastructures and systems of HEIs under the perpetual guise of apartheid ideology, teaching and cultural diversity.

For this radical transformation, numerous innovative and brave steps were undertaken such as extensive policy research, state policy formulation and implementation in the areas of funding, governance, academic structure and programmes and quality assurance. This resulted in the enactment of new laws and regulations; and major restructuring and reconfiguration of the HE landscape and institutions. These initiatives have often tested the capacities and capabilities of the State and HEIs, thus affecting the pace, nature and outcomes of transformation (Badat 2010).

## **2.3 TRANSFORMATION OF THE SA HIGHER EDUCATION SECTOR**

One of the key challenges facing South African universities post-1994 was that of transformation, a multi-faceted process concentrating on a complete reconfiguration at

all levels that could ultimately lead to redress and equity as outlined in considerable detail by Engelbrecht, Bhengu and Street (2015).

Such a process of transformation was visualised as a steppingstone towards the expansion of research outputs instrumental in contributing to fresh knowledge production, a key to skills elevation at all societal levels. This objective was described as a major step forward in the continuous enhancement of the road to transformation and the universities' role in a democratic society (Cloete, Bunting and Maassen 2015; Engelbrecht, Bhengu and Street 2015). Such an effort to succeed needs leadership determined to completely overturn the legacy of apartheid education. Such a past had to be radically re-organised and dismantled holistically (Bunting 2006).

Inevitably, the political change post-1994 resulted in a process of changing the then-existing University landscape. This process had begun with the abolition of the Bantu Education Act of 1954 and the Extension of the University Education Act of 1959 (Badat 2009). The key objective of the new process aimed at redress was addressing the historical inequalities and legacies of the past and the opening of the road to transformation of the country's HE landscapes. Hence, a gigantic effort was undertaken for the equalisation of the service provision at all levels and the expansion of access to tertiary education for all. Such a process was the foundation of a new beginning aimed at redressing the historical past and opening the doors of transformation (Badat 2009).

The findings of the 1996 National Commission on Higher Education (NCHE) report was followed by expansions as outlined in the White Paper on Higher Education Transformation and the promulgation of the Higher Education Act, No. 101 of 1997 (Republic of South Africa 1997a). This led to the immediate establishment of the Council of Higher Education (CHE) and the Higher Education Quality Committee (HEQC) established in 1998 and implemented in 1999 (CHE 2015).

The White Paper of 1997 signified the beginning of the new era that set the foundations of a consolidation of the fragmented HE sector. It targeted the forthcoming social transformation in the HE sector, beginning with the immediate opening of a University

system to all that could lead to an increase of diverse staff and students, abolish racial barriers, and lay the foundations of a homogenous HE system (Reddy 2004; CHE 2015). Such a continuous restructuring of the HE system led in the process to a new representative and inclusive HE system. The White Paper of 1997 called 'A programme for the Transformation of Higher Education' (Republic of South Africa 1997a), set out a critical deviation from the previous apartheid models based on the Black historical institutions' state controlled model as opposed to the White institutions' market model. The driver of the new model would be the government that was responsible for setting the HE sector's goals; determining the goals of individual HEIs and evaluating and monitoring the system's and individual institution's performance (Bunting, Sheppard, Cloete and Belding 2010).

HE from its genesis is in many ways the foundation of teaching and learning, and research in a democratic, progressive society as an important contributor to the social and economic development of communities. Successful universities are founded on well-researched teaching staff, scientific knowledge production and solid organisational principles that lead to financial stability and growth. These priorities guarantee premium quality service to students (Shattock 2010).

## **2.4 MERGERS OF THE HIGHER EDUCATION INSTITUTIONS**

One of the key implementation steps that led to the transformation and consolidation of universities has been historically rooted in the work performed by the South African Department of Higher Education and Training (SA DHET) based on several discussions, documents and policies that later led to mergers. The SA DHET's research and negotiations led to the much-debated *Size and Shape Report*, which was released in 2002. This report proposed a wide range of University configurations and mergers to take place during the period 2003 – 2004 (CHE 2015).

The mergers were envisaged in the CHE policies as the "combination of one or more separate institutions into a single entity". They were to be led by a single governing HEI in charge of the combined responsibilities, assets and liabilities of the merged institutions (CHE 2001). The fundamental objective of such a merger initiative was the consolidation of the different functions of the merged institutions. The existing 21

universities and 15 Technikons as indicated in Table 2.1 highlighted the historical development of these Institutions each with its own mission, vision and unique identity.

**TABLE 2.1 NUMBER OF PUBLIC HEIs IN SOUTH AFRICA PRE-1994**

RESPONSIBLE AUTHORITY	Universities	Technikons	Total Public HEIs
House of Assembly (for whites)	11	8	19
House of Representatives (for coloureds)	1	1	2
House of Delegates (for Indians)	1	1	2
Department of Education and Training (for Africans)	4	2	6
Republic of Transkei	1	1	2
Republic of Bophuthatswana	1	1	2
Republic of Venda	1	0	1
Republic of Ciskei	1	1	2
<b>TOTALS</b>	<b>21</b>	<b>15</b>	<b>36</b>

**SOURCE:** (Bunting 2006: 39).

Thereafter, after the finalisation of the merger, the landscape of the Higher Education Institutions (HEIs) gave the totality of the overall picture. Thus, the total new HE Institutions equated to 26 HEIs. This included 3 new public HEIs that were categorised as either traditional universities, comprehensive universities (CU) or University of Technology (UoT) as reflected in Table 2.2.

**TABLE 2.2 CATEGORIES OF PUBLIC HIGHER EDUCATION INSTITUTIONS**

TRADITIONAL UNIVERSITIES	COMPREHENSIVE UNIVERSITIES	UNIVERSITY OF TECHNOLOGY
University of Stellenbosch	University of Johannesburg,	Cape Peninsula University of Technology
University of the Western Cape	Walter Sisulu University	Central University of Technology
Rhodes University	UNISA	Durban University of Technology
University of the Witwatersrand	University of Venda	Mangosuthu University of Technology,
North-West University	University of Zululand	Tshwane University of Technology
University of Cape Town	Nelson Mandela Metropolitan University	Vaal University of Technology
University of KwaZulu- Natal	Sol Plaatjie University ( <b>new</b> )	
University of Fort Hare	Sefako Makgatho Health Sciences University ( <b>new</b> )	
University of the Free State	University of Mpumalanga ( <b>new</b> )	
University of Limpopo		
University of Pretoria		
11	9	6
<b>TOTAL HEIs in South Africa = 26</b>		

**SOURCE:** (CHE 2019: 99). Adapted.

The key scholastic and knowledge difference between former Technikons and traditional universities at the time was that the primary functions of the Technikons were to train students and provide them with the capability to connect and apply their chosen career or vocation to their chosen subject and/or discipline of learning rooted in specific scientific principles (Du Pré 2010). This means that the Technikon courses concentrated primarily on the application of knowledge and not knowledge *per se*, while universities at the time were aiming at providing education to students related to and based on scholarly and fundamentally scientific disciplines, preparing students for a wide variety of middle and upper-class professions and occupations. This was race

and class-based educational separation of the country's youth, mutually exclusive in nature (Bunting *et al.* 2010).

An initial examination and analysis of the process and outcomes of the merger processes outlined the difficulties facing the new institutions and their leaderships during an arduous and urgent restructuring of serious proportions that led to the creation of twenty-three universities. The emergence of a new classification system was questioned in a number of quarters; however, it was decided, processed and in the final analysis, accepted (Schultz 2010). According to Simkins (2016), three new additional universities were formed, namely, in Mpumalanga, Gauteng and the Eastern Cape as indicated in Table 2.2 and all 26 HE institutions were classified/categorised in accordance with their programme offerings.

The challenges of the transition period were multi-faceted. They were related directly or indirectly to intellectual, political, financial, economic, organisational, functional and systemic realities mainly in the terrain of building and sustaining the foundations and development of a unique combination of teaching and research. The combination of teaching and research in the dissemination of new knowledge, innovation also included the expansion of community engagement. According to Cloete and Maassen (2015), all three pillars were founded on transparent, solidly organised and focused institutional strategies and tactics, innovative and highly professional leadership and management capability. Cloete and Maassen (2015) point out that the processes and outcomes of what could prove to be radical, pioneering and innovative re-structuring, have not been able to convince its pioneer thinkers, policymakers and implementers. In essence, it has been a panacea in its attempt to address conclusively the historic challenges facing society, academia and the student movement (Cloete and Maassen 2015).

## **2.5 MASSIFICATION OF HEIs**

South Africa, which is universally considered a developing country through these processes and changes in the HE landscape faced the massification of HE characterised by a rapid increase in student enrolment, a global phenomenon, emanating from prevailing issues such as the democratisation of education and the advent of the knowledge economy and globalisation (Mohamedbhai 2008). However,

Msila (2006) contends that several challenges were faced by historically disadvantaged institutions (HDIs) during the massification, mainly due to lack of timely support, infrastructure and resources.

## **2.6 THE RESEARCH LANDSCAPE AND REALITIES**

As a developing country still in transition after 25 years of democracy, South Africa faced an ever-increasing demand for HE that has ultimately led to an unprecedented massification as explored and suggested by Mohamedbhai (2008). Despite the immense financial, economic and social challenges facing both South Africa and the globe, the massification of education for disadvantaged people has increased due to several factors including the new knowledge phenomena for research orientation and realities of the 4IR. Research is considered as one of the pillars of a University's contribution to a country and society. It was therefore inevitable that the research transformation agenda has been a priority for all universities. Hence, the inculcation of a research transformation culture and agenda at South African HEIs has become important at several levels, especially with the unfolding of the 4IR.

## **2.7 LEADERSHIP IN RESEARCH**

It is interesting to note that the National Research Foundation (2017/18) report includes an important concept document entitled '*Framework on researcher pathways from Doctoral holder level to established researcher level*'. This follows the continuous efforts of the NRF to develop a series of policies and plans aimed at supporting post-graduate students with the hope that the transformation of a PhD. holder to an emerging and later an established researcher will become a certainty. Despite all the interventions by the NRF to promote the research agenda, MUT has not had an impressive research transformation record.

It is understandable that such initiatives and aspirations cannot be achieved without the existence, consolidation, and cementing of solid and accountable academic leadership. An accountable leadership must understand and implement a thorough research agenda that would ultimately be responsible for the creation of future academics with higher qualifications. This would allow management of MUT to



operate, plan and implement strategies by careful targeting and time-framing leading to the empowerment of new cohorts of researchers. Such a change leading to development management of systemic processes will aim at empowering staff in comprehending the vital role and intricate relationships between teaching and learning and research to expand the knowledge horizons opened for a rejuvenated agenda. According to the CHE report (CHE 2012), the research agenda and its expected outcomes are fundamentally the bonds that align MUT's objectives that are dependent on annual budgets, resource allocation, department bailouts and sustainability imperatives.

The leadership of MUT acknowledged that the resource limitations were instrumental in the lack of a strong research agenda and culture (MUT 2011). Within this context, one of the key challenges of the University was the exploration and alignment of research-based niche areas associated with community engagement. Arising from these challenges, the role of post doctorate fellows and the research professors (including retired professors) at the MUT as well as other UoTs took place in a number of niche areas.

CHE (2012) encouraged MUT to explore the feasibility of utilising visiting professors to strengthen the impact of the professoriate in the various disciplines and develop future academic leaders and researchers. MUT has employed a few research professors over the years in the three faculties on a contractual basis to assist in improving the research transformation agenda.

The MUT Self-evaluation Report of 2011, highlighted its vision and mission that envisaged a 'superior performance', and 'excellence in applied research' based on the original investigation that led to value-added processes, services and products thereby improving human conditions through the utilisation of scientific principles and methods. The MUT Self-evaluation Report of 2011 further emphasised that the research-based scientific production of knowledge was described as instrumental in elevating the community's conditions of life at all levels through direct and indirect social community engagement, outreach, knowledge transfer, volunteerism and internship.

The MUT's Self-evaluation Report (MUT 2011) propagated the achievement of the completion of 10 priority areas including the attraction of well-qualified staff, excellence in teaching and learning, high-quality research and community engagement. Furthermore, there was the added responsibility to become actively involved in direct engagements with the country's social and economic imperatives. It is within this context, that MUT aimed substantially to elevate its core functions, a fact that led the Higher Education Audit Panel of 2011 to comment highly on the University leadership for the commitment in the pursuit of applied research (MUT 2011). However, the common understanding of the parties was that such commitment could not be achieved without the attraction and retention of qualified staff capable of realising the goals associated with MUT's vision and mission. According to CHE (2012), these challenges would not have the desired impact on the leadership, the appointment of suitably qualified staff as well as infrastructure and resources that compromised the institution holistically.

## **2.8 BACKGROUND OF MUT**

MUT was established as a Technikon in 1979 in Umlazi, KwaZulu-Natal in the heart of a Black township. Its origins began following a meeting between the then Chief Minister of KwaZulu, Dr Mangosuthu Buthelezi and the Chairperson of Anglo-American, Harry Oppenheimer. Following a commissioned research to investigate the potential for employment of qualified technicians in the country that pinpointed the immediate need and demand for more technicians, the first R5 million donation from the Oppenheimer Trust was the foundation for the establishment of the institution called Mangosuthu Technikon.

Following the construction of the initial and essential facilities, several other public companies and groups of companies donated substantial amounts, instrumental in the building of the main campus in Umlazi, Durban, from 1977 to its completion in 1981. This Technikon was renamed the Mangosuthu University of Technology in November 2007, the last of the former technikons to be renamed. Following the major reconfigurations of the tertiary education landscape from 2004 onwards in the effort to transform the sector through mergers, this UoT was the only Technikon that remained unmerged (Du Pré 2010).

The mandate of the former Technikons was to provide career-orientated programmes to enable graduates to cope seamlessly in the working world. Furthermore, former Technikons that offered Higher Diplomas realigned these qualifications to Bachelor of Technology degrees, Master of Technology and Doctor of Technology, according to the University of Technology (UoT) status and as decreed by the SA Department of Higher Education Act 101 of 1997.

Table 2.3 indicates the current programmes offered in the three faculties at MUT in 2019. It is evident that most of the programmes are at undergraduate levels except for one Master's in the Nature Conservation programme offered in the Faculty of Natural Sciences. This is a further indication that MUT's collaborative research productivity for a critical mass of staff with PhDs at postgraduate levels are yet to be achieved. However, the MUT has increasingly provided access to previously disadvantaged students to enrol for undergraduate qualifications.

**TABLE 2.3 FACULTIES AND PROGRAMME OFFERINGS OF MUT AS AT 2019**

<b>FACULTY</b>	<b>PROGRAMMES</b>
<b>Engineering</b>	<p><b>Diplomas in:</b></p> <ul style="list-style-type: none"> <li>❖ Building</li> <li>❖ Chemical Engineering</li> <li>❖ Civil Engineering</li> <li>❖ Electrical Engineering</li> <li>❖ Mechanical Engineering</li> <li>❖ Construction Management and</li> <li>❖ Quantity Surveying</li> </ul> <p><b>B.Tech in:</b></p> <ul style="list-style-type: none"> <li>❖ Chemical Engineering (to be phased out at the end of 2019)</li> </ul>
<b>Management Sciences</b>	<p><b>Diplomas in:</b></p> <ul style="list-style-type: none"> <li>❖ Accounting (3 years and 4 years: Extended Curriculum Programme)</li> <li>❖ Cost and Management Accounting</li> <li>❖ Public Finance and Accounting (3 years and 4 years: Extended Curriculum Programme)</li> <li>❖ Public Management</li> <li>❖ Human Resources Management</li> <li>❖ Marketing</li> <li>❖ Office Management and Technology</li> </ul> <p><b>B.Tech in:</b></p> <ul style="list-style-type: none"> <li>❖ Cost and Management Accounting (to be phased out at the end of 2019)</li> </ul> <p><b>Advanced Diploma in:</b></p> <ul style="list-style-type: none"> <li>❖ Human Resources Management</li> <li>❖ Marketing</li> <li>❖ Office Management and Technology</li> </ul> <p><b>Postgraduate Diploma in:</b></p> <ul style="list-style-type: none"> <li>❖ <b>Human Resources Management</b></li> </ul>
<b>Natural Sciences</b>	<p><b>Diploma in:</b></p> <ul style="list-style-type: none"> <li>❖ Agriculture</li> <li>❖ Analytical Chemistry</li> <li>❖ Animal Production</li> <li>❖ Biomedical Technology</li> <li>❖ Community Extension</li> <li>❖ Nature Conservation</li> </ul> <p><b>Bachelor of Science in:</b></p> <ul style="list-style-type: none"> <li>❖ Environmental Health</li> <li>❖ Information Technology</li> </ul> <p><b>Bachelor of Health Sciences: Medical Laboratory Sciences</b></p> <p><b>Advanced Diploma in:</b></p> <ul style="list-style-type: none"> <li>❖ Nature Conservation</li> <li>❖ Agriculture in Crop Production</li> </ul> <p><b>Postgraduate Diploma in:</b></p> <ul style="list-style-type: none"> <li>❖ Nature Conservation</li> <li>❖ <b>Master's in Nature Conservation</b></li> </ul>

**SOURCE:** MUT FACULTY PROSPECTUS (2019). Adapted.

## 2.9 ENROLMENT TRENDS AT MUT

The continuous student massification at institutions also had a serious effect at the MUT. According to Cloete (2008), student enrolment speedily increased within a short period from 5 700 in 2000 to 10 097 in 2006. The rapid growth in MUT's enrolment as reflected in Table 2.4 occurred with no additional requisite resources in terms of additional academic staff and infrastructure. Despite this shortcoming, the Minister of Higher Education revised the target enrolment of 10 000 for 2010 and increased to 11 500 students in 2015 to 12 500 students in 2019 (MUT 2015).

**TABLE 2.4 ENROLMENT TRENDS AT MUT**

<b>Trends 2005-2014</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<i><b>Other Humanities</b></i>	1145	1075	912	831	947	812	882	825	932	761
<i><b>Business/Management</b></i>	3096	3107	2858	2892	3155	3556	3490	3650	3759	3653
<i><b>Science, Engineering, and Technology</b></i>	5660	5915	6058	5405	5575	5666	5914	6326	6684	6652
<b>TOTAL</b>	<b>9901</b>	<b>10097</b>	<b>9828</b>	<b>9128</b>	<b>9677</b>	<b>10034</b>	<b>10286</b>	<b>10801</b>	<b>11375</b>	<b>11066</b>

**SOURCE:** (MUT 2014: 10).

There was a decrease in real numbers of academic staff at MUT during the period 2000-2006 even though the student numbers increased substantially during these years. This had serious repercussions for staff, students and the institution as the remaining academics were obligated to carry additional workloads, during the day and especially in the full-time evening classes to maintain a sense of consistency in delivery. Furthermore, academic staff were obligated to carry out their administrative duties directly related to their academic duties and responsibilities. During this period, the student to staff ratio was standing much higher in relation to the national target of 44:1 (Cloete 2008). In 2012, the ratio decreased to 40:1, still far above the national institutional average of 28:1 (DHET 2015b). This meant that the student to staff ratio at the MUT was the highest in the HEI sector for contact students in South Africa for several years.

Du Pré (2010) affirms that since the name change from Technikons to Universities of Technology, and the offering of post-diploma qualifications from advanced and postgraduate diploma to Master's and Doctoral qualifications, staff also had to improve their qualifications to attract postgraduate students by engaging in applied research and concomitantly increasing the research profile of the institutions.

MUT currently offers only one Master's qualification and no doctorate degrees, despite the fact that over the years it attempted to transform and improve its staff qualifications and research profile in a number of ways. This is the primary problem confronted by the institution. Since the release of the National Plan on Higher Education (NPHE), Universities of Technologies faced the key challenges of the immediate realignment within a post-school education expansion for improved staff qualifications as reinforced by the Ministry of Higher Education and Training.

However, student access provided MUT with direct opportunities and challenges. It indirectly shaped the complex nature of the new roads to transformation and change that demanded not only goodwill and opportunities but also a thorough examination of the institutional strengths and weaknesses. It soon became evident to the present leadership that the difficulties of the initial implementation stages of life were rooted in the lack of appropriate structures, systems, staff and resources. The unfolding process towards the achievement of such aims and objectives, however, proved to be much more difficult than expected as existing circumstances unravelling at the institution during the first years of its existence were in contrast to what was expected in terms of solid organisation, financial sustainability and operational stability, development and renewal.

## **2.10 CHALLENGES PREVAILING AT MUT**

Student access provided MUT with direct opportunities and challenges. It indirectly shaped the complex nature of the new roads to transformation and change that demanded not only goodwill and opportunities but also a thorough interrogation of the institutional strengths and weaknesses. It soon became apparent to the present leadership that the difficulties of the initial implementation stages after the new change

of the Higher Education landscape of the merged Institutions, were the lack of appropriate structures, systems, lack of qualified staff with vertical qualifications and the availability of resources. These challenges were further exacerbated by the fact that there was a continuous decrease of permanent staff at the Institution during the 2000-2006 period despite the ever- increasing student enrolments (Bunting *et al.* 2010).

According to Bunting *et al.* (2010), one of the redeeming aspects related to the institution was the fact that the academic programme at that period had no negative effect on the academic performance of students and staff despite these challenges. To the credit of academic staff, they remained resolute and loyal at all levels, even though the student to staff ratio was well above the national norm. Furthermore, despite the student success rate of 80% during this period, the institution faced a very small increase in the number of staff with PhD Degrees in their fields as well as a relatively marginal increase in research output, even lower in comparison to the low average outputs of other University of Technologies (Bunting *et al.* 2010).

## **2.11 AUDIT OF MUT**

The SA DHET took a thoughtful decision to audit this institution in 2011. The audit function was delegated to the Council for Higher Education (CHE). The audit panel comprised of highly qualified academics and auditors who interviewed 220 role-players and stakeholders at the institution, including the highest levels of leadership i.e. the Vice-Chancellor and members of the executive, members of the Senate, Deans, trade unionists, academics, support staff and the elected student representatives as well as civil society (CHE 2012).

The Audit Report of CHE (2012) set several generic and specific recommendations for the institution to follow to reach the heights its leadership had aspired to for many years. The first of which was scientific planning and the implementation of procedures and strategies dealing directly and indirectly with high teaching loads. According to the recommendations by CHE (2012), the high teaching workloads could be solved through the immediate appointment of capable, well-qualified and accountable academic staff in vacant positions.

## **2.12 RESEARCH CULTURE AT THE MUT**

According to the audit panel (CHE 2012), SA DHET recognised that MUT's leadership had shown a commendable desire to initiate and develop a research culture in a continuous effort to produce an ever-increasing cohort of active researchers that would ultimately lead to an envisaged post-graduate programme. The SA DHET was ready and prepared to encourage, support and plan an expansive research agenda for the MUT.

The 'marriage of teaching and learning and research' was an alignment of the strategic plans and vision and mission of the MUT which paved the way mainly for young, disadvantaged South Africans who were eager to take the opportunities offered to succeed in society. Subsequently, this led to the commitment by the institution to embrace its key role in the path of youth improvement, development and excellence. According to (CHE 2012), the MUT's research agenda needed to be expanded with a view to guide the institutions' decisions in the planning, designing and implementing its plans.

## **2.13 RESEARCH OUTPUT AT THE MUT**

As time passed, there was a general view that one of the key reasons for low research productivity at MUT during the initial stages of its existence was a serious lack of infrastructure, human resources capacity, and lack of effort to upgrade staff qualifications which contributed to low research output. The Self-Evaluation Report of MUT (2011) highlighted low staff morale, loss of capable and experienced staff and lack of effective institutional planning which exacerbated the existing problems of low research outputs. CHE (2012) reported that the restoration of trust, in general, would have ultimately led to the active participation of all stakeholders and role-players at all levels of academia and research endeavours. Moreover, the perception of trust by all role players at MUT, could have produced positive outcomes to the development of solid policies, systems, processes and structures that could have led to oversight, accountability and transparency.



Following the University audit (CHE 2012), MUT's Research and Technology Transfer Strategic Plan 2013 – 2017, was adopted in December 2012. It was a broad strategic plan pinpointing the key ingredients of prospective multi-disciplinary research undertakings aimed mainly at strengthening teaching and learning, applied research and community engagement and support throughout KwaZulu-Natal (MUT 2012). As a consequence, all objectives, strategies and research niche areas outlined in the MUT's Research and Technology Transfer Strategic Plan 2013 – 2017, were directly related to MUT's mission and vision and supported by Executive Management, all academics and researchers at all institutional levels.

#### **2.14 MUT RESEARCH POLICY OF 2016**

The primary purpose of the MUT's Research Policy of 2016 has been the encouragement of quality applied research which will be achieved through the creation of an enabling environment where researchers will flourish and, in the process, build up a solid reputation nationally and internationally. It aims at scientific applied research that creates innovative knowledge for not only the private sector, commerce and industry but also the communities which surround the institution and the country at large. Such scientific research is fundamental for the holistic development of the country.

The Academic Associate cohort comprises Senate-confirmed appointees as visitors, honorary, adjunct and retiree professors (MUT 2016). The applied research aspired by the vision and mission of MUT is guided and directed towards innovation, specificity and practical connotations and implementation and the creation of new knowledge as understood in its broadest sense. For such research to be successful and useful, it needs to be strategic and developmental in the creation of innovative products, systems, structures and processes (MUT Research Policy 2016).

One of the key elements of the process is the emphasis on the complementary relationship between teaching and research and the utilisation of research findings and new knowledge in teaching and learning that will be supported strongly by the institution's senior management and staff at all levels in the effort to enhance quality, sustainability, entrepreneurship and relevance (MUT 2016). The design of an

institutional research agenda with strategic focus is a priority and the alignment with all national goals is the foundation of MUT's effort to establish and maintain a critical mass of expertise, important in the effort to develop collaborative links with the country's private and public sectors. The University undertook to create the infrastructure, support systems and an appropriate climate within the existing constraints of the University to achieve these objectives (MUT 2016).

MUT's Research Policy of 2016 further articulates the duties and responsibilities of the Heads of Departments in terms of facilitating the research endeavours through research plans and implementation, organisation of programmes and initiatives at all operational and human resources and student levels. Additionally, it is vital to facilitate research initiatives through adjustment of the existing workload and create a separate section of the division of an Annual Report for research activities and outcomes (MUT 2016).

Gaps and discrepancies created unwarranted bottlenecks due to the lack of implementation of the delegations of authority policy within the institution. However, notwithstanding the challenges prevailing at MUT as outlined, the institution sustained itself because of the positive attitudes of the trade unions, the academics and the students (Parliamentary Monitoring Group 2017).

Thus, the Research Directorate was responsible for communicating to staff existing research opportunities, awards, loans and bursaries, facilitating and organising the establishment of research institutes, units and groups and supporting them in their endeavours. The Deputy Vice-Chancellor: Research, Innovation and Engagements was responsible for providing strategic leadership in academic research while the Research and Publication Committee had the responsibility for the academic application of research activities at the MUT.

The institution's strategic goals for the period 2015 – 2019 included goal number 5, where an 'increase in applied research in niche areas' was prioritised (MUT 2014). The University intended to increase its staff publication units by an average annual increase of 16.0% from 18 units in 2012 to 50 units in 2019. This, it proclaimed, would

increase the ratio of research outputs to permanent academic staff from 0.10 in 2012 to 0.19 in 2019 (MUT 2014).

## **2.15 STRATEGIC PLAN OF THE MUT: 2020 - 2025**

The 2020-2025 Strategic Plan of MUT (2019) was more detailed regarding research initiatives and provided a wide-ranging field of ideas and propositions founded on the certainty that research, its functions, structures, processes and outputs should inform teaching rather than inform it (MUT 2019). Moreover, advocating a direct relationship between research and teaching and learning would be a priority based on the premise that teaching will be informed by the existence of all sectors of the MUT and the country's economy, while applied research will inform and enhance learning through fresh knowledge production directly related to students' experiences. Simultaneously, the curriculum will be based on work-integrated research and teaching as the foundation of experiential learning and continuous student exposure to professional practices. Additionally, MUT Strategic Plan (2019) underscores the mandate that the learning will be based, inspired and integrated into research productivity.

There are several strong fundamental prerequisites for this ambitious plan, namely, the achievement of excellence in interdisciplinary and multidisciplinary research; engagement with emerging fields of scholarship and knowledge and focus on the growth of postgraduate student enrolment in all disciplines. These prerequisites are not impossible to achieve since it necessitates the efforts of all stakeholders and role-players. To achieve such an upward trajectory, MUT needs to attract and retain high-quality committed academic, administrative and support staff, students, committed and transparent research leadership together with adequate financial resources, research grants as well as funding from the corporate sector. According to MUT Strategic Plan (2019), all these cannot be achieved without infrastructure, facility upgrading, technological advancement, and effective communication channels at all organisational levels.

The MUT 2019 Strategic Plan's for 2020- 2025, advocates concrete proposals for the review of the MUT's Programme and Qualification Mix to create an equitable balance among all disciplines. This imperative could be instrumental in improving graduation

rates, increasing numbers of accredited Advanced Diplomas; enhancing and increasing accreditation of new postgraduate programmes by the statutory authorities; enhancing and expanding Short Learning Programs (SLPs) in faculties and training staff to prepare, plan and develop SLPs (MUT 2019). Thus, MUT's latest Strategic Plan 2020-2025 is deeper, more detailed and clearer in both theory and practice, conceptualisation and applicable methods as its dedication to research-based new knowledge creation reflects. Consequently, these were followed by the setting up of a Teaching and Learning Development Centre (TLDC) as the core of new developmental initiatives and quality practices. Moreover, Executive Management took a firm decision to employ a new cohort of research professors on a contract basis. However, DHET (2018a) reported that the research output did not increase substantially as it lacked serious focus.

Nonetheless, DHET's audit report (2018) also expressed its satisfaction in relation to various expected initiatives. These related to the MUT's research improvement, including additional block grants from DHET because of the institution's increase in research output and the teaching input grant as well as the new programmes (mainly the Advanced Diploma and Postgraduate diploma programmes) that were being introduced. According to the latest available statistics (released on the 14 September 2018), the Mangosuthu University of Technology had only three established researchers who all held executive positions including five-year contracts as research professors within the three faculties. Subsequently, two research professors had resigned.

Since the name change and status from Technikons to Universities of Technology, these institutions, in general, had to align their qualifications according to the HEQSF NQF levels. According to Du Pré (2010), the offering of post-diploma qualifications from advanced and postgraduate diploma to Master's and Doctoral qualifications, existing and future staff had to possess a minimum Master's and preferably Doctorate degrees for their universities to attract postgraduate students and concomitantly increasing the research profile.

Over the years, there have been several upgrading developments at various levels at MUT in terms of substantially elevating the focus on teaching and learning, while on the other hand there has been no prioritisation on the part of the academic staff in pursuing vertical qualifications. Prior to that, MUT had begun offering several B.Tech programmes which at present have been replaced by Advanced and new Postgraduate qualifications that have been appreciated by the student population who have witnessed the elevation of the growth trajectory of the existing qualifications to higher levels. The MUT Strategic Plan for 2020-2025 highlighted that it anticipated its entire academic staff would possess a Master's degree by 2025, while 30% would hold a PhD. In 2016, 70% of the academic staff had Master's degrees and 25% had PhD qualifications. It was expected that academic staff at the institution without Master's degrees and PhDs would take serious note for the imperative to pursue higher vertical qualifications as epitomised by the MUT 2019 Strategic Plan for 2020-2025, thus, empowering their own personal career growth and creating a positive image of MUT in relation to qualifications of staff profiles.

## **2.16 DHET'S RESEARCH OUTPUT POLICY**

The mandate of DHET'S 2015 Research Outputs policy was to fulfil the undertakings of the National Development Plan of 2030 that indicated that HE is a key driver of the knowledge system, which is imperative for the success of economic development. According to DHET (2015a), the country's universities are the foundations of knowledge production as they set the standards and norms determining the country's knowledge capital. Universities receive research subsidies for accredited research outputs which are calculated on the basis of targets (set norms) of permanent University staff in every institution and incorporate subsidy units for research Master's and Doctoral outputs (DHET 2015a). Hence, the need for the MUT to increase its academic staff qualifications to Master's and Doctoral qualifications and thereafter increase its postgraduate programme qualification mix (PQM) to attract the relevant research subsidies for producing Masters and PhD graduates.

Over the years, MUT submitted claims for published research outputs following the DHET regulatory dictates. The latest research outputs of MUT as published by DHET (2019), are indicated in Tables 2.6 which illustrates research output units by type of

publications with an increase in journal article publications compared to book chapters and conference proceedings over the 2013 to 2017 period.

In 2017, MUT submitted data for published research outputs equivalent to 29.11 units appearing in journal articles, approved books, conference proceedings and journal articles. After the relevant research panels assessed the research outputs, the University attained 24.22 units, an increase of 7.93 units when compared to the 16.29 units awarded for 2016 publications. CESM (the Classification of Educational Subject Matter) outputs units produced by MUT indicated that the highest number of units (8.65) was awarded to Engineering (CESM category 08 - Engineering) and the balance from the other two faculties.

In terms of journal publications in 2017, MUT submitted a claim for 24.44 units for subsidy allocation. However, only 23.19 units were considered for rewards in accredited journals while 1.25 units were declined for not meeting the research outputs policy requirements.

In terms of conference proceedings in 2017, MUT submitted a claim for 0.50 units but only 0.25 were awarded and 0.25 units were declined, as they were considered not following the research outputs policy requirements (DHET 2015 -2019).

In terms of books and chapters claimed in 2017, MUT submitted 4.17 units for book publications but only 0.78 units were awarded, while 3.39 units were declined because they did not meet the research outputs policy requirements or as an outcome of adjustments due to incorrect calculations.

## **2.17 MUT's RESEARCH OUTPUT INTERVENTIONS**

Since the three pillars of HEIs are teaching and learning, research (attract funding and subsidy income) and community engagement; the duty and responsibility of MUT, as well as all other HEIs, are to comply by these principles. Within this context, MUT's leadership has acknowledged the institution's low levels of research output in the HE sectors. According to CREST (2011), from 1999 to 2009, 48 accredited articles were published, of which thirteen were from the 2007 to 2009 period. The improved figures

for the period were accomplished by a small number of experienced researchers despite the prevailing circumstances.

Important efforts were undertaken by SA DHET and MUT leadership to enhance research productivity amongst its staff. Amongst them, was the utilisation of the Teaching and Development Grant (TDG) and the Research Development Grant (RDG) introduced by the DHET in 2011. Utilising these funds, MUT created the Teaching and Learning Development Centre (TLDC) encouraging the facilitation of all University staff to improve their skills and strengthen the need to update their knowledge and qualifications. In relation to upskilling of staff, both internal and external programmes were introduced including seminars, workshops, and training related to teaching and learning. Academic staff were also encouraged to register for the Postgraduate Diplomas in Higher Education either at Rhodes University or UKZN.

The merging of the RDG with the TDG took place in 2017 that led to the establishment of the UCDG (University Capacity Development Grant). Goal 5 of the earlier Strategic Plan 2014 of the University was to increase MUT's applied research in niche areas while Goal 11 aspires to lead the institution to become a centre of innovation and a preferred provider of technology solutions to Commerce, Industry, SMMEs and the Community (MUT 2014). In addition to these interventions, MUT introduced the Teaching Excellence Awards since 2014; an annual Teaching and Learning Colloquium that targets MUT academics and several Research Talent Development Initiatives including the appointment of research professors and retired professors from 2019 on a tenure basis. However, Programme 3 on research, innovation and engagement is as follows (Strategic Plan 2014):

- Sub-programme 1: Research (Innovation and Technology Transfer).
- Sub-programme 2: Marketing and Communications.
- Sub-programme 3: Institute for Rural Development and Community Engagement.
- Sub-programme 4: Technology Station Chemicals.

Additionally, Table 2.5 further elaborates on the sub-programme 1 with objectives, performance indicators, baseline and targets aligned with goal 5.

**TABLE 2.5 MUT'S STRATEGIC OBJECTIVES ON RESEARCH, INNOVATION AND ENGAGEMENT**

Strategic Goal	Objective statement	Performance Indicator(s)	Baseline 2013	Targets for 2019
<b>Sub-programme 1: Research (Innovation and Technology Transfer)</b>				
<b>Goal 5: Increase MUT's applied research in niche areas</b>	1.1 Improve research output at MUT	1.1.1 Total Research Output Units	17.7	25
		1.1.2 Research output per I/R Staff member	0.10	0.14
		1.1.3 No. of registered research projects	49	60
		1.1.4 No. of post-Doctoral fellowships	3	6
		1.1.5 No. of research fellowships	0	10
		1.1.6: No. of research professors	1	3
	1.2 Improve the % of I/R staff with Doctoral qualifications	1.2.1 % I/R staff with Doctoral qualifications	9%	20%
	1.3 Identify, assess and protect innovations emanating from research results and maintain the MUT IP Portfolio	1.3.1 No. of disclosures	2	10
		1.3.2 No. of patents	1	5
		1.3.3 No. of patents and trademarks renewed	0	8
		1.3.4 No. of staff involved in technology transfer projects	10	13

**SOURCE:** (MUT 2014: 33). Adapted.

Over the years, MUT submitted claims for published research outputs following the DHET regulatory dictates. The latest research outputs of MUT as published by DHET (2019), are indicated in Tables 2.6 which illustrates research output units by type of publications with an increase in journal article publications compared to book chapters and accredited conference proceedings over the 2013 to 2017 period.

**TABLE 2.6 MUT'S RESEARCH OUTPUT IN UNITS BETWEEN 2013 AND 2017**

	2013	2014	2015	2016	2017
<b>Books and Chapters</b>	0.46	0.53	0.00	1.33	0.78
<b>Conference Proceedings</b>	2.25	1.63	1.25	2.87	0.25
<b>Journal articles</b>	15.30	13.48	17.39	12.09	23.19
<b>TOTAL UNITS</b>	<b>17.01</b>	<b>15.64</b>	<b>18.64</b>	<b>16.29</b>	<b>24.22</b>

**SOURCE:** (DHET 2015-2019). Adapted.



In 2017, MUT submitted data for published research outputs equivalent to 29.11 units appearing in accredited journal articles, approved books and conference proceedings. After the relevant research panels audited and assessed the research outputs, the University attained 24.22 units in 2017, an increase of 7.93 units when compared to the 16.29 units awarded for 2016 publications. CESM (the Classification of Educational Subject Matter) outputs units produced by MUT indicated that the highest number of units (8.65) was awarded to Engineering (CESM category 08 - Engineering) and the balance from the other two faculties.

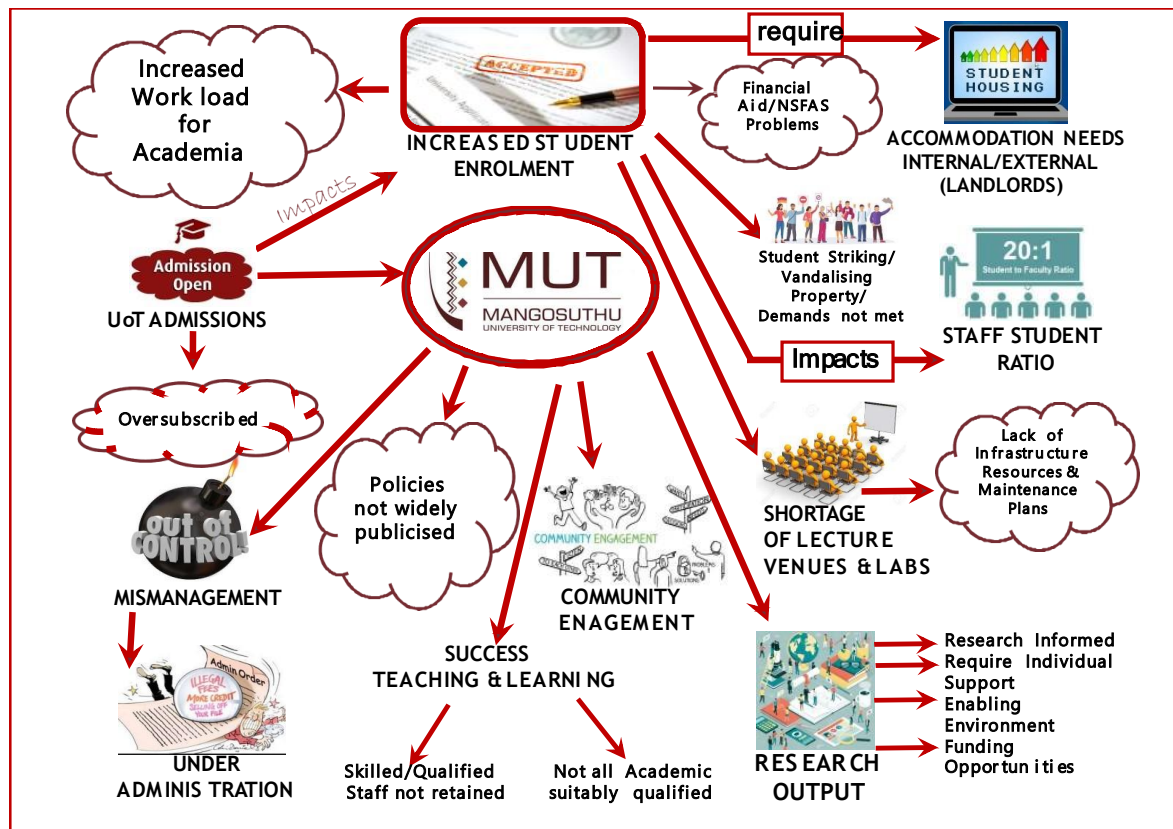
In terms of journal publications in 2017, MUT submitted a claim for 24.44 units for subsidy allocation. However, only 23.19 units were considered for rewards in accredited journals while 1.25 units were declined for not meeting the research outputs policy requirements.

In terms of conference proceedings in 2017, MUT submitted a claim for 0.50 units but only 0.25 were awarded and 0.25 units were declined, as they were considered not following the research outputs policy requirements (DHET 2015 -2019).

In terms of books and chapters claimed in 2017, MUT submitted 4.17 units for book publications but only 0.78 units were awarded, while 3.39 units were declined because they did not meet the research outputs policy requirements or as an outcome of adjustments due to incorrect calculations.

## **2.18 RICH PICTURE OF MUT**

The context and historical background of MUT is illustrated in Figure 2.1 as a rich picture as part of a systems approach that is synonymous to Soft Systems Methodology (SSM) established by (Checkland 1989). SSM is a systems thinking approach that was developed from the analysis of complex organisational problems (Scholes and Checkland 1990) and is represented with diagrams or models of reality (Bennetts, Wood-Harper and Mills 2000).



**FIGURE 2.1 RICH PICTURE OF MUT ALIGNED TO SYSTEMS THINKING**

**SOURCE:** Self-generated (2020).

The rich picture in Figure 2.1 above illustrates MUT as the epicentre with the relevant stakeholders, structures, challenges and opinions and their interrelationships of the situation at hand. Furthermore, it discloses deficiencies and facilitates a common understanding to encourage healthy discussions on the issues (Ramírez 2002). The illustrated rich picture (Figure 2.1) encapsulates all the rich, complex, multifaceted issues and interactions amongst all the stakeholders at MUT in a system holistically.

Moreover, a rich picture exemplifies complexities, inter-relationships causal relationships, connectivity, influences that can record and bring about an understanding of the problem situation on hand. Additionally, the rich picture is especially valuable in this case study to capture the pervasiveness of the structure and process of the current situation at MUT. Moreover, it provides an opportunity for other academics' subjective experiences, meanings, feelings and values through individual and focus group interviews. Additionally, the researcher being an employee at the

MUT for more than 25 years, demonstrates the thinking and feelings of the topic under investigation in a visual manner because of her understanding and experience of the problem situation on hand related to this case study.

## **2.19 CONCLUSION**

This chapter provided the context and historical background of the MUT, focusing on the management and administrative challenges related towards the research transformation agenda. It also highlighted the challenges facing MUT with regards to staff improving their vertical qualifications given the resources that were subsequently made available, namely, the various types of financial grants and establishment of research units. The Chapter also gave a holistic overview of the MUT 2019 Strategic Plan for 2020-2025 with emphasis, *inter alia*, on research interventions initiated to accelerate research outputs, innovations, collaborative engagement and research productivity. The rich picture aligned to systems thinking illustrates a holistic overview of the key challenges facing MUT as an HE Institution. The next chapter provides a detailed literature review of the theoretical concepts underpinning this study and explores the focal issues related to research transformation in the higher education sector at the MUT.

## **CHAPTER THREE**

### **LITERATURE REVIEW**

#### **3.1 INTRODUCTION**

The literature review in this chapter attempts to address the imperatives of the research transformation agenda at public HEIs in SA and the challenges that influence them. Moreover, the literature study forms the basis of an interpretive paradigm as a theoretical framework for this case study. The first section addresses the factors affecting research output, capacity building research initiatives for transformation, enablers of research transformation and developmental strategies for research output. The second section of this chapter incorporates the Systems Thinking paradigm and explores the applications of a qualitative System Dynamics framework of systems thinking with emphasis on causal loop diagramming to conduct this case study.

#### **3.2 FACTORS INFLUENCING RESEARCH OUTPUT AT HEIs**

The SA DHET research output policy of 2015 replaced the 2003 policy for measurement of research outputs applicable to all SA public HEIs. This policy provides a framework for the dimension and assessment of the research output of all SA public HEIs. Additionally, this policy was developed by the imperatives for the transformation of the SA HE system as contained in the White Paper 3: a programme for the transformation of HE (Department of Education 1997), the National Plan for HE (Department of Education 2001a) and the White Paper for Post-School Education and Training (DHET 2013b) which summarises a single co-ordinated HE system and to build an expanded, effective and integrated post-school system. Moreover, the intention of the policy is to promote research productivity by incentivising and improving the quality of research productivity in major categories of research output at SA public HEIs.

After various transformation initiatives post-1994, it became fundamental for HEIs to incorporate research knowledge as a foundation to augment teaching and learning approaches. Universities internationally and in South Africa are located and operate

within several specific and ever-changing circumstances determined by global, continental, regional, social, political, economic and financial realities. Their key aims and objectives of teaching, learning and innovative research are instrumental in the creation and distribution of knowledge, whilst elite research universities became diligently connected with the globalised economy (Altbach and Reisberg 2018). Valero and Van Reenen (2019) maintain that HEIs are considered crucial national assets, as they are sources of new thinking patterns, innovative and original in nature as the foundations of new knowledge. Furthermore, research is fundamental in universities' contribution towards national and global developments.

### **3.2.1 The Importance of research at universities**

There is no doubt that research internationally and in Africa specifically relies on the production of new cohorts of practitioners in all fields and disciplines. For this to be achieved, Jenkins and Healey (2005) postulate that universities inevitably are the hubs of new levels of scholarship that are rooted in new ideas of planning and action associated with the appropriate institutional reforms. These reforms are the foundation of institutional building. Moreover, Kurtić and Đonlagić (2012) suggest that for the development of an HEI, it is essential to grow and establish the appropriate research climate as an important part of the organisational culture.

Universities in all societies have performed basic functions, which result from the combination of cultural and ideological, social and economic, educational and scientific roles that have been assigned to them. They are multi-purpose or multi-product institutions, which contribute to the generation and transmission of ideology, the selection and formation of elites, the social development and educational upgrading of societies, the production and application of knowledge and the training of a highly skilled labour force (Enders 2004). To achieve the tasks assigned to them, basic facilities, infrastructure, resources and leadership must be in place.

The White Paper on Higher Education Transformation Paper 3 (1997) recommended a restructuring of higher education in South Africa and specifically stipulated increasing the production of senior qualifications of students especially at the Master's and Doctoral level. Within this context, the research efforts of each University in Africa and

South Africa need to be in direct correlation with the aims and objectives associated with change and transformation related directly and indirectly with Africanisation. Lepori, Geuna and Mira (2019) argue that the current African and South African knowledge production are founded on the epistemological mould developed by European counterparts to differentiate the second sector of HE universities.

As African and South African universities expand their societal involvement locally, provincially, nationally and globally, the establishment of a thoroughly planned and implemented research and intellectual environment has become the foundation, which appears to be strong enough to sustain the culture of the national and continental future (USNEWS 2020). The evidence shows that currently, there is no model for this on the African continent; however, there is an urgent need for its creation.

The first vital step forward concerning this driver is the beginning of the identification of fresh initiatives that will create solid institutional partnerships amongst African researchers and collaboration with the international research community. Universities need to be proactive to achieve competitive advantages. Moreover, Ramli, Zainol, Aziz, Ali, Hassim, Hussein, Markom, Dahalan and Yaakob (2013) confirm that this can be achieved via collaboration when it comes to knowledge management in order to obtain, create, and share knowledge, particularly in generating and disseminating new knowledge through research activities. Furthermore, Ramli *et al.* (2013) and Griffioen and de Jong (2017) emphasise that collaboration must be based on mutual respect, trust and understanding, including collective seminars that will bring together established researchers and PhD students from throughout Africa and the world. However, Aithal (2016) cautions that the quality and the reputation of an institution depend on the collective effort by academics as well as engaging students to perform research projects and case study development. Research projects and case developments can emanate from collaborative efforts between academics and students improve an institution's research standing in the public HE sectors.

Bland, Center, Finstad, Risbey and Staples (2005) contend that scholars who are interested in the success of their academic careers emphasised that individual, institutional and leadership factors combine to underpin the achievement of optimum

output. This implies that researchers in traditional research-led universities with supportive institutional facilities/structures tend to be more research inclined and productive than their peers at universities of technology that are research-informed. Miller, Taylor and Bedeian (2011) posit that promoting the requirement to publish in DHET accredited journals is unequivocal in repositioning research at public tertiary institutions and consider refusal to publish as professional misconduct.

It is evident that the SA UoT sector is research-informed and needs to grow with its counterpart of traditional universities that are research-led. However, Njiraine (2019) suggests that as an enabler for increasing research activities amongst academics in HEIs, predominantly in the UoT sector, there is an urgent need for knowledge sharing practice. Moreover, Njiraine (2019) contends that despite the availing of digital infrastructure support for access of digital information to the academic research community, the commitment of knowledge sharing practices is not evident to quantify the initiatives. Thus, it is imperative that the academic research community embrace knowledge sharing in pursuit of innovation.

In these initiatives, Tan and Noor (2013) concur that the preliminary steps such as the significance of research proposals, a well-researched literature review, the modes and dimensions of research analyses will be an extension of research as the core of University knowledge production. However, Griffioen and de Jong (2015) point out that issues related to international and continental market analysis, a multi-disciplinary understanding of political, social, economic and administrative actualities can be debated, analysed and dissected in detail towards promoting a research culture at Universities.

### **3.2.2 Research culture at universities**

HEIs are complex social systems. According to Hurtado, Clayton-Pedersen, Allen and Milem (1998), HEIs are defined by the relationships and interconnectedness between academic and administrative staff, faculties, students including alumni, institutional policies, vision and missions, bureaucratic procedures, institutional history, traditions and larger socio-historical backgrounds.

In the present historical context, the research culture of a University relies on the complete cooperation of the University Executive Management in close collaboration, cooperation and synergy with all role-players and stakeholders, including the students, the University councils and the communities surrounding them. Moreover, Lutchen (2018) emphasises that within these parameters, the research culture of a University is the fundamental tenet of intellectual knowledge production aspiring to entrench and expand new intellectual paradigms rooted in new foundations of research practices that will feed back into the society and economy.

University research leads to the autonomous scholarship of nurturing public intellectuals and scholars. Moreover, Boyce (2003) acknowledges that this also includes policy-oriented initiatives and applied research in the humanities, science, engineering and financial analysis at all levels of knowledge production and analysis. Research at universities is fundamental because it evolves from the undergraduate achievements and its direct and indirect attachment to postgraduate education. Andersson and Palm (2017) advocate that research at African and South African universities is important as it is the challenge of the prevailing Western experience and models that revitalise the continent and the country in their efforts to produce a paradigm based on their historical traditions and current realities as they unfold. Such a reality will nurture a research community to be ready and equipped to rethink and restructure the aims, objectives, processes and structures of the University and economic society in their entirety.

Darling-Hammond, Flook, Cook-Harvey, Barron and Osher (2020) maintain that research culture at a University is crucial as institutional integrity rooted in formal and informal standards, protocols, policies and ethics play a key role in productivity and the creation of new knowledge to institutions and societies. Thus, the enhancement of such culture is based on the utilisation of solid communication, an environment that is supportive of debating visions, objective plans and their implementation as well as failures and success of their undertakings at all levels. Kock, Lategan and Orkin (2012) attest that in such an environment, the key role of leaders, administrations and communities need to be based on the collective decision to lead by example. Such culture begins with open-ended discussions and debates within a united understanding



and collaborative environment where all existing and future participants can share ideas and visions that ultimately lead to common trust and mutual respect. Such initiatives are reinforced by a wide array of channels instrumental in supporting the collective work whilst all challenges and problems are also debated and discussed to provide practical solutions. Geber (2009) reports that men tend to be more inclined to academic research than women, and senior academics whether men or women tend to be more prolific than younger academics in the research field.

According to Hazelkorn (2008), it is imperative for academics to be mindful of both teaching and research transformation as their careers progress. Within such an environment, the promotion of career counselling and support to all, both old and new academics, reduces existing disagreements and becomes instrumental in increasing staff satisfaction and connecting researchers at all levels. Furthermore, Lewis and Simmons (2010) concur that this will enable them to become an important part of the institution as they have opportunities to think and prepare their plans for future programmes, career services, career paths and progress positively towards building a research culture.

Moreover, Murray and Pollard (2011) suggest that these continuous debates including their attitudes, opinions and subsequent behaviours at individual and collective levels will ultimately lead to group cohesion and consensus at all levels of agreements in terms of vision, mission and objectives. Moreover, Murray and Pollard (2011) affirm that the creation of a positive and collective research culture then lies on their behaviours and attitudes, as well as common goals and standards. Pratt, Margaritis and Coy (2006) claim that a research environment flourishes because of the cooperation and synergy of institutional, team and department leaders; those who are at the forefront of the continuous promotion of a positive research culture through their participation in all aspects of debating, planning, implementing, assessing, monitoring and evaluating all the processes involved.

According to Dill (2012), there are transformational leaders in guiding, encouraging debates, taking part in training, and redefining standards through the existing structures and processes planned to boost morale in the working environment through

their behaviour and actions. However, Cele and Lekhanya (2014) maintain that underperformance in research activities and publications has been attributed to several influences including institutional, personal, financial, infrastructural, scholarly and professional factors. Furthermore, Cele and Lekhanya (2014) concur that a research culture is informed by practices that include recognition and reward for quality research, the identification models of good research processes and administrative support. Moreover, An (2019) maintains that one of the major elements of continuous development of research culture within a University is career development of the academic and research staff as an integral part of their retention and progress. However, Hill and Haigh (2012) concede that when this is achieved, talented researchers feel obligated to search for their existing gaps and weaknesses in terms of skills and seek new developmental ways to fulfil their aspirations that combine integrity with excellence.

When such forward-looking processes become a certainty, the existence and importance of an embedded research culture provides the impetus for the active engagement of all staff in the institution. Furthermore, Billot (2010) maintains that a healthy competitive spirit amongst researchers becomes inevitable as different departments, sections and faculties become involved in a healthy competition and address areas that need improvement. A positive research culture at a University is a guarantee of research excellence and innovation when academic staff have pursued and successfully obtained vertical qualifications.

### **3.2.3 Qualifications of staff and programmes offered**

According to Altbach (2005), the trend of recent decades for teacher education programmes is to change from providing the student with a grounding in the basic disciplines of education (such as philosophy of education, history of education and sociology of education, etc.) to equipping the student with a set of techniques deemed necessary for good teaching, unlike artisanal training. However, Whitty (2006) points out that whatever research takes place is directed mainly at addressing issues or problems in practice (i.e., in schools and classrooms).

Addressing delegates at the South African Technology Network (SATN) conference in 2014, Dr Blade Nzimande, Minister of the Higher Education and Training stated that South Africa would run out of academics unless radical processes are taken to revisit the numbers. He also raised the concern regarding the average age of South African academics at 55 years who maybe retiring soon without a sufficient pipeline for replacements. Whilst higher education worldwide demands knowledgeable and qualified staff, the situation in South Africa with the ageing academic workforce may result in an under-qualified academic workforce and low numbers of postgraduate students.

To mitigate the shortage of the academic workforce, the DHET made several grants available, for example, Research Development Grant of R190 million specifically to develop research capacity among academic staff as an investment towards post-graduate teaching and research as well as increasing the number of PhD qualifications. Furthermore, the Minister of SA DHET highlighted the imperative to recruit, support and retain black and female academic staff who are under-represented at all levels in the higher education sector. He emphasised the need for these recruits as well existing staff to create pathways to be effectively inducted and thus promoted in time taking cognisance of the prevailing high staff turnover at public HEIs.

#### **3.2.4 High staff turnover at public Universities**

According to De Winne, Marescaux, Sels, Van Beveren and Vanormelingen (2019), academic staff retention is one of the major challenges confronting public HEIs, induced by globalisation that has intensified competition and increased mobility of highly skilled academic personnel. Furthermore, HEIs depend entirely on academic staff for academic success and long-term sustainability including research productivity. Thus, Ng'ethe (2014) maintains that it is imperative for universities to retain their talented academic staff to accomplish their vision, mission and strategic objectives to gain and maintain competitive advantage including research output. Whilst, HEIs are determined to retain their talented academics by applying effective retention strategies, several authors like (Samuel and Chipunza 2009; Maina and Waiganjo 2014) also confirm that staff turnover remains high in public universities.

Studies conducted by Samuel and Chipunza (2009) revealed that staff turnover is high amongst productive researchers since they are being attracted by more than one HEI with various kinds of incentives. Maina and Waiganjo (2014) concur that productive researchers and skilled employees are migrating abroad for better environments, which has an adverse effect on local investment at HEIs. Samuel and Chipunza (2009) maintain that South African employees including well-established research academics are ranked amongst the best in the USA, Italy, Germany, Brazil and Britain and therefore easily poached by multinational organisations.

Abassi and Hollman (2000) and Sherman, Alper and Wolfson (2006) contend that some of the reasons cited for high staff turnover are attributed to hiring practices; managerial style; lack of recognition; lack of performance management systems; lack of competitive compensation packages; toxic workplace environments; lack of promotion/career opportunities; inadequate training and development, as well as mentoring and supervision skills.

Staff turnover is destructive and costly to organisations as well as HEIs. Furthermore, Wynen, Van Dooren, Mattijs and Deschamps (2019) attest that when an employee quits, there are costs involved, for example, a replacement process needs to begin, namely, advertisements, short-listing of applicants, selection, interviews, recruitment, increase in time training a novice employee, as well as other existing indirect costs. Pienaar and Bester (2008) concur with Samuel and Chipunza (2009) that a departing employee is a huge loss to an organisation since the acquisition of knowledge and skills gained and investment made is transferred to a new organisation to gain competitive advantage. This also applies to academic staff with Master's and PhD qualifications with extensive research production. Furthermore, Ng'ethe (2014) claims that academic staff turnover also forms the basis for disruptions of course offerings, discontinuities in departmental and student planning, as well as loss of advisors for student graduates impact on the quality of services and the image of the department and institution.

Tettey (2006) maintains that whilst academics move to "greener pastures" and add value to the new organisation; their departure negates the synergies and momentum

that come from working with a group of academics working together. This is weakened on the scope of knowledge production and dissemination including challenges related to the massification of student enrolment.

### **3.2.5 Challenges related to the massification of student enrolment at public Universities**

There are institutional dynamics that affect the individual negatively and positively. Lutgen-Sandvik, Riforgiate and Fletcher (2011) agree that when the undercurrents are intensified the more independent the individual becomes, the more problems arise including bottlenecks. Higher education (HE) is known as a sustainable vehicle leading to a country's human capital, social and economic development and a pillar in the process of nation-building, social cohesion, open debate, knowledge production, teaching and research. Furthermore, HE makes an immeasurable contribution in terms of initiating innovative research efforts in all spheres of science and technology towards economic growth and social development.

In a historic meeting in 2004, the Association of African Universities (AAU) and the Working Group on Higher Education (WGHE) presented and discussed a seminal research study on the Sub-Saharan HE innovations (Ng'ethe, Assie-Lumumba, Subotzky and Sutherland-Addy 2003). It was a seminal contribution to the realities and challenges facing the HE sectors. This was based on research undertaken amongst 53 universities in several of the continent's sub-regions. It concentrated on the existing circumstances of reforms and steps forward and investigated a wide variety of topics such as access and equity; staff development and retention; research and service; teaching practices; finances; governance; the quality of existing curriculum; student life and strategic mission and vision. Increasing enrolment, internationalisation and globalisation and financial constraints were identified as pillars of innovation paths. In SA access to public HEIs for financially needy, and academically qualifying students is funded by the National Student Financial Aid Scheme (NSFAS).

Several scholars such as Bok (2003), Altbach (2005), Zusman (2005) and Shin and Harmin (2009) identified a diversity of challenges in the contemporary higher education

sectors including massification, internationalisation, privatisation, accountability and governance, rankings and world-class universities.

Scott (1995) describes massification at universities as a reality with the demand for access and increased student enrolments at HEIs throughout the world even before the era of the millennium. Throughout the years, massification associated with high enrolments at universities has been a reality in developed countries. However, the situation in many developing countries except for South Africa and a number of other African countries is not the same although there has been a notable increase in enrolments in the first decade of the new millennium (Mohamedbhai 2008).

Motala, Vally and Maharajh (2016) assert that for such student massification to be successful, careful and adequate planning in terms of facilities, infrastructure, financial and human resources development are fundamental. It is implicit that universities in Africa took real roots following the independence struggles and victories as the newly installed leaderships visualised the future ahead as the cornerstones of the future of economic and social development (Kariwo, Goungo and Nungu 2014). This fairness and vision for a better future led to the establishment of several universities on the African continent destined to become the foundations of the new societies and attracted at least initially the first elite groups as in the case of more developed societies.

The difference, however, lies in the fact that, unlike the African case, relative massification took place mainly in Europe following the end of the second world war (Hornsby and Osman 2014). Furthermore, Selyutin *et al.* (2017) assert that the demands of today's societies, dominated by a globalised economy turn the massification of higher education into a process of inevitability regarding the explosion of knowledge generation and dissemination throughout the world.

Studies have shown that massification can be described as a process and certainty that higher education is a 'common good' for all citizens and not only 'education for the elites.' However, Guri-Rosenblit, Šebková and Teichler (2007) claim that in most cases access to universities was considered expensive for the poor and middle classes

in many countries. Moreover, Songkaeo and Yeong (2016) state that massification is a mechanism to convey higher education across all the different cultural, social, geographical and economic groups in the various societies.

Massification, especially in Africa has created a number of serious problems and challenges for universities. Some are associated with limited financial, physical and human resources, corruption associated with good governance issues, the inability to meet increasing demands for access, competitiveness, increasing corporatism, inadequately educated and trained personnel, leadership weaknesses, relevance and quality of programme offerings, and poor research and innovation capabilities and capacities (Roberts and Ajai-Ajagbe 2013).

Hornsby and Osman (2014) highlight that one of the major problems and challenges created through massification is the large classes. These large classes tend to have a negative effect on the quality of teaching and learning of the students, and together with heavy workloads make it difficult for lecturers to be more productive in the research field. In many instances, the lack of appropriate facilities and resources force talented and high-quality academic staff to seek greener pastures with better working facilities. This led HEIs to employ part-time/contract staff, a fact that in many cases is not beneficial for students who are accustomed to continuity in their chosen programmes (Marginson 2017).

Moreover, Swartz, Gachago and Belford (2018) concur that the existence of very large class sizes has ultimately led to leadership, management and human resources challenges including quality management and student and staff administration. Such impediments impact negatively on student dropout and success rates, especially at the first-year level. Roberts and Ajai-Ajagbe (2013) maintain that this also impacts on staff lacking time for research, high student/staff ratio, over utilisation of existing facilities, high staff inefficiencies, and capacity limitations. Furthermore, Roberts and Ajai-Ajagbe (2013) concur that these problems are exacerbated by the lack of quality assurance and enhancement systems. Moreover, massification becomes exacerbated when universities lack adequate teaching resources, cannot provide up-

to-date equipment, modern facilities and infrastructure, technologically advanced gadgets and equipment and access to global knowledge (Swartz *et al.* 2018).

Altbach (2016) postulates that massification has created a situation whereby the University becomes obligated to discover a wide variety of new financial and other sources instrumental in meeting the needs of both students and academic/research staff. Moreover, Altbach (2016) points out that a continuation lack of resources exacerbates the problems and leads to perpetual financial crises. Furthermore, Habib (2019) emphasises that massification is ubiquitous throughout the world and there have been several empirical attempts to identify, analyse and dissect the pros and cons of the reality of life and education.

As a result of student massification and its consequences, it is essential for those institutions that have willingly decided to or have been pressurised to implement increased student enrolment to take strategic decisions that can be crucial to their future successes. Some of these decisions are, *inter alia*, outlined by Sawyerr (2004) and Association for the Development of Education in Africa and Working Group on Higher Education (2004) are as follows:

- a well-refined and detailed 5-to-10-year strategic plan to monitor and assess the processes and effects of the phenomenon as a guideline for immediate, medium- and long-term strategies;
- tactics and measures which are aided by a computer-based comprehensive database of institutional statistics;
- enhance the internal quality assurance system;
- communicate directly with the communities and relevant stakeholders in the search of establishing and ensuring the relevance of the existing programmes and research initiatives;
- through positive academic and student leadership communication aimed at improving student success;
- ensure that services exist to guarantee the safety and security of all students and human capital;



- secure the capacity of all human resources capabilities especially those of permanent academic staff with the appropriate qualifications;
- secure, well-managed and appropriate salaries and conditions of service of academic staff;
- elevate research activities and productivity and enhance research-informed lectures and keep records of all research undertaken and completed in a repository, and
- ensure the effectiveness and efficiency of Information Communication Technology (ICT) for the benefit of all developed institutional policies related to it.

Twenty-five years after democracy in South Africa, the enrolment in higher education which had more than doubled was further boosted by the successful intervention of the 2015/2016 #FEES MUST FALL student movement and the subsequent ruling party's bold decisions at its national elective conference. This realism dented the perpetration of the racial inequities predominantly in the Black African universities and the Universities of Technology despite the efforts of SA DHET to move forward in accordance with the country's constitution, legislation and policies that advocate the urgent need of redressing the inequalities of the past through continuous improvement in the quality of life (Heher 2017).

Massification as a result of population growth and demand for higher education at universities have serious repercussions on staffing implications, financial resources and infrastructure of universities mainly in South Africa and Africa (Akalu 2016). More importantly, there are increased needs in student housing and subsistence, the development of on-campus technology and the necessity of employing additional research and academic staff. The lack of judicious use of existing resources exacerbates these problems. Furthermore, Habib (2019) admits that massification has a very serious bearing on teaching and learning especially in Africa and South Africa.

Massification results in serious difficulties in terms of individual student supervision and assessment of learning and these realities lead to examination failures at all levels, especially in first- and second-year courses (Mohamedbhai 2003). The key issue in

these cases is basically that available academic facilities, including amongst others, lecture venues, administration and technological facilities, laboratories, and infrastructure. are generally inadequate or unavailable (Materu 2007). The serious increase in the student/staff ratio diminishes the ability of teaching staff to render individual attention to students. In addition, the inability to engage smaller group tutorials as well as expanded administrative responsibilities for lecturing and professorial staff reduces the time available for research initiatives.

Muramalla (2019) asserts that the majority of the lecturing and research staff whose responsibility is to teach large numbers of students and undertake research become discouraged and demotivated as they are obligated to deal with academic administrative duties, formalise and mark all types of student assessments including final examination scripts. As a result, their time for research becomes extremely limited and demotivating.

Swartz, Gachago and Belford (2018) concur that these prevailing situations are exacerbated by the wide variety of student problems that lead to protests and demonstrations in many universities due to lack of proper and healthy accommodation in the campuses, the low quality of external student accommodation facilities, overcrowded classrooms, poor research equipment and technological tools and equipment. Furthermore, Tekane, Louw and Potgieter (2018) caution that the impact of student protests cause further disruptions to the continuity of the academic programme, which creates an additional burden on academics to spend more time catching up on lost academic time.

### **3.2.6 Staff/student ratio at public Universities**

According to the Organisation for Economic Co-operation and Development OECD (2018), the staff/student ratio at an institution of higher learning is a key component of success or failure throughout the world. Its significance has been recognised as one of its key policies, especially in respect of the best universities globally. Furthermore, OECD (2019) emphasises that over the years, the staff/student ratio has been an integral part of institutions' resource planning strategies and tactics because it is

directly and indirectly related to human and professional management as well as the academics and students' success and well-being.

While the responsibility for the lecturer/student lies in the hands of University leadership and management in conjunction with the faculties and human resources divisions, there is always the hope that the number of students per lecturer is optimal for the benefit of all parties (Babcock and Betts 2009). It is interesting to note that the importance of the ratio is such a decisive factor of success and excellence that the top University ranking institutions such as the QS World University Rankings and Times Higher Education demand that universities need to submit lecturer assignment ratios as a quality assurance indicator. Such an indicator refers to the “assessment of the number of permanent academic staff members who are employed relative to full-time student enrolment numbers” (Blatchford *et al.* 2016)

Dee and West (2011) attest that the staff/student ratio is a very serious indication of universities' dedication and commitment to student and teaching support and a clear indication that universities with more staff per student stand a very good chance of building and developing an interactive and engaging teaching environment, resulting in greater student success. Research has shown that a well prepared and planned staff/student ratio is a foundation of future success as it is an inevitable part of the University's quality assurance system, a resource planning tool and performance management systems (Blatchford *et al.* 2016).

Shay (2018) contends that these realities are indeed associated with teaching staff only, while academics in many 'research universities' also employ academics involved only in research. Furthermore, Essop (2018) concedes that this has also become a reality at all of South Africa's 'research-led universities' competing at all levels, especially in their attempt to become top universities in the country and reach the elite of the top 300 in the world. However, Winter (2018) points out that there are also full-time University researchers who have a lesser teaching workload.

In most cases, internationally, there have been questions on the fact that despite the existence of an appropriate staff/student ratio, the teacher's performance might not

adhere to the high-quality expected. Whilst, on occasions, highly qualified academics have been substituted by post-graduate students or low-paid tutors/assistants (Konstantopoulos and Chung 2009). Such occurrences differ amongst disciplines and institutions as well as the study levels of the students. It is implicit that there are serious differences in the teaching of a third-year Accountancy class to that of a Public Administration or Human Resources equivalent. Moreover, Essop (2018) explains that the knowledge and its distribution of a third-year Accountancy class is based more on technical knowledge while Public Administration or Human Resources equivalent is based on legal knowledge and theoretical underpinnings and consequences.

However, it is acknowledged that an adequate staff/student ratio can only be successful when it is combined with the adequacy of staff and their commitment to research-based and informed tuition as well as their attention to all students and their needs. According to Graue, Harch, Rao and Oen (2007), appropriate staff/student ratios significantly promote staff commitment to improve productivity for themselves and their students, whom they develop throughout their University years. Moreover, Graue, Hatch, Rao and Oen (2007) maintain that there are a number of key issues pertaining to University initiatives and responsibilities that could make the staff/student ratio more pertinent and successful. These can be the creation and development of:

- accurate internal data able to measure student staff load numbers;
- measurements of staff workloads in relation to student numbers;
- the existence of casual academic staff;
- alignment of budgeting and planning on calculating the basic allocations of covering all staff and operating costs, and
- elevation of the infrastructure in terms of new lecture and seminar venues.

Furthermore, Dynarski, Hyman and Schanzenbach (2013) contend that the correct calculations of an appropriate staff/student ratio is a firm commitment towards a productive working environment. Such initiatives can be described as instrumental in an institution's commitment to balancing the ratio through increasing or reducing the student numbers, taking initiatives in facilitating academics to combine teaching with research initiatives and dedicating more time to assist and mentor students. These could be supplemented by regular quality and performance assessments, research

productivity, feedback, and improved working environments (Biddle and Berliner 2002).

Babcock and Betts (2009) in their research dealing with reduced class distinctions in relation to ability, effort, and the function of the educational production showed that expansion of the class size could be decisive in the reduction of low-effort students' gain when compared to high-effort students. The empirically-based results revealed that larger gains for disadvantaged students were achieved because smaller classes allowed teachers to incentivise disengaged students more effectively, most likely because students felt there were better able to connect to the educational setting in smaller classes.

Finn, Pannozzo and Achilles (2003) summarised theory and data in dissecting empirically the hypothesis that the key to the academic benefits of small classes is founded on student behaviour in the sense that they became more engaged socially and academically when class sizes were reduced. Furthermore, the researchers believed that the increased engagement and learning behaviours of the students were attributable to small classes and that they displayed less disruptive behaviour than students in large classes.

Cuseo (2007) empirically examined the case against large class sizes and their adverse effects on the teaching, learning, and retention of first-year students. The findings pinpointed several negative outcomes resulting from the existence of large-sized classes, *inter alia*:

- ❖ minimal interaction between the mentor/instructor with the students present;
- ❖ the absence of feedback and direct communication;
- ❖ lower levels of learning and academic achievement as well as grades related to overall student's academic performance;
- ❖ lower student evaluation and rating in terms of course instruction;
- ❖ increased reliance of the Faculty on the lecture method of instruction instead of direct communication with the student;

- ❖ minimal involvement of students in the process of learning in terms of mentorship;
- ❖ reduced depth of thinking of students inside the classroom because of the large numbers in lecture venues;
- ❖ limited breadth and depth of the objectives of the various courses;
- ❖ the course assignments and strategies associated with course-related learning utilised by students outside the classroom and limited satisfaction and learning experience with the overall course, and
- ❖ the teaching and learning environment of lecturers/mentors.

The student/staff ratio provided by DHET in Table 3.1 (CHE (2019) for years 2012 up to 2017 indicates a marginal increase in the UoT sector at 29:1. However, the audit report of MUT by CHE (2012) indicated a high student/staff ratio of 46:1 for the period 2005 to 2008, and 40:1 in 2013 to 38:1 in 2019 (MUT 2014) which is significantly higher than the UoT sector of 29:1. Moreover, the actual and projected student/staff ratio indicated in the MUT Strategic Plan 2025 was 59:1 in 2017, 58:1 in 2018 and is expected to be reduced to 45:1 by 2025 (MUT 2019). Thus, the high student/staff ratio indicated a shortage of academic staff which also negatively impacted the workload of existing academic staff whose time to devote to research was seriously compromised.

**TABLE 3.1 HEADCOUNT OF STUDENT: STAFF RATIO IN THE UoT SECTOR**

	2012	2013	2014	2015	2016	2017
UoTs	28	28	28	27	28	29

**Source:** (CHE 2019: 57). (Adapted).

### **3.2.7 Increased academic workload**

Internationally, the key problem faced throughout the tertiary education landscape seems to be the amount of work expected from an academic known as workload (Papadopoulos 2017). The academic is expected to perform a pre-determined and planned amount of work assigned to him/her in a specified time. It is one of the key factors related directly and indirectly to decisions associated with productivity and/or employee turnover. Peseta, Barrie, and McLean (2017) acknowledge that heavy

workload levels have been associated with health issues and dissatisfaction, and it is categorised into physical and mental workloads.

Bentley and Kyvik (2012) affirm that the mental state is faced mostly amongst upper, middle, and higher management employees while physical workload occurs mainly amongst manual workers and operating level employees. Additionally, Bentley and Kyvik (2012) affirm that the welfare of all employees in all work environments, including universities, is determined largely by the efforts of the leadership of a specific institution to ensure that workload is evenly distributed and manageable to be successful. Furthermore, Mustapha and Ghee (2013) emphasise that any discrimination, favouritism or managerial biases in the allocation of workloads will trigger dissatisfaction amongst academic staff that would impact on the work culture of an institution.

A research study conducted by Akob (2016) reflected on the empirical significance of work ethic workload, work and job satisfaction on teachers' performance and showed that workload determined the individual's work behaviour. Furthermore, Strydom (2011) reported that light and acceptable workload had also led to high levels of job satisfaction and had a positive influence on both the behaviour and performance of teachers. However, Keys and Devine (2006) contend that workloads vary depending on the type of institution, for example, academics at research-led institutions are afforded a lighter teaching load whereas academics at teaching focus institutions may have a heavier teaching load.

Ali and Farooqi (2014) investigated the effects of workload on job satisfaction in a public University and the effects of job satisfaction on employee performance and engagement in the academic and administrative duties and responsibilities in the workplace. Their findings showed that work overload had a very strong negative relationship with job satisfaction, while job satisfaction had a higher significant positive relationship with the employee's performance. Additionally, Ali and Farooqi (2014) reported that job satisfaction also had a highly significant positive relationship with employee engagement.

Erat, Kitapçı and ÇÖMEZ (2017) studied the impact of workload at individual and organisational levels including stress, their emotional commitment and intentions of turnover. The large number of academics interviewed (N= 1043) in a number of public universities in Turkey added empirical significance to the findings and their correlation analysis showed conclusively that workload had a positive association with turnover intention, responsibility loss and stress, and negative association with emotional commitment. Furthermore, Erat, Kitapçı and ÇÖMEZ (2017) observed that even though workload had a positive relationship with emotional commitment and stress, it did not correlate with turnover intention.

Swartz, Ivancheva, Czerniewicz and Morris (2019) stress that a university academic is entrenched with the norm of a teaching workload, research and community engagement, of which the latter has been an additional duty and responsibility evident in the South African Higher Education terrain. However, Simkins (2016) points out that academic and research employment takes different forms in South Africa as well as in most of the developing world. However, when compared with the conditions and circumstances in the developed world, there is advanced flexibility, lower workloads and confirmed tenure with above-average remuneration packages (Gillespie, Walsh, Winefield, Dua and Stough 2001).

According to Rajarajeswari (2010), the heavy workload amongst academics has been the result of several diversified circumstances and conditions internationally and in Africa and have a negative effect on research undertakings and new knowledge production. Heavy workload together with increasing student massification means more hours of teaching accompanied by more academic and additional administrative pressure, coupled with occasional leadership demand for increasing accredited publication achievements. Additionally, the intensification and perpetration of the 'third stream of income' (offering of short courses as well as certification courses etc.) led to leadership efforts to attract, retain and develop a highly qualified Faculty staff at all levels (Rajarajeswari 2010).

Heavy workloads are the roots of a wide variety of physical, social and psychological vulnerabilities and health problems including burnout and stress that on most



occasions have negative effects on both the teaching and research performances of an academic, especially when such situations are not well managed (Karimi and Alipour 2011). These realities are exacerbated when the academic employee is faced with the institution's poor organisation and administrative practices, poor work conditions, and lack of recognition. Such situations create symptoms and repercussions of emotional exhaustion and occasionally negative attitude towards fulfilling the teaching responsibilities, including overseeing students' work and research and consequently feelings of inadequacy in terms of personal performance. When such feelings become a reality, it extinguishes the appetite for undertaking and performing the research duties and responsibilities (Ali and Farooqi 2014).

### **3.2.8 Burnout/stress amongst academic staff at universities**

Taris, Schreurs and Van Iersel-Van Silfhout (2001) findings showed that academics within this context are very vulnerable to serious risks of their well-being and health. Moreover, Barkhuizen and Rothmann (2008), described universities as "stress factories" and reported that heavy workloads at universities have a negative effect on the everyday life of academics as it significantly increases stress levels which result in burnout (Barkhuizen, Rothmann and Van De Vijver 2014). Owens, Kottwitz, Tiedt and Ramirez (2018) affirm that after many years of continuous teaching service, academics have validated levels of dissatisfaction and increased mental and emotional states of burnout.

According to Togia (2005), continuous stress turns into a chronic reality due to heavy workloads on many occasions, thereby promoting chronic fatigue and exhaustion. This could be emotional as well as negative towards all aspects of job performance. Furthermore, Togia (2005) states that these symptoms of burnout have serious repercussions for the life and overall performance of academics.

Chantiri (2010) and Omolawon (2010) highlight that today's University academic activities at all levels are extremely demanding as the everyday activities are directly or indirectly related to the responsibilities of teaching, research and community engagement and service. Furthermore, Lin and Huang (2014) concurred that the key source of stress and burnout among academics was work overload. According to

Ongore and Agolla (2008), research in a number of disciplines has shown that the root cause of stress and burnout are environmental (external) or internal and are instrumental in shaping actions and behaviour. Furthermore, Ongore and Agolla (2008) revealed that stress and burnout have direct and indirect negative consequences including high blood pressure, migraines, fatigue, insomnia and irregular sleeping patterns. These are harmful to the individual and the organisation.

Stress and burnout have become evident in the empirical research of Barkhuizen and Rothmann (2008) who studied the realities and consequences of academic staff in occupational stress. Their key findings revealed that work-life balance and work overload played a very significant role in their psychosomatic stress. These findings are similar to those of Johnson, Cooper, Cartwright, Donald, Taylor and Millet (2005) Johnson *et al.* (2005) who researched the relationship between psychological and physical stress and job satisfaction among 26 different professions discovered that teachers were among those who scored worse in comparison to all three factors.

Moreover, Van Dick and Wagner (2001) revealed that academics' stress negatively affected their services because it was instrumental towards job dissatisfaction, regular absenteeism, and physiological effects such as high blood pressure. Such negative effects can in the long run negatively lead to psychosomatic and/or several other serious health problems including heart diseases.

Individuals in all spheres of life and experiences, including academics carry a wide variety of values, beliefs, and resources and appraise their personal and professional situations differently, meaning that stress and burnout are not expressed in the same way both individually and in the workplace environment (Karimi and Alipour 2011). However, Goff (2011) suggests that academics should acquire a deep understanding of the sources of stress and develop mastery and resilience with appropriate coping mechanisms.

Given the fact that in most HEIs, all promotion policies are based on academics' knowledge production associated with accredited local and international books, journals and conference proceedings, it is evident that performance pressures

associated with heavy workloads are key issues leading to stress and burnout. It should be acknowledged that HEIs and especially UoTs promote capacity building research initiatives for transformation. However, the extent to which these initiatives can be capitalised by academic staff needs to be negotiated and addressed with the current challenges of the working environment.

### **3.3 CAPACITY BUILDING RESEARCH INITIATIVES FOR TRANSFORMATION**

The South African academic terrain has gone through fundamental changes since 1994 as the new democratic dispensation had entered a path of transformation associated with political, ideological, social, financial and technological changes.

Capacity building has different meanings for different people and is dependent on the context it is used. According to Eade (1997) and Senge, Kleiner, Roberts, Ross, Roth, Smith and Guman (2001), capacity building is understood to be dependent on improving knowledge and changing one's behaviour to make better informed decisions; but more importantly to adapt to changing circumstances and be more productive in implementing decisions. Nyamupangedengu (2017) states that the mergers and categorisation of the universities have made clear the reality that the future of higher education in the country depends fundamentally on the attitudes, behaviour, planning and implementation of initiatives whose success or failure is contingent on the response of all stakeholders to these challenges.

Research transformation in an institution demands capacity enlargement over a measurable period. Capacity building is a process that occurs among individuals, organisations and systems whose outcomes are advanced skills and capabilities to execute and disseminate high research quality. The development of research capacity pivots on three factors; namely, people, settings and activities. Capacity building initiatives in research development is about connecting people from diverse disciplinary backgrounds who interact in different capacities and settings and encourage a wide variety of capacity-building activities (Brownson, Proctor, Luke, Baumann, Staub, Brown and Johnson 2017).

The continuous efforts of the DHET and its relevant organs including the NRF have led to significant increases in the number of post-graduate qualifications throughout the country including PhD. degrees, improved national and international publication records, continuous and improved scholastic collaboration with a wide variety of some of the top universities internationally (CHE 2019).

On the other hand, academics and researchers in universities face a number of challenges and problems due to work-life imbalances, work overload, and/or lack of resources especially in the technical universities. Inevitably, such problems and challenges have been instrumental in creating a new context when it comes to research productivity, upgrading of staff academic qualifications, research and knowledge production, research-based rankings and competitive edge in comparisons with their counterparts.

### **3.3.1 DHET'S transformation agenda of the HEI system**

Since 2008, SA DHET has implemented a transformation agenda of the University education system regarding access, student success and staff development. To this end, there have been notable achievements of equitable alignment of South African student demographics, decrease in the dropout rate of first-year students, increase in postgraduate enrolments, increase in Black instructional and research staff, increase in staff with Doctoral qualifications and increase in the research output of universities. However, SA DHET (2016a) acknowledges that challenges still exist in the following areas:

- The postgraduate enrolment requires substantial growth including graduate share of Black South Africans remains a concern;
- Black South Africans instructional and research staff numbers are seriously disproportionate in comparison to the general population demographic;
- Universities struggle to recruit new academics in certain fields of study, and the recruitment challenge is exacerbated for the historically disadvantaged universities, universities in rural areas and the Universities of Technology;
- The number of Black South Africans in the professoriate levels are under-represented;

- Academic staff holding Doctoral degrees still needs to improve considerably;
- Research production and equitable participation needs to be clearly understood, and
- The link between the quality of research production, and innovation need to be interrogated.

SA DHET has responded to the above challenges as part of its multi-faceted contribution to University transformation, by introducing the University Capacity Development Programme (UCDP), which has the predominant focus of “transforming teaching, learning, researching and leading towards enhanced quality, success and equity in universities.” The UCDP targets three main areas, namely, student development to enhance student success, staff development and programme/curriculum development. DHET (2015b) has implemented a staff development programme through the Staffing South Africa’s Universities Framework (SSAUF) which focuses on conceptualising and implementing strategic mechanisms along the academic and professional career continuum at universities. As highlighted in Table 3.2, DHET (2015b) has thus far implemented three core national academic programmes and two institutional support programmes.

**TABLE 3.2 STAFFING SOUTH AFRICA'S UNIVERSITIES FRAMEWORK**

	<b>PATHWAY PROGRAMMES</b>	<b>STRATEGIC FOCUS FOR ACADEMICS</b>
1	Nurturing emerging scholars programme (NESP) <b>(national level)</b>	The NESP will identify postgraduate students with demonstrated academic ability who are interested in following an academic career and provide them with attractive, structured study and development opportunities that will prepare them to apply for an academic post at a public University. The NESP is being positioned as a feeder programme for the nGAP and associated programmes that individual universities have in place.
2	New Generation of Academics Programme (nGAP) <b>(national level)</b>	The nGAP programme recruits new academics against carefully designed and balanced equity considerations and disciplinary areas of greatest need into permanent posts at universities and support them through an intensive development programme. Since its inception in 2015/16, the programme recruited 369 lecturers at South African public universities
3	Existing Academics capacity enhancement programme (EACEP) <b>(national level)</b>	The EACEP will support the development of existing academics, for example, through support to complete formal qualifications, or to develop specific competences that enable progression in the system. Currently, two sub-programmes are being implemented and they are USDP and FPP.
3.1	University Staff Development Programme (USDP) <b>(national level)</b>	The USDP provides support for existing permanent academics and professional staff at universities to achieve national Doctoral degree targets, e.g., providing temporary or replacement staff over short-term contracts.
3.2	Future Professors Programme (FPP) <b>(national level)</b>	The FPP involves growing a representative professoriate, through the implementation of a coherent, structured, adequately supported programme that will target talented individuals at universities and that will support them towards being eligible for professoriate positions.
4	Staffing South Africa's Universities Development Programme (SSAU-DP): Staff development activities implemented by universities as part of their UCDP Plans at the <b>institutional level</b>	
5	Supplementary Staff Employment Programme (SSEP): The SSEP will enable universities to recruit specific skills on a need's basis, in a temporary capacity, to address the specific gaps as the overall staffing challenges are being addressed at the <b>institutional level</b> .	

**SOURCE:** (DHET 2015b: 16). Adapted.

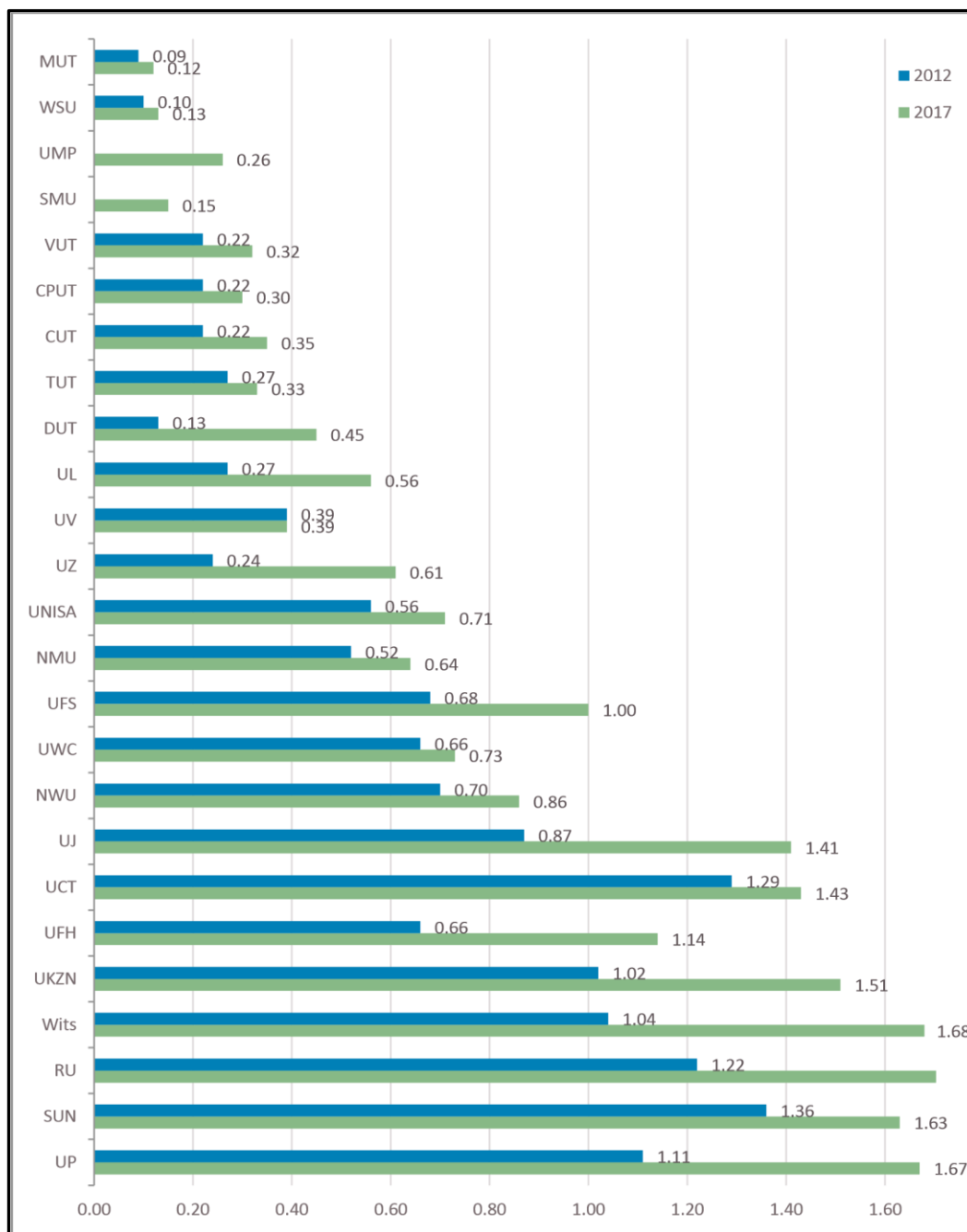
### **3.3.2 Research output and funding of public Universities in SA**

Waghid and Le Grange (2003) highlight the significance of research output at HEIs in South Africa of research and development of the African continent by producing high-

quality articles in DHET accredited journals, acclaimed books and presentation of papers at international conferences. Furthermore, Jeenah and Pouris (2008) postulate that the quality and quantity of research outputs are used as benchmarks to monitor the performance of South Africa's national system of innovation. Yudkevich, Altbach and Rumbley (2016) concur with the viewpoint of Jeenah and Pouris (2008) and assert that the world rankings criteria have stimulated both individuals and government to evaluate institutions based purely on measurable research output, whilst ignoring the core of the academic enterprise which is teaching and learning.

Bibliographic reviews of publications have been frequently used to describe research activity and characterise research that is undertaken either by individuals or institutional research output (Milat, Bauman, Redman and Curac 2011). Academic citation provides an objective measure of research use and academic impact (Weightman and Butler 2011).

Figure 3.1 illustrates the research output of SA public universities between 2012 and 2017. It is evident that the SA University of Technology sector's research output, including some of the previously historically disadvantaged universities, is on the lower end of research output with marginal increases between 2012 and 2017 except for DUT compared to the traditional universities. The main contributing factor for DUT's increased research output was the merger between the two former Technikons, namely, ML Sultan Technikon and Technikon Natal which were in close proximity to each other, resulting in combining staff and students of both Technikons as well as a moderate increase in their research output. However, the situation at MUT being in "sheltered existence", has seen the slow pace of instructional research staff achieving Master's and PhD qualifications, thus contributing negatively towards research transformation, *vis-à-vis* the production of vertical qualifications.



**FIGURE 3.1 RESEARCH OUTPUT OF PUBLIC UNIVERSITIES IN SOUTH AFRICA**

**SOURCE:** CHE (2019: 98).

Furthermore, this situation was exacerbated by the moratorium from DHET during MUT's administration period; namely, not to offer any additional post-diploma qualifications at Master's and PhD levels. This is also evident in Table 3.3 which reflects that in 2016, MUT with the lowest enrolment in the SA public higher education



sector did not offer any Master's and Doctoral qualifications compared to its UoT counterparts; excluding the newly established public HEIs and Rhodes University that predominantly attracts postgraduate students. Furthermore, Table 3.3 hereunder reveals that only MUT amongst the six UoTs did not offer any Master's and Doctoral qualifications as of 2016. However, the researcher was aware that one department at MUT was in the process of offering a Master's programme in 2017 after approval from the regulatory bodies such as DHET, CHE and SAQA.

**TABLE 3.3 NUMBER OF STUDENTS ENROLLED AT UOTs, BY QUALIFICATION TYPE AND INSTITUTION IN 2016**

INSTITUTION	Enrolment per Qualification Type						TOTAL
	OCCASIONAL STUDENTS	UNDER-GRADUATE CERTIFICATES AND DIPLOMAS	UNDER-GRADUATE DEGREES	POST-GRADUATE BELOW MASTER'S LEVEL	MASTER'S DEGREES	DOCTORAL DEGREES	
Cape Peninsula University of Technology	103	22 580	9 766	380	1 390	236	34 455
Central University of Technology, Free State	30	9 122	5 454	645	294	163	15 708
Durban University of Technology	0	20 353	6 841	0	861	322	28 377
Tshwane University of Technology	155	42 552	13 556	438	1 819	381	58 901
Vaal University of Technology	292	15 755	2 715	293	139	47	19 241
Mangosuthu University of Technology	0	11 103	321	164	0	0	11 588

**SOURCE:** (DHET 2018b: 108). Adapted.

### 3.3.2.1 Funding of public HEIs

DHET's funding of public HEIs leans more favourably towards teaching than research as illustrated hereunder in Table 3.4. The research grants as a percentage of total grants increased marginally during the 2012 to 2018 years. Furthermore, Table 3.4 reveals that between 2015/16 and 2016/17 the percentage of research grants remained at 15.6% and had decreased to 14% for the period 2017/18. It is evident that a greater percentage of funding is placed on teaching activities versus research production. This could be one of the reasons for UoTs especially MUT to focus

predominantly on teaching and learning activities rather than on improving research production.

Apart from research funding from DHET, researchers can also access funding support from several other research incentive structures such as the NRF, the National Department of Science and Technology, science councils as well as international funding agencies including the European Union and Deutscher Akademischer Austauschdienst (DAAD)/German Academic Exchange Services.

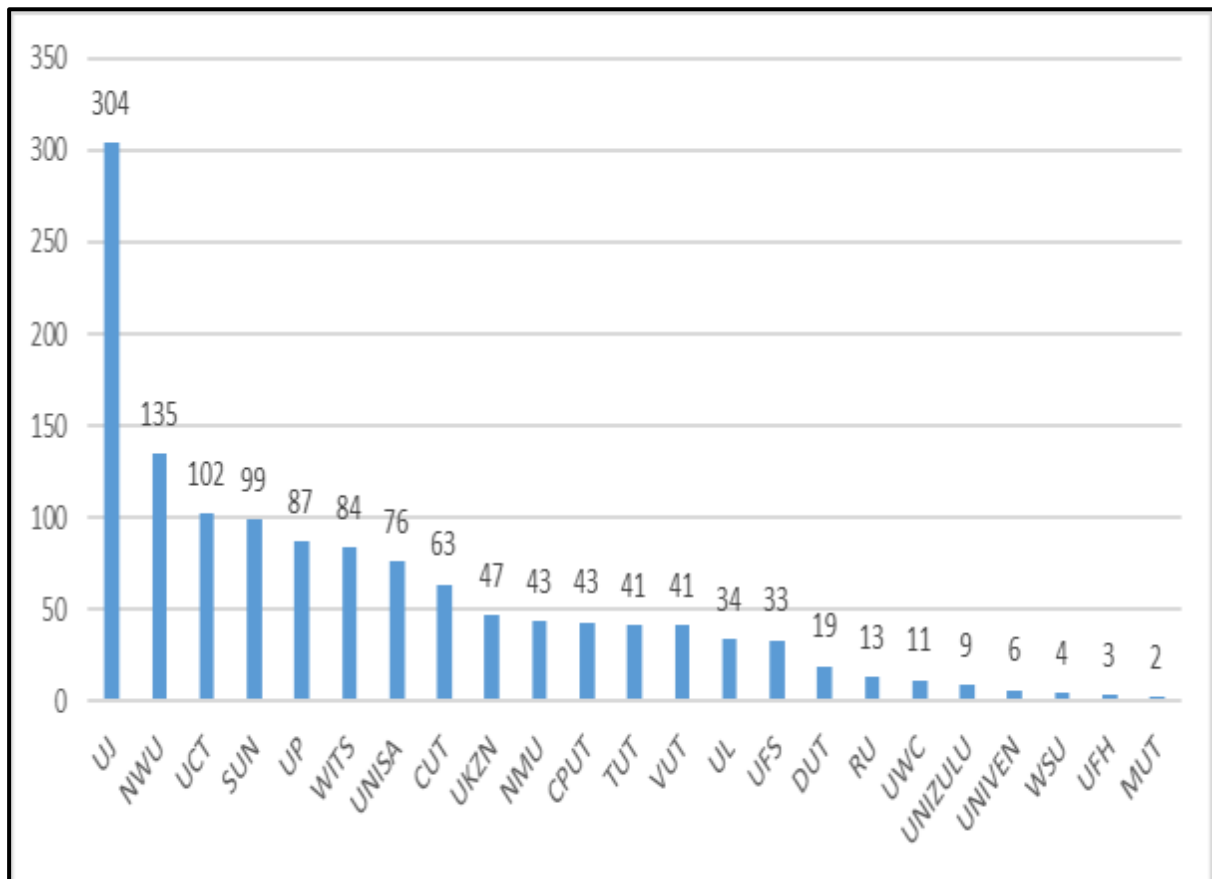
**TABLE 3.4 DISAGGREGATED GOVERNMENT FUNDING BETWEEN RESEARCH AND TEACHING**

	2012/13 Rbillion	2013/14 R	2014/15 R	2015/16 R	2016/17 R	2017/18 R
<b>Research</b>	2 403 401 000	2 523 331 000	2 770 101 000	3 013 169 000	3 186 831 000	3 346 481 000
<b>Teaching</b>	14 195 709 000	14 861 198 000	15 687 741 000	16 354 820 000	17 265 557 000	20 530 855 000
<b>Total grant</b>	16 559 110 000	17 384 529 000	18 457 842 000	19 367 989 000	20 452 388 000	23 877 336 000
<b>PERCENTAGE OF RESEARCH GRANT OVER TOTAL GRANT</b>	14.5%	14.5%	15%	15.6%	15.6%	14%

**SOURCE:** (CHE 2019: 93). (Adapted).

### 3.3.2.2 Funding for published conference proceedings

Figure 3.2 indicates that in 2018 MUT received the lowest proportion of its share (2) from published conference proceedings in the public SA Higher Education sector. Thus, there is a need for MUT to capacitate and encourage its academic staff to publish in accredited journals and conference proceedings as well as access funds from the University Capacity Development Programmes (UCDP) (DHET 2020b).



**FIGURE 3.2 SUBSIDIES AWARDED (ROUNDED) FOR PUBLISHED CONFERENCE PROCEEDINGS BY UNIVERSITIES IN 2018**

**SOURCE:** DHET (2020b: 33).

### 3.3.2.3 Per capita research publications output

DHET (2020b) reported that the average per capita research publication output for all the public South African HEIs in 2018 was 0.97. This means that as of 2018, the average academic at public SA HEIs produced one research publication unit (rounded up). However, eight SA public traditional universities that are research-led, exceeded the national average of 0.97 units per year (UP: 1.71; SUN: 1.64; WITS: 1.59; RU: 1.54; UKZN: 1.54; UCT: 1.51; UJ: 1.33 and UFS: 1.04). As highlighted in Table 3.5, MUT's average per capita research publication output in the UoT sector was 0.19 from a 216 headcount of permanently employed academics, which was far below the national average of 0.97. One of the contributing factors for the low per capita research publications output is that MUT has not yet developed a research culture since the

focus as a previous Technikon and even as a UoT has been traditionally reliant on teaching and learning.

**TABLE 3.5 PER CAPITA RESEARCH PUBLICATION OUTPUT IN THE UoT SECTOR IN 2018**

University	Headcount of permanently employed academics	Research publications	Per capita research publications output
CUT	300	175.20	0.58
DUT	605	345.43	0.57
VUT	389	149.91	0.39
TUT	935	295.59	0.32
CPUT	804	218.58	0.27
<b>MUT</b>	<b>216</b>	<b>42.12</b>	<b>0.19</b>

**SOURCE:** (DHET 2020b: 35). Adapted.

### 3.3.2.4 Weighted per capita research output

The weighted per capita research output indicator in Table 3.6 consolidates the publication output into two categories of graduate production, namely, research Master's (weighted by a factor of 1) and Doctoral graduates (weighted by a factor of 3) and is normalised by dividing the overall research output units by total headcount of academic staff (DHET 2020b).

The data indicate that the weighted per capita research output for all the SA public universities in 2018 was 1.91. This means that the average academic in the country produced two research output units (rounded up). Moreover, SA's eight public HEIs that are recognised as research-led universities and ranked highly in the HE sectors, exceeded the national average of 1.91 units per year as indicated in Table 3.6 hereunder.

**TABLE 3.6 WEIGHTED PER CAPITA RESEARCH OUTPUT EXCEEDED BY TRADITIONAL PUBLIC UNIVERSITIES**

<b>TRADITIONAL PUBLIC HEIs</b>	<b>WEIGHTED PER CAPITA RESEARCH OUTPUT</b>
University of Pretoria	3.70
University of KwaZulu Natal	3.33
Stellenbosch University	3.19
Wits University	3.03
University of Fort Hare	2.82
Rhodes University	2.81
University of Cape Town	2.56
University of Johannesburg	2.25

**SOURCE:** (DHET 2020b: 36). Adapted.

Table 3.7 reveals the MUT's weighted per capita research output in the UoT sector remained at 0.19 from a 216 headcount of permanently employed academic staff, which was below the national average of 1.91 amongst the SA public University sector. It is evident from Table 3.7 that one of the contributing factors for the low weighted per capita research output for MUT is that the institution did not offer any Master's nor Doctoral qualifications in its PQM offering as of 2018.

**TABLE 3.7 UoT'S WEIGHTED PER CAPITA RESEARCH OUTPUT IN 2018**

<b>University</b>	<b>Headcount of permanently employed academics (a)</b>	<b>Research publications Units (1)</b>	<b>Master's Graduates Units (2)</b>	<b>Doctorate Graduates (3)</b>	<b>Overall Research Output (1+2+3)</b>	<b>Weighted per capital research Output (1+2+3)/a</b>
<b>DUT</b>	605	345.43	130	195	669.93	1.11
<b>CUT</b>	300	175.20	40	54	269.20	0.90
<b>TUT</b>	935	295.59	243	174	712.09	0.76
<b>CPUT</b>	804	218.58	186	99	503.08	0.63
<b>VUT</b>	389	149.91	54	30	224.41	0.58
<b>MUT</b>	<b>216</b>	<b>42.12</b>	<b>0</b>	<b>0</b>	<b>42.12</b>	<b>0.19</b>

**SOURCE:** (DHET 2020b: 37). Adapted.

### 3.3.2.5 Publication output by publication types

DHET's Research output policy of 2015 recognises three types of publications in the form of scholarly books and book chapters, published conference proceedings and the number of articles published in peer-reviewed and DHET accredited journals. The output units awarded in 2018 in each of these categories per University reflected the largest proportion of the SA public University's output in the form of journal articles (19 098.72 or 82.5%), followed by books and book chapters (2 069.93 or 10.8%) and published conference proceedings (1 272,73 or 6.7%) respectively (DHET 2020b).

Moreover, another noticeable revelation in Table 3.8 is that most of the previously historically disadvantaged traditional universities including Universities of Technology have not elevated from their research ranking, despite South Africa being more than twenty-five years into democracy.

It is evident from Table 3.8 that MUT's research output is ranked the lowest (0.2%) in the SA UoT sector, and that its moderate publications are in the form of journal articles (0.3%) followed by conferences at 0.1%. Hence, the need for MUT to inculcate a research culture amongst its academic staff for its future research sustainability in the public HE sector in South Africa. Moreover, there is a need for MUT to contribute towards book and book chapters and encourage staff to participate in conferences and publish in accredited conference proceedings.

**TABLE 3.8 RESEARCH OUTPUT BY PUBLICATION TYPE: BOOKS AND BOOK CHAPTERS, CONFERENCES AND JOURNALS OF UoTs IN ASCENDING ORDER IN 2018**

University	Books and Book Chapters		Conferences		Journals		Overall Units in 2018	% of Overall Sector Publications Units
	Units	% of Total Institutional Units	Units	% of Total Institutional Units	Journals	% of Total Institutional Units		
DUT	49.66	2.4%	18.46	1.5%	276.81	1.8%	344.93	1.8%
TUT	3.86	0.2%	41.34	3.2%	250.33	1.6%	295.53	1.5%
CPUT	13.90	0.7%	41.90	3.3%	161.87	1.0%	217.66	1.1%
CUT	6.19	0.3%	58.89	4.6%	105.13	0.7%	170.20	0.9%
VUT	2.74	0.1%	40.62	3.2%	106.39	0.7%	149.74	0.8%
MUT	0.00	0.0%	1.88	0.1%	40.24	0.3%	42.12	0.2%

**SOURCE:** (DHET 2020b: 22). Adapted.

### **3.3.2.6 Proportion of academic staff with doctorate as highest qualification (2018)**

According to the National Development Plan of 2030 (2012), a target for the public University system was set indicating that 75% of all academic staff in universities should have a Doctoral Degree by 2030. Furthermore, the NRF (2016-2017) anticipates increasing the number of Doctoral graduates annually from 2 000 to 5 000, thereby increasing the number of PhDs per million of the population from 36 in 2015 to 100 by 2030.

According to DHET (2020b), there has been an increase in academic staff with Doctoral qualifications from 30% in 2005 to 48% in 2018 in SA public universities. Moreover, South Africa's ten traditional public universities exceeded this average of 48% (UP: 69.6%; WITS: 65.0%; UCT: 64%; RU: 58.4%; SUN: 57.2%; UKZN: 55.6%; UWC: 55.2%; UNISA: 54.4%; NWU 52.0% and UJ: 49.8%). This situation is a consequence of traditional universities focusing on offering Master's and Doctoral qualifications in their suite of PQM.

Furthermore, DHET (2020b) indicated that in 2018, 35% of academic staff possessed Master's qualifications and 17% of academic staff possessed Honours or lower qualifications. It is then a certainty that institutions with the highest number of academic staff with Doctoral and Master's qualifications will contribute significantly towards its research output and continue to do so.

**TABLE 3.9 PROPORTION OF ACADEMIC STAFF WITH A DOCTORATE AS HIGHEST QUALIFICATION IN THE UoT SECTOR AS AT 2018**

University	Number of academics with Doctorates as highest qualifications	Number of Instructional/Research staff	Academics with doctorates (%)
CUT	120	300	40.0%
TUT	297	935	31.8%
CPUT	241	804	30.0%
DUT	179	605	29.6%
VUT	79	389	20.3%
MUT	36	216	16.7%

**SOURCE:** (DHET 2020b: 39). Adapted.

Furthermore, the average proportion of Doctoral degrees amongst academic staff for the SA UoT sector was 29% in 2018. It is evident from Table 3.9 above that MUT's academic staff with Doctoral qualifications was at 16.7%, which is below the UoT sector of 29%. This poses a problem for the research productivity gap with the remaining staff not having a PhD qualification. One of the underlying reasons for the low number of Doctoral academic staff is MUT being a historically disadvantaged institution, was predominantly recognised as offering undergraduate qualifications in the main. Hence, staff did not understand the need to pursue a vertical career path towards a Doctoral qualification as a prerequisite to teach at the undergraduate level. Moreover, in recent years, the PQM at MUT has progressed to offering advanced and postgraduate programmes. However, of concern, as of 2020, only one Master's programme is being offered. It is envisaged that as academic staff achieve Doctoral qualifications within academic departments, then MUT will be capacitated to offer additional Master's programmes in their PQM. Furthermore, over a period of time, academic staff will have to acquire all-encompassing supervision skills to offer Master's and Doctoral qualifications.

### 3.4 ENABLERS FOR RESEARCH TRANSFORMATION

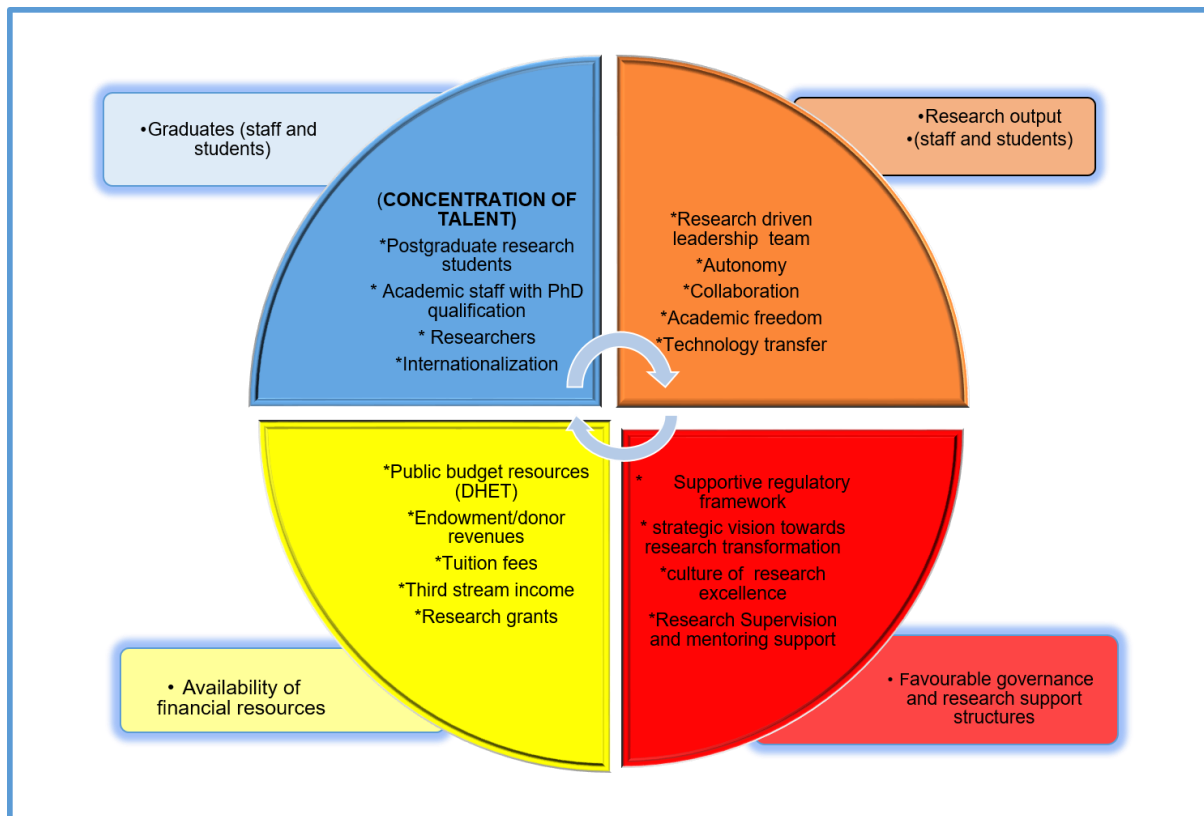


According to Ngcamu (2016), leaders in HEIs are supposed to be responsible for influencing transformation since they are essentially designated to initiate, implement, monitor and evaluate transformative initiatives including reviewing institutional policies and strategic plans as well as promoting research productivity.

### **3.4.1 Support structures for research productivity**

Access to higher education is the gateway to the empowerment of people as well as developing nations towards knowledge generation and innovation as the apex of growth and prosperity (Altbach and Salmi 2011). For countries to be knowledge-driven, there is a dire need for a network of active collaborative researchers at universities; locally, nationally and globally to search for the unknown in an enabling environment. Geber (2010) argues that career academics may develop all the characteristics desired in a productive researcher quite early but without institutional support, it will take a while for them to gain their feet in the field of research. An HEI is thus considered an ideal environment for research scholars to network to seek fresh ideas in their quest for new knowledge, creation and innovation (Altbach and Salmi 2011).

Moreover, to support and increase research output, HEIs require active support of all relevant stakeholders, for example, heads of departments, Faculty Deans, human resource department, library, research office as well as support from top management. Thus, Breen, Jaganyi, Van Wilgen and Van Wyk (2004) emphasise that research capacity building does not exist in silos, but rather a shared responsibility within institutions that promote research output. Moreover, the crucial characteristics of a research-transformed University of Technology are illustrated in Figure 3.3 under four quadrants, namely, graduates, research output, availability of financial resources and favourable governance and research support structures.



**FIGURE 3.3 CHARACTERISTICS OF A RESEARCH TRANSFORMED UOT**

**SOURCE: SALMI (2009: 8). ADAPTED.**

Altbach and Salmi (2011) claim that HEIs need to strive towards becoming successful research transformed universities. However, for this to be achieved, it is critical to have a pool of academic talent, sufficient research resources to offer a rich learning environment, supportive governance structures and leadership in place for decision making without being hampered with lengthy administration and bureaucracy. Furthermore, Iravania (2011) affirms that a public HEI can improve its research ranking by empowering and supporting academic staff to increase their level of knowledge by updating teaching skills and research competences. Scott Jones and Goldring (2015) report that to address the decline in the number of academic staff interested in research, there is a need to support the academic staff at universities. Generally, academics are content in a working environment that helps them to achieve a balance between the needs of their own life, career and achieving the strategic goals of the employer (Noor 2011).

### 3.4.2 Sabbatical leave at HEIs

Sabbatical leave exists in both the private sector and universities throughout the world and is established in the policy directives of many universities. Merriam-Webster (2020) defines a sabbatical year for academics as a “school year free from teaching duties that can be devoted to research, travel and writing and traditionally sabbatical leave occurs every seventh year.”

Smith, Spronken-Smith, Stringer and Wilson (2016) emphasise that sabbatical leave is indispensable yet an under-examined part of academic careers. However, Smith *et al.* (2016) stress that sabbatical leave takes several forms in a wide variety of industries, while University professors, lecturers and research staff can often utilise it for many reasons, including completing their studies, a book or a research project that can lead to publications.

Sabbatical leave has proven to have a positive effect on talent creation and has become a very positive instrument in the process of talent retention and development as many academics use them to develop themselves in a number of ways (Miller, Bai and Newman 2012). Research supports sabbatical leave for academic staff that enables them to find time to avoid skills obsolescence and remain academically qualified by generating innovative ideas that can benefit both their organisation and themselves (Baruch, Dany, Pralong, Davense, Carraher, Crocitto and Sullivan 2014). However, sabbatical leave can be effective when both interested parties agree on proper preparation and planning in respect of timing, targeted aims and objectives before implementation (Hakken 2019).

Research literature worldwide has espoused conclusively that those who experience excessive stress at the work, tend to become physically ill with serious symptoms of emotional and physical exhaustion leading to sleepless tendencies, irritation, and hopelessness (Newell and MacNeil 2010). This contention by Newell and MacNeil (2010) has been supported by Carr and Tang (2005) and Smith *et al.* (2016) indicating that there has been a tendency to perceive sabbatical leave at universities as an antidote to burnout and stress for academics.

Carr and Tang (2005) emphasise that stress to University employees in most cases cost the leadership replacement costs because of perpetual low morale and absenteeism and high turnover that needs constructive cooperation to be overturned. Covey (2004) described in detail the impetus of 'periods of renewal' of employees to be perpetually productive, sharpening their attitude and behaviour and becoming committed and faster in fulfilling their duties and responsibilities.

Sabbatical leave is a unique strategy and process within a University teaching programme, associated with academic satisfaction as well as professional development (Carraher, Crocitto and Sullivan 2014). However, within the academic world, sabbatical leave means much more than downtime. Sabbatical leave is based on a wide variety of forms including efforts to maximise one's academic qualifications; participation in combined research projects with researchers with the same or other institution/s; personal reasons such as attention to families or children, business or volunteer work for the community or non-governmental organisations (Pagano and Pagano 2009). Moreover, Shams and El-Masry (2013) describe downtime as the time that is not wasted but really well spent, precisely because a work break is effective in avoiding burnout and reducing stress amongst employees.

Furthermore, Furbish (2009) and Otto and Kroth (2011) contend that sabbatical is also related to several human resources absence by University staff such as extended leave or leave of absence, release leave, long leave and self-funded leave. In many universities, Furbish (2009) explains that there is a tendency of what has been referred to as 'self-funded leave', a special kind of sabbatical. In this instance, the employee finances such a sabbatical. This is a strategy because the employee sets a portion of the salary aside, which is later utilised in the financing of a long leave of absence. Such initiatives are flexible and are not subject to specific leave outcomes or requirements by the University rules.

Sabbatical leave should not be considered as "time off" and on most occasions varies in substance and length. In most cases, empirical research shows that there are substantial differences and procedures in many tertiary institutions of learning

worldwide related to sabbatical leave (Miller, Bai and Newman 2012; (Halbesleben, Wheeler and Paustian-Underdahl 2013).

The wide diversification of the teaching, learning and research realities are related directly and indirectly to the issue of sabbatical leave. Furthermore, the majority of academicians are aware of the expectations of the respective University leaderships in respect of them fulfilling their duties and responsibilities diligently and successfully at all operational and intellectual levels. This means that the University leadership expects excellence and productivity at all levels (Iravania 2011). However, Zahir and Fakhri (2011) affirm that in established “research-based”, “research-intensive” or “research-led” universities throughout the world and in South Africa a fully paid sabbatical is in most cases a productivity-based award to academic staff at all levels when they excel.

Internationally, sabbatical leave in all spheres is the result of a highly contested competitive process, but at the University level, there is a difference because the consent is based on approval from higher authority levels (Otto and Kroth 2011; Miller, Bai and Newman 2012). Interestingly, despite its significance for academia the realities and outcomes of sabbatical has not been thoroughly researched at several levels (Swenty, Schaar, Phillips, Embree, McCool and Shirey 2011). Most of the existing efforts for analysis and dissection are opinion-based, subjective narratives, meaning that the real impact at the institutional level has not really attracted serious research interest. In the South African HE terrain, it is envisioned that a sabbatical can assist towards increasing research outputs, completion of joint projects, upgrading qualifications, up-skilling and re-skilling, the elevation of institutional as well as personal motivation and commitment, increasing loyalty and enhancement of staff performance and effectiveness.

Davidson, Eden, Westman, Cohen-Charash, Hammer, Kluger, Krausz, Maslach, O'Driscoll and Perrewé (2010) postulate that the importance of a sabbatical leave lies in the fact that University employees could pursue professional and personal goals and interests and goals related to family, life balance, health, research, improved productivity, up-skilling and re-skilling, training and development. The utilisation of

such leave depends on personal and intellectual priorities and the belief that the exercise will be instrumental in producing positive and long-term outcomes on personal and institutional productivity. Wingfield (2017) points out that sabbatical leave becomes beneficial for both the recipient and the institution in the process of re-energising personal and/or intellectual levels. In essence, for such leave to become a success, the emphasis is always on the investment that is beneficial for both parties.

On the part of the University, it is implicit that expectations exist throughout the period of the sabbatical mainly because of the short-term costs associated with it, that the benefits emanating from the process will be substantial both for the institution and for the beneficiary. Moreover, sabbatical leave is undeniably considered a key institutional investment for the future, associated with the most important element in the growth and development of its human capital.

### **3.5 DEVELOPMENTAL STRATEGIES FOR RESEARCH TRANSFORMATION**

At the seventh South African Technology Network (SATN) conference in 2014, the then Minister of Higher Education Dr Nzimande addressed the delegates indicating that South African academics were decreasing in alarming numbers with the average age of academics retiring soon at 55. Additionally, this problem is exacerbated by “the challenges being multi-faceted, having to do with the ageing workforce; developments in higher education worldwide that demand even 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”. He further reiterated that the shortage of academics was affecting the quality of research outputs. To overcome this problem, he further indicated that several grants had been made available, for example, Research Development Grant of R190 million aimed at developing research capacity among academic staff to enable them to contribute towards post-graduate teaching and research and increase the number of Doctoral qualifications. Moreover, DHET was finalising a strategy to build capacity and develop future generations of academics by recruiting, supporting and retaining especially young black female academic staff who are under-represented in the higher education environment at all levels.

### **3.5.1 Mentorships for academics in teaching and learning and research**

Darwin and Palmer (2009) highlight that mentoring is an important tool for effective teaching and learning as well as research transformation in higher education. Furthermore, mentoring is a process of influencing and nurturing the intellectual development of students and career-driven goals of academic staff. According to Crisp and Cruz (2009), the social science literature provides several definitions of mentoring, stressing the lack of clarity and precision on the concept of mentoring within the context of University students. However, Chantiri (2010) defines mentoring as a willing compatible partnership between a mentor and mentee. However, mentoring support is not always easy for the mentees to access.

Whilst fewer HEIs have mentors, the pressure from academics to increase all areas of research output, including publications, impacts on the availability of mentors (Pololi and Knight 2005). Moreover, smaller institutions such as MUT are worse off for mentoring support since mentors with matching academic disciplines are not readily available to support individual mentees. This situation is exacerbated when one mentor has to support several mentees thus dividing their personal time, workload and attention between several mentees for career development. Angelique, Kyle and Taylor (2002) postulate that seeking further advice on funding mentorship support, publishing outlets and other areas of academic success is frustrating.

Gardiner (2005) recommends that for mentoring programmes to be successful, inclusive and accessible, it is advisable to create formal and structured mentoring programmes integrated into the broader human resource goals of the institution (Meyer and Fourie 2004; Nundulall and Dorasamy 2012). According to Darwin and Palmer (2009), a considerable number of formalised strategic programmes initiated by HEIs implemented a dyadic model whereby an experienced academic staff member (mentor) is attached to a mentee. Furthermore, a study conducted by Nundulall and Dorasamy (2012) recommended that a formal research mentoring programme be initiated at HEIs to augment morale of novice staff who lack insufficient capabilities to engage in research activities. Tynan and Garbett (2007) agree on the value of mentoring by knowledgeable and proficient researchers as supported in the literature.

Moreover, the utilisation of established and senior researchers as mentors must be acknowledged and provide a trajectory towards research development career paths for novices.

Researchers in HEIs have concomitantly linked mentoring as career advancement, and promotion (Higgins and Kram 2001), personal gratification and development (Ehrich, Hansford and Tennent 2004) as well as increased self-assurance (De Vries 2011). However, this can only be achieved with institutional support from various units, for example, department, Faculty, administration, finance and from the promotion of a research culture, circumvention of lengthy bureaucratic processes and more decentralised decision-making.

Gardiner (2005) stresses that several benefits arise from successful mentor-mentee relationships. The literature on mentoring and supervision for PhD students highlight several suggestions and strategies to enrich the PhD journey being the pinnacle of academic accomplishment. A study conducted by Nyquist and Woodford (2000) suggested that mentoring and supervising postgraduate students is a process that should commence at inception in a systematic manner and provide unambiguous and clear direction with regular constructive feedback including emotional support.

According to Johnson (2002), firstly, mentees being novices in research transformation perform well with guided strategic initiatives and regular support from mentors. Secondly, mentors receive extrinsic rewards in the form of accelerated research output, with the resultant financial rewards, an increase in networking circles, as well as professional recognition. Thirdly, the consequential benefits for the HEIs are manifold, namely, increased retention, greater organisational commitment as well as increased publication rate with additional research income (Johnson 2002) and (Gardiner 2005). According to Eller, Lev and Feurer (2014), the key components of an effective mentoring relationship are illustrated in Figure 3.4. All these components are essential to assist mentees achieve self-confidence in their competences and inspire them to improve on their potential.





**FIGURE 3.4 KEY COMPONENTS OF AN EFFECTIVE MENTORING RELATIONSHIP**

**SOURCE:** Eller, Lev and Feurer (2014: 817). Adapted.

### **3.5.2 Knowledge creation and management with PHD's (with external stakeholders and communities/CSR)**

Boulton and Lucas (2011) point out that the dissemination and wider distribution of new knowledge is the outcome of institutions that are operating within an ever-expanding global transition facing a multiplicity of structural and functional problems and challenges, where transmission of well-researched knowledge has become an urgent priority. Within this context, the continuous well-researched knowledge production is founded on the approach of universities leading towards a balance between teaching,

research and community obligations and in the process becoming an integral part of the elevation of the existing condition in their surrounding communities (Boulton and Lucas 2011).

For South Africa to elevate the quality of life for all its citizens, it is imperative to maximise the potential of its people through the acquisition of knowledge and skills, efficient and economical work as well implement operational plans with the obligatory institutional arrangements. The duties and responsibilities of academics who teach and guide are possibly more demanding because they are obligated by present and future realities to increase their intellectual capacities and to be able to disseminate the new knowledge realities to students to prepare graduates adequately for a successful and productive future.

The student-academic staff common understanding, collaboration, synergy and coordination of aims and objectives provide the opportunities for students to upgrade their knowledge acquisition through research and post-graduate studies (Anderson, Herriot and Hodgkinson 2001). There have been several attempts by researchers and academics to empirically identify the difficulties, problems and challenges as well as the successes and failures of Universities of Technology in their efforts to successfully apply the demands and priorities of knowledge creation by obtaining vertical qualifications.

All levels attached to University education from the undergraduate to PhD levels bear importance for the graduates, their families, and their communities at large, especially in South Africa where the new government policies have opened the doors of learning to the poorest of the poor (Council on Higher Education 2016). Likewise, faster steps forward demand synergy, collaboration and coordination amongst universities, all layers of government and the private sector in the efforts to transform the lives of staff, students, communities and society. Wild (2015) emphasises that these collaborations are instrumental in advancing the possibilities of creating adaptive and innovative knowledge leading to innovative cognitive flexibility and agility.

It is very difficult to access the existing challenges facing South African universities in their efforts to adapt to the present circumstances, especially in relation to Universities of Technology, which on most occasions have faced both infrastructure and support realities when compared to research-led and comprehensive universities (Levy 2017). This is evident even though there have been serious steps forward in terms of increased enrolments and research productivity at these institutions.

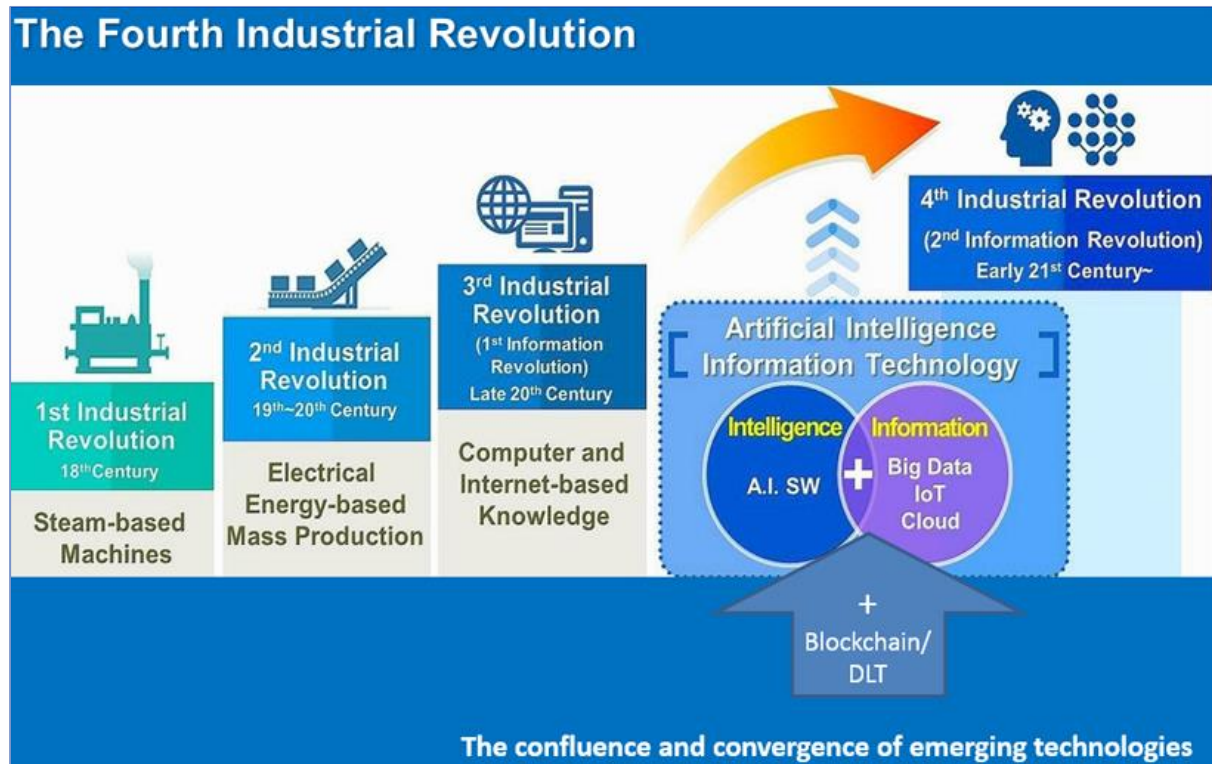
The South African HEIs have academic development units, such as the Teaching and Learning Centres as well as Research Units. These are fundamental entities in the preparation of professors, lecturers, tutors and researchers regarding the demands for knowledge creation and the new professional and job realities through evidence-based practice in improving the students' learning skills (World Economic Forum 2016).

### **3.5.3 Upskilling and re-skilling for the 4<sup>th</sup> Industrial Revolution (4IR)**

The world of work has been changing rapidly and radically as the already existing 4IR unfolds. This means that the nature of education and especially universities are rapidly changing. Moreover, universities must stay relevant at this historical juncture where there is a need for them to accelerate the pace of change as the 4IR is instrumental in shaping the future of academia in terms of teaching, learning, research and community engagement, thus re-shaping the demand for planning and implementing strategies for the future (World Economic Forum 2020).

The existing competition for the appropriate talent in teaching and research is fierce as the future is in a perpetual process of changing rapidly. This process leads to the understanding that almost all skills, knowledge, job titles and roles within the academic teaching and research communities will inevitably change in accordance with the demands and imperatives of 4IR and its repercussions as reflected in Figure 3.5 with emphasis on artificial intelligence and information technology. Furthermore, the World Economic Forum (2017) reported that the 4IR technologies, such as artificial intelligence, genome editing, augmented reality, robotics, cloud computing and 3-D printing, are rapidly changing the way humans exchange, and distribute value by the choices they make today. Therefore, the future will be dependent on how we adopt,

invest and position these great new technologies in every economic sector including HEIs (Schwab 2017).



**FIGURE 3.5 FOUR INDUSTRIAL REVOLUTIONS - PROGRESSIONS FROM THE 18TH TO THE 21ST CENTURY**

**SOURCE:** (Genovese 2017).

Hence, all organisations, especially HEIs need to prepare for the future that for most is unknown, especially in terms of research talent that is scarce even now. Questions of change, transformation, re-skilling and up-skilling have become an urgent necessity in an environment of uncertainty. These questions ought to be of key importance to leaders, managers and followers. More importantly, the existing talent needs changes and new strategies, and tactics need to be undertaken to motivate, keep and attract human resources that are needed for the future.

The core of the effort lies in a clear understanding of artificial intelligence, automation and advanced technology that shape the new work environment. The new era will be characterised by robots, electronic vehicles, artificial intelligence, super-computing and

neuro-technological brain enhancements amongst others, meaning dramatic changes in peoples' lives that take place speedily (De San José 2019).

Xing, Marwala and Marwala (2018) report that the key question that arises is how employees shape their responsibilities in utilising new technology, its realities and repercussions associated with a wide variety of competing forces that are complex and ever-changing. As a result, universities need to reinvest in their human capital to become abreast of technological changes. Mokyr, Vickers and Ziebarth (2015) have outlined such historical realities throughout different eras. They have accepted that new technological innovations had negative effects on large sections of the working classes. However, they concluded with the optimistic view that despite these innovations; technological progress will have positive results for humanity. In opposition to such predictions of the future, Acemoglu and Restrepo (2018) assert that the 4IR was likely to increase the levels of automation which in the process would enable the creation of new and better jobs, boosting employment and remuneration to new levels.

While the reality of the loss of jobs in the process of the 4IR cannot be disputed there has been an absence of the fact that new jobs will be created, meaning that people need to be well equipped to perform them (Acemoglu and Restrepo 2017). This becomes evident when one looks at the outcomes emerging from the invention of the computer and the creation of new job sectors, such as analysts, builders, data researchers, interpreters and innovators. Nevertheless, computers or robots do not possess human creativity, interaction, mobility and physical dexterity.

Whilst the 4IR is a process in motion, it is up to the leaderships of the public and private sectors including HEIs to be strategic in the effort to save jobs and create new jobs in advancing efforts for re-skilling and up-skilling as a strategic and tactical priority. This is the basis of lifelong learning, in need for the creation of a climate rooted in the belief that new ventures create new jobs. Furthermore, this means that the key response of universities throughout the world and in South Africa need to accelerate their efforts to build up the new generations of managers, entrepreneurs and well-informed, trained workers.

The most successful application of the 4IR in higher education seems to be empirically evident in SinGAPore indicating that existing HE systems aided by strong state support have been successful in the preparation of lifelong learners (Gleason 2018). Moreover, a comprehensive review of SinGAPore provides a detailed review of programmes and policies that can be internationally replicated in the effort to prepare all sectors and citizens to face the challenges of the 4IR.

The 4IR-related educational initiatives were the creation of new highly technology-driven universities preparing students and staff for the automation economy. Gleason (2018) describes SinGAPore's Skills Future and Smart Nation with a detailed description of their structures, systems, processes, practices and strategies concerning the existing and future workplace challenges for the country. However, the emphasis was on youth prospects and opportunities in the new terrains of employment. Moreover, taking into account the necessity of developing the mind-sets and skills necessary for lifelong learning, the SinGAPore state has initiated and cemented large scale practical policies that at present and in the long run are considered vital in guaranteeing a smooth transition into the 4IR era (Gleason 2018).

Yuan (2017) described in detail how fast the unity-based reforms in China have fast progressed despite the initial challenges, and the state of current higher education reform efforts in China that support innovation. They explore the major hurdles for the forthcoming reforms associated with an automation-based economy based on what is thought to be the 'Chinese model' and its strong possibility of success in the future of innovation.

Müller (2018) examined the circumstances prevailing in the situation of the tertiary education institutions in Costa Rica in respect of their preparations for the developmental learning and research towards meeting the demands of the 4IR. His analysis of findings led him to adopting a regenerative development approach as the basis of innovative initiatives in the tertiary institution's terrain despite the existence of major challenges facing them. His study recommended the adoption of new technological advances, the immediate movement from disciplinary approaches to

holistic ones and the emphasis on discovering the new demands leading to the survival of civilisation.

Inevitably, universities in South Africa and Africa, in general, together with the institutions internationally are obligated to become pioneering forces in the efforts to being at the forefront of the development of their societies. This reality, directly and indirectly, relates to teaching and research-based strategies that lead to socially conscious and skilled educated citizens, equipped with competencies required for the success of the 4IR. In this reality, the role of the academic and research staff is of paramount importance because the existing conditions demand new and advanced ways of teaching and research instrumental in advancing employment in a knowledge-based economy and society at large.

This process can only be successful with the re-positioning of universities and their staff for their role to be optimised in the efforts leading to the reconstruction of the country's future in a highly competitive global society and environment. Within these parameters, a key to success is the strengthening of links between universities and the private sector as a pillar for economic competitiveness. However, historically universities through their research activities have been instrumental in advancing technological innovations, which are the drivers of knowledge production and research outputs.

As the technological priorities are rooted in the expansion of in-demand skills associated with the 4IR, it has become evident that the important skills and knowledge with high employment prospects lie in technological advancement. This includes innovation, engineering, science, mathematics, arts Geo-informatics and data science qualifications that have for a number of years increased in demand because new digital platforms and technologies are instrumental in generating vast amounts of data that change the processes of knowledge production. These new realities pose many challenges for the academic and research staff at all universities, especially those with limited resources as re-skilling and up-skilling become an inevitable requirement for the road forward.

Furthermore, Yusuf and Nabeshima (2007) analysed how universities can promote economic growth since certain professions face obsolescence due to the perpetual advancement of cloud computing, machine learning and big data. This indicates that wide ranges of jobs are at stake because of the atomisation of many processes that are performed by new and sophisticated methods and systems.

The re-skilling and up-skilling of the lecturing and research staff at universities are of paramount importance because they need to be able to produce employable graduates whose advanced knowledge will ensure that they are able to keep up with the fast-paced shifts in workplace projects. This knowledge needs to be based on critical and advanced thinking patterns, clear communication skills, advanced creativity leading to innovation, collective and collaborative work, and common ethical and transparent culture.

The re-skilling and up-skilling of vertical qualifications, existing courses and disciplines are strongly influenced by the dictates of the 4IR. This will culminate in the continuous effort to lead students to discovery, innovation, invention, and exploration that will enhance their future contribution in the planning, building and cementing a future-inspired, transformation-led society, based on trans-disciplinary teaching and innovative research methods capable of producing active citizens.

The Business Higher Education Forum (2018) asserts that the process and outputs of such re-skilling and up-skilling need to be founded on the principles of not providing 'mere facts' to students but rather guiding them to the development of a creative mind-set and mind elasticity. This will allow them to research, discover, create and invent new scientific and applicable knowledge that adds value to society's elevation at all levels. Additionally, Forrester (1996) maintains that the current education system should provide a basis for student mobility to cope with changing demands and opportunities that arise from the 4IR.

According to Xing and Marwala (2017), South Africa and the universities' challenges ahead in respect of the 4IR have proposed an 'Adopt Fast and Adapt Quick' strategy for the country's tertiary institutions. Their empirical study based at the University of



Johannesburg initiated the planning and implementation of what they have called “smart mining”. Their findings have led to the adoption of what they have called a ‘detailed and adaptive solution’ directly and indirectly related to the new demands in the tertiary education terrain including addressing issues related to digital literacy, knowledge acceleration, transformation, vision, mission, inclusiveness and direct engagement of students (Xing and Marwala 2017).

Muller and Cloete (2017) discuss initiatives of South African Universities towards the continuing engagement with the challenges associated with 4IR. Additionally, Muller and Cloete (2017) emphasise that the combined efforts of all universities’ stakeholders and role-players put the tertiary institutions in a strong position to play a key role in economic and social development instrumental in job creation through the production of what Manuel Castells has called “self-programmable graduates”. Such graduates are skilled individuals possessing the abilities to change and adapt to a wide variety of new technologies and different occupations throughout their professional life.

Finally, the Minister of the DHET has established a Ministerial Task Team on the 4IR to empower academic staff and students to confront the world of technological advancements in the HEI sector and take into consideration blended learning in view of the COVID-19 pandemic (DHET 2020a).

#### **3.5.4 Talent Retention**

Talent retention and development of academic and research staff at a University is important for knowledge production are fundamental in its success or failure. This relationship is important as organisational issues such as structures, policies and processes, functions, human relations, low salaries, stress, burnout, disillusionment and tough working conditions lead inevitably to job migration to the private sector or other HEIs with better working conditions either locally or globally.

Moreover, Habib (2016) affirms that research productivity should be one of the key elements in the success of the National Development Plan. Hence, the recruitment and retention of highly research-driven academic staff need to be carefully deliberated as a key priority even though such recruitment faces the problem of the scarcity of

highly qualified researchers at Universities of Technologies who on many occasions demand higher remuneration packages and incentives for research productivity. According to Habib and Morrow (2007), the top end of the graduate pool is unlikely to be attracted to academic research as a profession if the remuneration packages are not attractive and better than what the industry offers.

The key question arising within this context is how the Universities of Technology and a number of comprehensive universities facing many problems and challenges can really compete with traditional research-led universities in terms of attracting, recruiting, developing and retaining such staff offering them solid career prospects and future opportunities at all professional levels (Theron, Barkhuizen and Du Plessis 2014). A study conducted by Guma (2011) confirms that poor job retention among employees often led to additional costs on employee turnover which creates a burden on the remaining employees, delays in staff recruitment, training costs, lost productivity, loss of clients and intellectual capital. However, Yousaf (2010) argues that the challenge of academic retention is a global problem that affects both developing and developed countries. In South Africa, staff retention in universities is a huge challenge. Pienaar and Bester (2008) as cited by Koen (2003) state that between 5% to 18% of academics leave or job hop from one institution to the other for better job opportunities and benefits.

HESA (2011) and Theron, Barkhuizen and Du Plessis (2014) have highlighted that there is a serious problem in terms of retention at South African universities as many academics have intimated that they were preparing to leave the sector. This will result in universities in the country facing serious “brain-drain” problems and challenges soon in terms of retaining talented research and academic staff. Bolden, Gosling, O'Brien, Peters, Ryan, Haslam, Longsworth, Davidovic and Winklemann (2012) state that staff recruitment, development and retention are processes planned and implemented by institutional leadership and the departments that aspire to academic teaching and research excellence at all organisational levels. Hence, Van Dijk (2008) postulates that the attention to high performers is a matter of coordination and synergy strengthened by solid communication patterns coupled with rewards for excellence.

According to Musah and Nkuah (2013), high research performers in academia are keenly aware of their contribution to the relevant institution and expect treatment in accordance with their efforts and achievements in knowledge production and anticipate the full support and cooperation of the institution in a mutually beneficial relationship that leads to perpetual retention and development at all levels. Such relationships are directly and indirectly related to the researcher's job satisfaction levels within the institution as they have a wide variety of special needs such as perpetual financial support, including international conference attendance, continued intellectual and research development, a conducive work environment, promotions to higher levels and on many occasions fringe benefits (Piccoli, Callea, Urbini, Chirumbolo, Ingusci and De Witte 2017).

Habib (2016) asserts that these are the key reasons why South Africa's 'traditional research universities' have in many ways acceded to such initiatives to safeguard the retention of their top research performers, while they head-hunt additional talent from other countries of Africa and globally. Bolden, Petrov and Gosling (2008) and Thite (2010) reinforce their view that such universities are aware that it will be very difficult, if not impossible, to retain their research talent unless they offer them bonuses and attractive incentives in addition to competitive salaries and/or wages; an appropriate and well-equipped office environment; opportunities for professional advancement and reduced teaching workload.

All South African universities require talented researchers who are not only productive in the terrain of knowledge production but are also prepared to share with the academic community, their colleagues and students their intellectual and research capabilities with confidence and resilience. When such a process becomes a reality all participants in knowledge production share, become motivated and committed to long term relationships with the University as they also begin to aspire to excellence, dedication, professional development, future financial rewards, higher performance evaluation and fresh identification of their own needs (Theron, Barkhuizen and Du Plessis 2014).

Dunbar (2016) has shown conclusively that mutual trust amongst the key participants in the talent retention relationship is a key element as it is directly and indirectly linked

to the institution's vision, mission and key objectives and its core business, namely, teaching and learning, research and community engagement. Moreover, George (2015) postulates that in the process of recruitment and selection, communication regarding existing and future priorities of the University and its leadership are of paramount importance, while from the researcher's perspective, key elements are associated with career and future expectations, opportunities and the recognition of their expertise with lucrative rewards.

The existing or future possibilities of differences amongst the stakeholders could be resolved through the building of a common understanding of existing realities and the knowledge and integrity of the parties. Whilst HEIs operate autonomously, they report to DHET and other stakeholders as an integrated system in the higher education sector. Thus, investment in human capital who are research-driven to produce new knowledge and innovations are paramount for society both locally and globally.

### **3.6 SYSTEMS THINKING AND COMPLEXITY THEORY**

Systems Thinking is a field founded on the General Systems Theory and has been utilised in a very wide field of disciplines including academic and research fields (Dominici 2015). Furthermore, Hofman-Bergholm (2018) agrees with Dominici (2015) and asserts that systems thinking utilisation has been considered as powerful in researching, analysing, dissecting and solving a wide variety of complex institutional problems.

Several seminal contributions that are instrumental in the present case study are the core of the present literature review. One of the key foundations of its success and worldwide acceptance is its interdisciplinary nature of systems, based on the theoretical and empirical reality that a system is an entity comprising of interdependent and interrelated parts (Rousseau, Billingham and Calvo-Amodio 2018). Furthermore, systems exist within environments including HEIs that have direct or indirect effects on them. Hence, with higher education transformation, systems need to adjust in accordance with the existing complexities, constraints, dynamics, and existing principles.

The term "general systems theory" as highlighted by Von Bertalanffy (2010), has been adopted by many theoreticians and researchers in psychology, biology, mathematics, social networks analysis, sociology and a much wider sphere of disciplines. Additionally, systems thinking has been a 'school of thought' accommodating extensive views of definitions, which depend on both innovation and repetition of empirical findings. This realism makes the common understanding and recording a broadly accepted definition by all or most of its exponents, evident with 'common themes' in systems thinking and its direct relationship with complexity theory.

According to Tong and Arvey (2015), in every organisation, including HEIs there is strong evidence of intensified complexity in the working environment because of ever-increasing changes that are unpredictable. Inevitably, all organisations including HEIs are obligated by circumstances to deal with their own problems and challenges especially the increasing complexities associated with their human resources both skilled and unskilled by adopting and diffusing complexity science. The multiplicity of complex systems throughout the organisational and operational levels, as the 'new science of complexity' has been transformed into a reality and a necessity. Moreover, Axelrod and Cohen (2000) state that linear methodologies, then, become a reality of the past. Furthermore, Senge (2006) contends that the bottom line of systems thinking is leverage, namely, seeing where gaps, actions and changes in organisational structures can lead to substantial, long-term improvements.

McElroy (2000) and Grobman (2005) concur that these regional, national, and global veracities are mainly due to a number of reasons, namely, organisations are dissolving at very high rates; the productivity of technological revolutionary methods have led to declining costs and increasing productivity of information processes and the intensive local and global competition both in the private and government sectors.

Complexity theory is an integral part of systems thinking and research is the empirical foundation of such an intellectual terrain. According to McMillan (2003) and (Bar-Yam 2004), complexity theory has been described as fundamental in the analysis of strategic management and organisational imperatives including HEIs, which is the subject of this case study. Complexity in systems evident in HEIs has been related to

existing realities facing them. According to Caputo (2016), these realities relate to structures, policies, processes, organisation, rules and regulations, culture, conflict, communication channels, behaviour, leadership and hierarchy. Additionally, there are also teaching, learning, research, human resources, ethics, integrity, mentorship, training, support, politics, psychology, resilience, performance levels, talent development and retention, safety, dissent, labour relations, identity, burnout, mentorship, succession planning and technology levels, amongst others emphasised by Axelrod and Cohen (2000), McElroy (2000) and Grobman (2005).

Fonseca (2002) and Liang (2016) describe complexity theory as an interdisciplinary theory that grew out of systems theory in the 1960s. Fonseca (2002) and Liang (2016) proclaim that complexity theory mainly draws from research in the natural and human sciences, examines non-linearity and uncertainty and places emphasis on a wide array of interactions and the accompanying feedback loops that accompany them in the context and realities of systems that change constantly. Complexity theory has been utilised extensively in the fields of strategic management and organisational studies and has been applied in the analysis of processes, structures and leadership of organisations and their adaptation patterns related to their work environment and their efforts to cope with conditions of uncertainty. Burnes (2005) explains that organisations, especially HEIs, learning and research in South Africa, including the African continent and internationally are characterised by complex structures and processes filled with dynamic networks of interactions, planning and a wide variety of implementation processes. Complex issues dominate the lives of existing human capital in the HE institutions and play key roles in the process of adaptability. Moreover, Burnes (2005) and Beaument and Broenner (2011) proclaim that this is because of the different levels and veracities of individual and collective behaviour and actions of human capital that exist within institutions.

### **3.7 COMPLEX ADAPTIVE SYSTEMS (CAS)**

Butler and Allen (2008), Goldstein, Hazy and Lichtenstein (2010) and Waddock *et al.* (2015) regard complexity theory as an integral part of systems theory and systems thinking since it was classified as organisations with Complex Adaptive Systems (CAS)

exhibiting principles such as self-similarity, co-evolution, chaos, possibilities, self-organisation, complexity emergence and space of possibilities.

Ordered and chaotic systems are contrasted with CAS through the relationships existing between the system and the agents, which act within it. In CAS, there is co-evolution between the agents and the system where the agent's behaviour is constrained by the system, but the agents' interaction with it, and then modify it. This is a key characteristic of CAS as observed by Uhl-Bien and Marion (2009) and Mowles (2014). However, Rouse (2016) refers to universities as exemplars of complex organisations with numerous stakeholders, agendas and conflicting priorities. Moreover, Rouse (2016) contends that whilst universities are a subset of general society, they are not as complex as the overall society.

It has been eloquently stated by Lauser (2010) that 'complexity science' targets a 'sub-set of all systems' that is evident in social, biological, technical, economic, chemical, physical and biological systems. Furthermore, it is a sub-set that is evidenced in biology, chemistry, physics, social, technical and economic domains that are co-evolved with its environment. However, Lauser (2010) explains that such sub-set is the foundation of an emerging structure and that the sub-set of all systems is a creation known as a complex system. Lauser (2010) concludes that self-organisation takes place through the interactions, feedbacks and dynamics of components that are heterogeneous.

According to Yorks and Nicolaides (2012), complexity as an integral part of systems thinking has been utilised significantly in the empirical efforts aimed at providing significant insights into the dynamics of organisational change. Furthermore, Yorks and Nicolaides (2012) and Albert, Kreutzer and Lechner (2015) claim that these dynamics are in the social, educational, psychological, communication and technological sciences amongst others as well as other scientific fields and disciplines researching and studying complex systems.

Although there are many general and specific agreements on a wide range of commonalities on themes and strategies on systems theory and thinking there is an

acknowledgement that a commonly accepted definition does not exist. This reality has been demonstrated by an extensively debated contribution by Arnold and Wade (2015) who introduced and described it as a “systems test” that would be instrumental in including a wide variety of key elements such as the elements, purpose and inter-connections that would identify the system itself. Their analysis based on a comparative analysis of definitions embraced by seven important exponents of thinking showed that all of them fail their proposed systems test. This finding, however, did not stop them from accepting the reality of existing common themes within their definitions, the common roots of understanding of behaviour, the existing inter-connections, the evidence of holistic systems, and the system’s structure as the foundation of behaviour.

Arnold and Wade (2015) argue that despite their belief and analysis of previous definitions, the above contradiction that they examined pinpointed the fact that such an analytical system and thinking based on the identification and understanding of systems that predict their behaviours through analysis needs a strict definition. The most vital contribution has been the commonalities and the synthesis of the theoretical and empirical relationships.

Richardson (1986) and Hovmand (2014) concur that the majority of systems thinking exponents agree that there are fundamental differences between it and linear thinking, as its focus lies on the relationships amongst its system components, in an integrative, holistic thinking, contrary to the prevalence of a dissected thinking. Furthermore, Richardson (1986) and Hovmand (2014) concur that the dissected reductionist thinking ignores the existing relationships among system components that dominate systems behaviour.

Moreover, such a foundation is based on several key questions. Hovmand (2013) explains that they are based on the principle that specific behaviour is the outcome of an understanding of the historical past and the vision of the future. Within this, basic conceptualisation systems are dynamic, and Yearworth and White (2013) attest that they are subject to a wide variety of forces and feedback mechanisms instrumental in



leading to a deep understanding of the behaviour of systems over a period through the identification of the driving variables.

As Weinberg (2001) has shown that the basis of systems thinking is rooted in its direct and indirect dealing with organised complexity, the living antithesis of unorganised complexity and organised simplicity. This principle leads to a systematic understanding of the system's behaviour. Moreover, Rouse (2016) suggests that to bring about transformation at a University, there is a need to interrogate the University in-depth as an organisation and its operation.

### **3.8 ICEBERG MODEL**

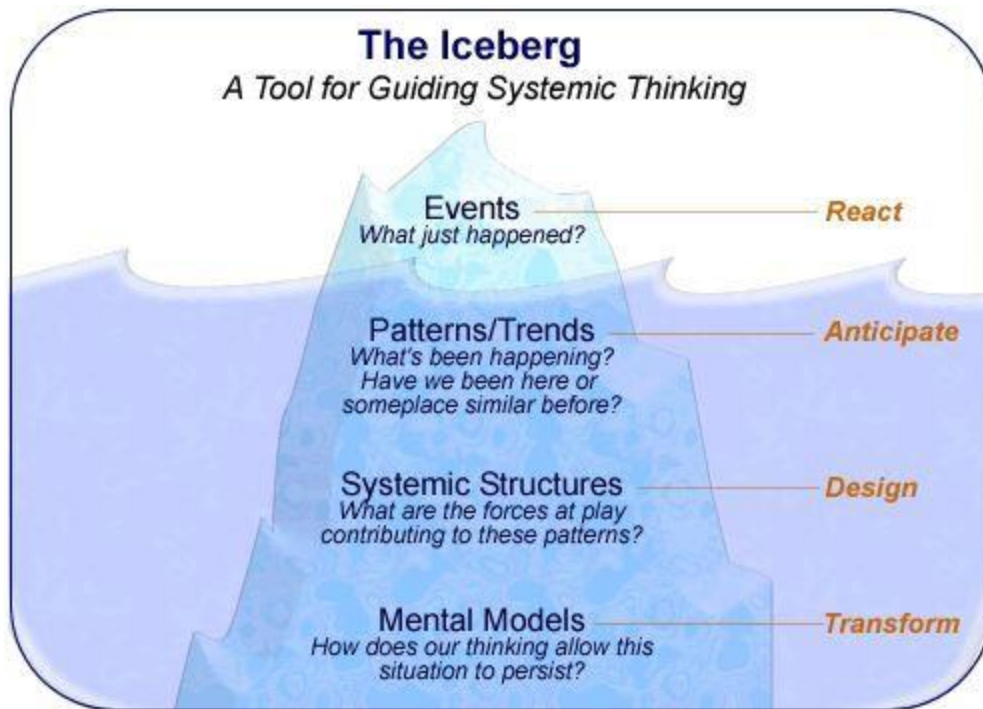
The above-mentioned models of thinking and analysis have led to the widely accepted Iceberg Model. It was founded on the belief that observable realities and events were caused by mental models and systemic structures such as inter-relationships, social and organisational hierarchy, procedures and rules, attitudes, authorities, process routes and flows, incentives, compensation, goals, corporate cultures, delays and feedback loops and existing forces are within an organisational environment (Millar 2019).

Structures are instrumental in shaping behaviours, meaning that the understanding and identification of systemic structures lead to an understanding of behaviours. Despite the common themes, understanding as well as empirical and theoretical commonalities, there is an agreement by Monat and Gannon (2015) that the existence of two different schools has strengthened as opposed to weakening the terrain of thought and debate. According to Monat and Gannon (2015), one school is rooted in the theory and practice of the Iceberg Model concentrating on the events and patterns caused by mental models and systemic structures.

Cunliff (2019) points out that the Iceberg Model accepts that distinguishing natural systems from human-designed systems is important as the former systems always consist of self-organised structures while the latter is of designed structures. Cunliff (2019) maintains that this school of thought views system dynamics as the most fundamental element of systems thinking, without equating it to systems thinking. The

other school's focus is on the inter-relationships among system components and the effects on the dynamic behaviours that arise, and the modelling of system dynamics. However, (Binder *et al.* 2004) argue that although there is a tendency to equate system dynamics with systems thinking, it does not fully embrace the Iceberg Model which is one basic model of systems thinking.

Monat and Gannon (2015) advocate that the Iceberg Model supports the 'systemic structures' including comprising the inter-relationships amongst components, the dynamic relationships and behaviour amongst systems and causal loops. Furthermore, patterns and events are determined by those structures, demonstrating the way these structures have an impact on daily lives in ways that can be observed and analysed. According to Burnell (2016), the 'integrated model of systems thinking' is rooted in an integration of the Iceberg Model concepts and causal loop diagrams into an overarching framework to determine the root cause of the bigger problems related to this case study. The concepts of the Iceberg Model can be utilised in the higher education sector as illustrated in Figure 3.6 with events, patterns, systemic structures and mental models, emergence, feedback, self-organisation, unintended consequences and system dynamics (Toole 2005). The Iceberg Model depicts a deeper understanding of the institutional system being examined at each level as well as allows for augmented leverage for transformation and strengthening the system towards continuous improvement.



**FIGURE 3.6 THE ICEBERG MODEL**

**SOURCE:** (Gerber 2012).

### 3.9 SYSTEM DYNAMICS RELATED TO CAUSAL LOOP DIAGRAMS (CLD)

Jay Forrester of the Massachusetts Institute of Technology (MIT) formulated the term “System Dynamics” in the 1960s to recreate the understanding of a system and its feedbacks (Forrester 1961). Moreover, Forrester (1961) states that the intention of system dynamics is to explore the dynamic responses to changes within or from outside the system by creating designs to describe the past and predict the future. Furthermore, Forrester (1961) expanded on his basic model through further detailed analysis by creating a link between the model application and management education. Therefore, Towill (1996) concurs that it is appropriate to regard Forrester as the “father” of system dynamics as well as the originator of the many techniques applied in contemporary supply chain management. System dynamics is an iterative process evolving in response to new insights and changing circumstances and/or new goals. (Milstein and Homer 2006).

Throughout the decades of its existence, De Pinho (2015) asserts that system dynamics and its exponents have developed a wide range of methods aiming at the analysis of complex situations through extensive utilisation of technologically rooted simulation. The introduction of causal loop diagrams (CLD) over the years has been a very substantial and useful element of the empirical dimensions of systems thinking and accepted as key foundations in the process of investigating and structuring solutions without the use of computer mapping and modelling (Thinking Systems 2017).

Myrtveit and Saleh (2000) affirm, that causal loop diagrams have been instrumental in the emergence and dominance of qualitative system dynamics in the analysis of the behaviour of the system in its totality and have recognised it through such scientific processes. Thus, one may postulate that the quintessence of SD is when analysts focus attention on designing organisations in which ordinary people can achieve extraordinary results (Sterman, 2000).

According to Saisel and Barlas (2006), the fundamental causal loop diagrams and stock-and-flow diagrams have become an integral component of systems thinking in terms of the communication amongst relationships and system components. These are directly related to a number of criteria; wide applicability to most systems; easy to understand and use; addressing one or more concepts directly related to a systems thinking definition; focusing on the complete understanding of systems already in existence. Saisel and Barlas (2006) point out that the widely accepted eight criteria of system thinking systemigrams are: causal loops diagrams with feedback and delays; root cause analysis; interpretive structural modelling; systems archetypes; system dynamics/computer modelling; behaviour over time graphs and stock and flow diagrams. Yearworth (2013) states that causal loop diagrams are instrumental in the process of systems identification beginning with the first step (the problem), the second (its examination), the third (analysis) and the final (solutions).

Oliva and Mojtahedzadeh (2004) maintain that the construction of causal loop diagrams has been an influential tool of system dynamics in the effort of empirical research that leads to the analysis and understanding of everyday realities through

deciphering complex and inter-dependent issues of society and its organisations at all levels of life. Furthermore, this is undertaken through an analysis of existing complex systems via the identification of the important variables of a particular system through links and sentences. In this case study, existing challenges, risks and problems are constructed scientifically through the careful linking of several causal loops. Oliva and Mojtahedzadeh (2004) affirm that this process is the foundation of the analysis of existing and future challenges and problems and includes variables, the links to their interconnections and the loop sign (+/-) that pinpoints the type of behaviour produced.

Causal loops have become an integral part of systems thinking because systemic behaviour is on many occasions determined by the existence of balancing and reinforcing processes that take different forms depending on existing circumstances and behaviours (Kim and Andersen 2012). Despite this reality and existing differences, the creation of causal loop diagrams is instrumental in understanding the inter-relationships among all components of the system. Such relationships can be described as complicated because of the 'cause and effect realities' some of which could be hidden, hence the difficulty of identification. According to Kim and Andersen (2012), this has led to the choice of causal loops as one of the first and key steps in the understanding of system behaviour.

Martinez-Moyano and Richardson (2013) postulate that causal loop diagrams are an integral part of the systems thinking. However, these authors claim that their success is founded on the clarity of the fundamental steps to be undertaken in terms of modelling and simulation beginning with problem identification; problem definition; conceptualisation of the system; model formulation; testing and evaluation of the model; model use; implementation; dissemination and design of strategy and infrastructure.

Sterman (2000) states that within the boundary of a system there are basically two types of variables, those inside (endogenous) and others crossing it outside (exogenous). Furthermore, Sterman (2000) maintains that once these have been established the search of the relationships amongst the variables begin within the systems thinking and lead to the process of developing the feedback loops that are

represented within the system of causal loop diagrams in system dynamics. Causal loop diagrams generally represent the feedback loop structure of the system and are the foundation of the dynamic behaviour of the system (Binder *et al.* 2004). They represent in many ways that the feedback structure of systems capture the premises related to the root causes of dynamics and the resultant feedback.

The application of causal loop diagrams in the context of system dynamics and systems thinking in this case study will be created on determinants and relationships of key components associated directly and indirectly with the institution's research transformation outcomes themselves. Moreover, equally significant is the quality of efforts, policies, initiatives and services on the part of the University as well as their appropriateness and accessibility. Additionally, it is the crucial role of leadership and management in such processes, the attitudes and behaviour of staff and their existing capacities; and the role and participation of 'outside key players' such as the DHET and the University Council as highlighted by Narayanan (2005), Forrester (2007), Ghaffarzadegan, Lyneis and Richardson (2011), Franco, Rouwette and Korzilius (2016); and Lich *et al.* (2017).

In the process of this case study, causal loop analysis utilises diagrams as portrayed by Williams and Hummelbrunner (2010) and Groesser and Schaffernicht (2012) as systems thinking tools, which will represent the existing dynamic social or physical changes in systems in a qualitative way. Moreover, Geyer and Rihani (2012) and Hargreaves and Podems (2012) concede that causal loop diagrams analyse relationships of a multiplicity of sub-systems and variables and take into account different types of feedback loops.

As the analysis of causal loops is in progress, the diagram will be structured in accordance with the details of relations of cause and effect that affect the system positively or negatively as well as the fundamental weaknesses in the process of building or blocking the institutional performance. Chen, Chang and Chen (2014), Inam, Adamowski, Halbe and Prasher (2015) and Frannek, Nagaoka and Nakagawa (2016) assert that in such system diagrams, key obstacles are identified, it could be

leadership, policies or their non-existence, supervision and guidance, lack of information, governance, or human resources.

### **3.10 CONCLUSION**

This chapter focused on the extensive literature on imperatives of research transformation agenda at HEIs and factors that impede research transformation in HEIs incorporating systems thinking, system dynamics and causal loop diagramming. These factors play a pivotal role in future survival and sustainability of HEIs since the funding from DHET for public HEIs is dwindling. Hence, the imperatives of research transformation at the MUT are crucial to becoming efficient and effective by contributing to the knowledge economy locally, nationally and globally. Thus, the researcher contends that it becomes increasingly imperative that research transformation at the MUT is recognised and contextualised in this paradigm shift. The next chapter focuses on the research methodology applied using a qualitative system dynamics perspective that impacted on the actual investigation of the research transformation at the MUT.

## **CHAPTER FOUR**

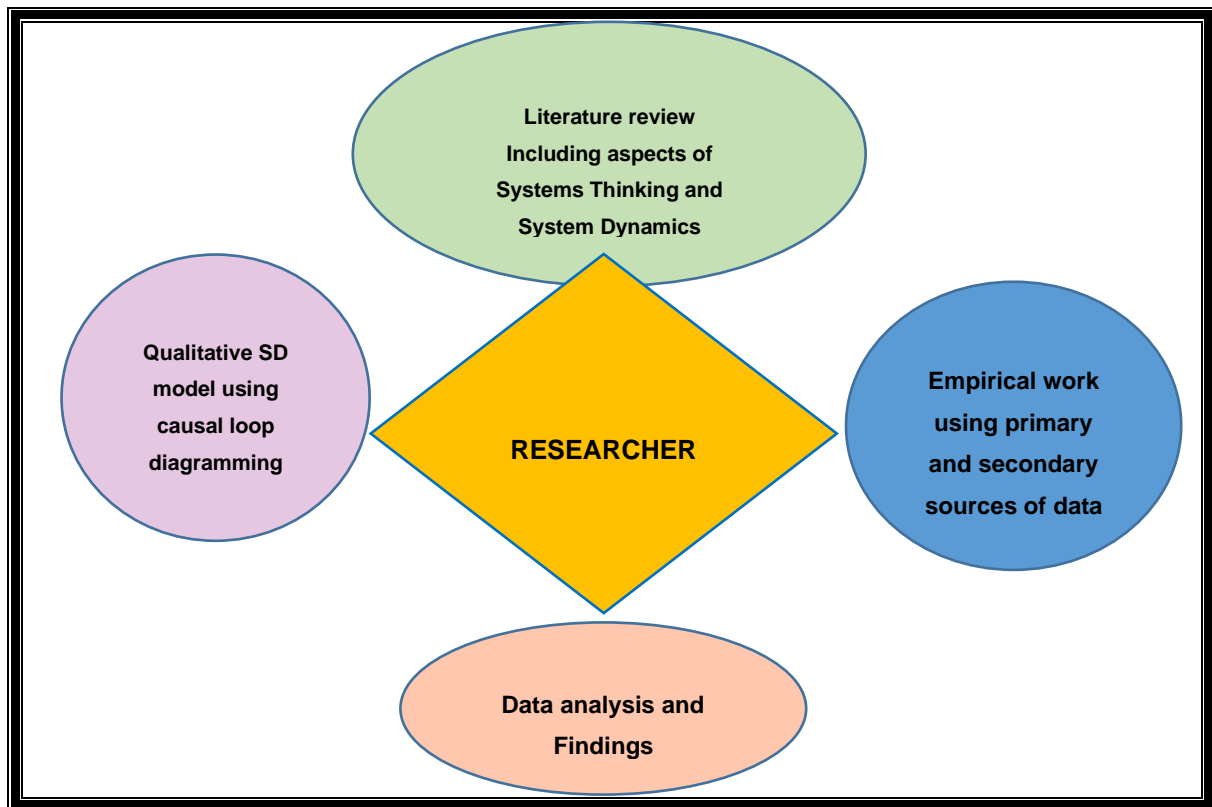
### **RESEARCH METHODOLOGY AND DESIGN**

#### **4.1 INTRODUCTION**

The previous two chapters of this case study provided the theoretical framework for research transformation at MUT. This was undertaken by providing the contextual background and historical perspective of MUT, relevant statutory and policy documents as well as an analysis of the extant literature on research transformation. This chapter provides an overview of the research design in an attempt to address the research questions in this case study. It further outlines the preferred paradigm between the qualitative and quantitative approaches and justifies why the qualitative research paradigm was considered for this study. Thereafter, the chapter covers the rationale for the sampling, data collection, interviews, measuring instrument, interviewing schedule and aspects related to reliability and validity, trustworthiness, triangulation, ethics for the credibility of the study, analysis of data collection, coding and themes. This chapter concludes with the inclusion of system dynamics to assist in identifying the causal loop feedback effect between and amongst the variables.

Figure 4.1 reflects the process that was followed in this case study using a systems thinking approach with special emphasis on system dynamics (SD), which refers to an iterative process, rather than a linear approach, which is synonymous with an SD qualitative study. The focus of this case study is underpinned by a qualitative research design using an SD causal loop diagramming model.





**FIGURE 4.1 ORGANISATIONAL APPROACH OF STUDY**

**SOURCE:** Self-generated 2019.

## **4.2 THE RESEARCH APPROACH**

### **4.2.1 The research problem contextualised**

The South African Higher Education sector, especially the UoT sector (previously named as Technikons) has undergone significant changes after the transition to democracy in 1994. This includes changes to the Higher Education (HE) legislation, mergers of public HE institutions, a surge of private HE institutions, national and international competition (Du Pré 2010). Prior to 1993, the mandate of Technikons was to offer a solid base of career-oriented programmes that prepared graduates for the world of work through “work integrated learning” and no provision was made for research activities. Prior to HE Act, no. 101 of 1997, Universities and Technikons were formally regulated and funded as distinct divisions of the tertiary higher education system. Furthermore, prior to 1993, Technikons were prohibited from offering Master’s and Doctoral programmes (Department of Education 2001a).

After the nomenclature change to University of Technology, the emphasis on research output for UoTs was to be research-informed whereas traditional universities were research-led. To be research-informed and prepare graduates for the world of work, it is imperative that academic staff at the UoTs have the requisite skills, higher qualifications and knowledge to keep abreast of the constant technological challenges of the industry including research productivity.

To enable MUT to adapt to the demands of the corporate world and the mandate of DHET to increase research output, it is vital that MUT adopts a holistic integrated framework to ensure that these demands are met. The ability of MUT to meet the demands of all its stakeholders and DHET depends on the identification of a comprehensive framework to support its staff by developing concrete strategies to capacitate staff with the requisite skills and knowledge to improve its research transformation agenda. The main aim of this case study is to investigate the challenges and develop a system dynamics model using causal loops for identification and accelerating the research transformation agenda at this UoT.

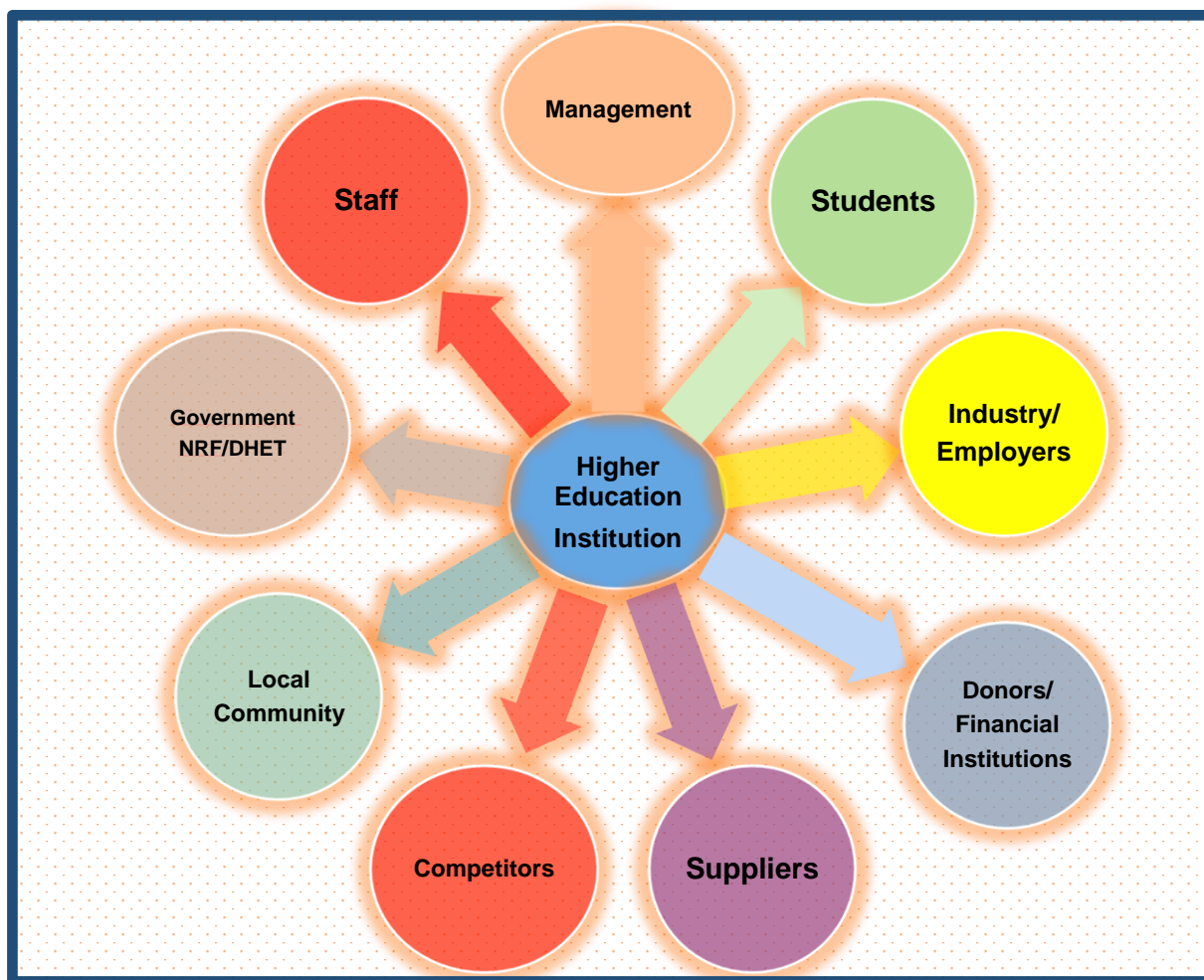
#### **4.2.2 A Holistic approach**

Research productivity in the form of publications attracts funding for HEIs from DHET and NRF. Hence, research productivity is an essential characteristic of any public HEI and therefore should be prioritised for future sustainability, considering state funding is dwindling. According to Macupe (2012), there have been in the past and currently HEIs in South Africa that had to be placed under administration because of poor governance, poor management and financial mismanagement of funds resulting in unsustainability for the future of institutions.

However, the sustainability of HEIs is a complex issue with inter-relationships between many endogenous and exogenous variables. Endogenous variables for sustainability within the institution include a diversity of programme qualification mix (PQM) including postgraduate qualifications (Master's and PhDs), management of student enrolment, student tuition fees, throughput rates, research output, improved staff qualifications, equitable teaching workload and appropriate resources and infrastructure, as well as strategic executive leadership\management. Whereas exogenous variables external

to the institution are teaching input and output funding from the DHET, funding from NRF through research output, University Capacity Development Grants (UCDG), and additional funding for historically disadvantaged institutions as well as donor funding. The bulk of funds for MUT from the DHET are from student enrolment, tuition fees and throughput rates and very little from research productivity and donor funding. Traditional universities have always been at an advantage of being research-led, resulting in receiving favourable research funding allocations and donor sponsorships compared to UoTs that are research-informed.

It is important to acknowledge that research productivity at UoTs is a complex issue arising from the previous Technikon mandate whereby the focus was predominantly on a solid reputation of teaching career-orientated programmes. As a result, most of the UoT's research output (as indicated in Table 3.2 earlier) has been on the lower scale. Moreover, research transformation and sustainability at UoTs and in particular at MUT is a multifaceted and complex problem comprising of interaction with policies, including internal stakeholders (Management, staff with unions and students) and external stakeholders (DHET, NRF, competitors, suppliers, donors, local community, industry and employers) as illustrated in Figure 4.2 hereunder. Furthermore, scrutinising any of the institutional policies and stakeholders in isolation would only result in a disjointed and fragmented approach to address the research transformation agenda at MUT.



**FIGURE 4.2 STAKEHOLDERS OF HEIS**

**SOURCE:** Self-generated; (2020).

Moreover, research transformation at MUT is a complex issue involving the interaction of several layers (operationally and strategically) within the institution as well as external to the institution. It is complex because of the diversity of behaviours and properties it has displayed, for example, dynamic and emergent challenges over time. Furthermore, a system in its totality is characterised as a complex set of interacting components according to which the whole is greater than the sum of its parts since the relationships between these integrated parts link them holistically (Verschuren 2001).

Systems thinking is justified as a more holistic evaluation approach for this case study since it deals explicitly with examining complex social problems within the organisation

(Hummelbrunner 2011). Systems thinking is a problem-solving approach capable of handling high levels of problem complexities (Espinosa, Harnden and Walker 2008; DeTombe 2015) including multiple aggregation levels of a problem (DeTombe 2015; Joore and Brezet 2015). The evolution to research transformation at MUT requires reflective technological, institutional, and sociocultural transformation, which requires the responsiveness and “buy-in” at multiple aggregation levels of the problem.

Systems thinking is a sense-making process that organises the messiness of real-world issues into concepts, variables and components to enable us to understand the complexity better. Senge *et al.* (2001) claim that with systems thinking skills, “People start seeing and dealing with interdependencies and deeper causes of problems” and view systems thinking as a discipline of organisational learning for “seeing wholes”.

Therefore, adopting holism makes sense to examine all the characteristics or variables of the problem at hand since it is the interaction and inter-relationships between these characteristics or variables that contribute to the problem of this case study (Jackson 2016). An example would be a car that appears perfect from the outside. However, the car would not be mobile if all the parts are not connected to function optimally and efficiently. Therefore, strategies for long-term sustainability of research transformation at MUT requires changes in the individual behaviour of academics as well the requisite support from all related stakeholders including the Research Unit and Executive Management.

This investigative case study of MUT recommends a systems thinking approach as a holistic means of scrutinising the complex social problematic issues focused on the philosophy of holism to address real-world problems in a practical way (Jackson 2016). Holism in this case study considers MUT to be more than the sum of its parts. It is the collaboration of individual stakeholders and the networks of inter-relationships associated with these stakeholders that will give credibility and sustainability towards the future of the institution to transform the research agenda. Moreover, all the stakeholders of the institution are fundamental in providing credence to this study. However, ultimately, the HEI’s Vice-Chancellor “steers the ship” with support from Executive Management to ensure that the institution remains sustainable, competitive

and endures both internal and external pressures. Therefore, a holistic perspective to address research transformation at MUT is paramount when designing solutions, for complex institutional problems leading to long-term sustainability.

Systems thinking is an overarching concept covering an array of philosophies, tools and methodologies based on the principle of holism (Jackson 2006). An overview of Systems Thinking has been well covered in Chapter Three. However, this case study focused on system dynamics (SD), as a rigorous and respected applied systems approach as one of the Systems Thinking methodologies for the theoretical framework to guide this case study.

According to Jackson (2007), SD is based on the principle that systems comprise more than just a few variables, including the behaviour of the system holistically which is overseen by the feedback processes between such variables. Moreover, Jackson (2007) emphasises that it is critical to have a deep understanding of the system's structure to ultimately understand its behaviour and implement effective problem-solving actions. Whilst the highlight is on the structure of the system as the root problem of all issues, it is imperative to examine the system holistically, namely, viewing the organisational structure instead of placing blame on individual employees, departments or managers.

Milstein and Homer (2006) address the following five steps of inquiry as described in Table 4.1 hereunder when applying SD as a methodology:

**TABLE 4.1 FIVE STEPS OF INQUIRY FOR SYSTEM DYNAMICS**

FIVE STEPS	EXPLANATION
<p>1.</p> <p><b>What aspects of a system's behaviour are of concern?</b></p>	<p>When investigating the research transformation at MUT, the focus had to be on extracting the variables most pertinent to the research transformation agenda since this was the key issue that this case study intends to investigate.</p>
<p>2.</p> <p><b>Why are those features changing in those ways at those times?</b></p>	<p>Once the variables for research transformation from step one were identified, it was necessary to determine as to how these variables interact with one another and the feedback processes between them. Additionally, this gives an indication as to why the MUT system behaves as does currently and cannot progress substantially on the research transformation agenda.</p>
<p>3.</p> <p><b>Where is the system heading if no new action is being taken?</b></p>	<p>At this point, it is possible to pinpoint the magnitudes of organisational dynamics and behaviour through generic system archetypes that would encourage MUT's research transformation instead of the <i>status quo</i>.</p>
<p>4.</p> <p><b>How else can the system behave if different decisions are being made?</b></p>	<p>Having an understanding as to how the system will behave, it will then allow different stakeholders including policy initiators to determine whether such behaviour is acceptable or unsatisfactory to MUT's overall sustainability of the research transformation agenda. Furthermore, stakeholders will be able to investigate how the system will respond under the guidance of such policies, or decisions. Before policies are implemented; they have to be approved with scrutiny through various internal statutory committees. The reason for these procedures is to ensure that no adverse effects arise later once they are implemented, thereby saving the institution resources and avoiding any negative resilience. These are critical issues since time is a valuable resource and wastage of time leads to procrastination of re-approval processes. Therefore, acknowledgement and implementation of research policies with all internal stakeholders to enhance the research transformation agenda will be an exceptionally valuable approach.</p>
<p>5.</p> <p><b>Who has the power to move the system in a</b></p>	<p>MUT is a public HEI that comprises several internal organisational layers from the VC, DVCs, Deans of Faculties, Faculty staff as well as administrative staff functions. Thus,</p>

FIVE STEPS	EXPLANATION
more desirable direction?	whilst the VC steers the organisation with its vision and mission, this can be only achieved with the assistance and support of all stakeholders and not by a particular individual. Therefore, research transformation within MUT can be realised by the feedback relationships amongst the identified variables. Moreover, the variables can be applied to produce a positive research transformation culture within MUT. In this regard “who” then refers to the different units within MUT that has the authority over the range of variables to make a positive influence over other units within the organisation.

**SOURCE:** Milstein and Homer (2006: 2). Adapted.

### 4.3 RESEARCH QUESTIONS

The research questions for this study were the following:

- ❖ What are the contributing factors for the low research output at MUT?
- ❖ What capacity-building initiatives are in place towards the advancement of research transformation for MUT?
- ❖ What are the enablers for research transformation at MUT?
- ❖ What are the critical factors to support a research
- ❖ h culture at MUT?

### 4.4 PRINCIPLES OF RESEARCH DESIGN AND METHODOLOGY

#### 4.4.1 Research paradigm

Huitt (2011) associates a paradigm with a philosophical concept of worldviews and a model for conducting research. Whereas Saunders, Lewis and Thornhill (2009) refer to research philosophy as a system of beliefs and assumptions about the development of knowledge that the researcher is embarking on, for example, emerging with new knowledge after addressing a problem within the organisation. Epistemology, ontology and axiology are three types of research assumptions to distinguish research philosophies to ultimately understand the research questions, the methodology and



interpretation of the findings as well as enhance the rigour of the study (Saunders, Lewis and Thornhill 2009).

Burrell and Morgan (2017) refer to epistemology as assumptions about knowledge that is acceptable, valid and legitimate and the way this subject knowledge can be communicated to others. However, Thomas and Hardy (2011) refer to ontology as assumptions about the nature of reality and its truthfulness. Moreover, Thomas and Hardy (2011) point out that the focus is on how to resist change, which must eventually be for the benefit of the organisation. Saunders, Lewis and Thornhill (2009) refer to axiology as the role of values and ethics by the researcher including the level of consistency and reliability or reconstructing previously held theories.

The presentation of these three foundations of the research philosophy in this case study is interconnected to the research paradigm that was applied. This case study focuses on investigating the imperatives of research transformation at MUT in the current context as a HEI in South Africa.

Epistemology in this case study is concerned with the existing knowledge that MUT academics have related to research transformation in the HE sector. Thus, it begs the question: Is it possible to have access and support to knowledge creation related to research transformation for MUT academics?

Ontologically, research transformation at MUT is the subject under investigation. This case study applied the use of qualitative research methodology including analysis of MUT policy documentation and open-ended interviewing schedule with participants and a focus group to address research transformation at MUT. Furthermore, the case study empowered participants to discuss the realism and consequences of research transformation at MUT. The application of axiology is the importance of research transformation in higher education and specifically MUT in the UoT sector during the pre- and post-apartheid era justifies the value for the study of this phenomenon.

#### **4.4.2 Types of Research Design**

A research design is a master plan that specifies the methods and procedures for collecting and analysing the requisite information and provides a framework of action for the research (Zikmund, Babin, Carr and Griffin 2013). Research methodology is a “strategy of enquiry which moves from the underlying assumptions to the research design and data collection” (Myers 2013). The three types of research designs are quantitative, qualitative and mixed methods.

##### **4.4.2.1 Quantitative Research**

The primary aim of quantitative research is to determine the causal relationship between independent and dependent variables using numerical values, quantities and measurements pertaining to the study sample (Singh 2007); (Fox, Martin and Green 2007); (Creswell 2009). Quantitative research has a structured data collection process using predetermined methods, concepts and variables (Greener 2008). In quantitative research, data is analysed using statistics and hypotheses and applying deductive reasoning to arrive at results in the form of numbers, graphs, tables and charts (Creswell 2009; Leedy and Ormrod 2013). However, Fox, Martin and Green (2007) maintain that the role of the researcher in quantitative studies is to remain impartial by aiming to use unbiased approaches.

##### **4.4.2.2 Qualitative research**

In qualitative research, the areas investigated cover many different types of social settings and daily lives, including the major variations in qualitative research, for example) action research, grounded theory, case studies, feminist works, narrative inquiry and phenomenology (Yin 2015). Additionally, Maxwell (2004) describes qualitative research as advancing to valid causal descriptions, analysing how certain situations influence others and understanding the cause-effect processes on a particular situation. For this case study, a qualitative research paradigm was applied using a real-world context supported by a holistic systems thinking approach. Furthermore, the rationale for applying a qualitative research paradigm is that it was the most practical means to ask the relevant questions for this case study, in order to gain rich data at face value that enhances the credibility of the findings (Myers 2013).

There are two main approaches to research, namely, deductive mainly for quantitative studies and inductive for qualitative studies (Saunders, Lewis and Thornhill 2009). The research approach used for this case study was inductive to obtain a close understanding of how research transformation impacts academics in the workplace at MUT. In the inductive approach, the data collected produces patterns of meanings, idea generation and interpretations about the phenomenon being investigated. As a rejoinder, Saunders, Lewis and Thornhill (2009) argue that the strength of an inductive approach is the reasoning that enables a cause-effect relationship between certain variables and understanding how humans interpret their social worldview in terms of values, cultures, beliefs and experiences. The opinions of Saunders, Lewis and Thornhill (2009) are shared by Holloway and Galvin (2016) and Creswell and Creswell (2017).

There are basic characteristics of qualitative research recognised by several authors to ensure sense-making and acknowledging patterns among words to synthesise a meaningful picture without sacrificing its richness and dimensionality (Leung 2015). Moreover, Creswell (2009) has summarised the common characteristics in Table 4.2 hereunder which captures both traditional perspectives as well as the recent advocacy, participatory and self-reflexive perspectives of qualitative inquiry. Table 4.2 hereunder lists the characteristics, an explanation and its pertinence to this case study.

**TABLE 4.2 CHARACTERISTICS OF QUALITATIVE RESEARCH PERTINENT TO THIS CASE STUDY**

<b>Characteristics of qualitative research</b>	<b>Explanation</b>	<b>Pertinent to this case study</b>
Natural setting	Researchers collect data at the site where the participants experience the problem under study. Researchers have face-to-face communication with participants and observing their mental model.	The researcher is employed at MUT for more than 25 years.  The researcher interviewed the participants employed at MUT. Thus, all the participants agreed to conduct the interviews at the researcher's office.
Researcher as key instrument	Data is collected personally by the qualitative researcher by examining documents, observing behaviour or interviewing participants. .	The researcher personally conducted interviews centred on purposive sampling. The basis of the interviews was on research transformation at MUT. The researcher took responsibility of constructing the complete interviewing schedule without utilising any existing model or prototype.  Thus, the researcher collected and analysed all the data from the interviews as well as archival documents from MUT.
Multiple sources of data	Qualitative scholars rely on multiple sources of data instead of the single data source. This enables the researcher to make sense of all the data to create categories and/or themes.	This case study accessed relevant documentation pertinent to this study from MUT, DHET and NRF as well as interviews with participants from purposive sampling.  The data analysis from both these sources enabled the researcher to identify "common threads" that contributed towards the findings of this case study.

<b>Characteristics of qualitative research</b>	<b>Explanation</b>	<b>Pertinent to this case study</b>
Inductive data analysis	Qualitative researchers organise data into categories and themes using a “bottom-up” approach. This inductive process demonstrates working to and fro between the themes and the data until a complete set of themes have been constructed. This may involve collaborating with participants to confirm the themes.	The resultant data from the interviews and examination of the relevant documentation formed the source of the inductive approach as well as extraction of broad themes.  Two participants were identified to confirm the themes which contributed towards the findings.
Participants' meanings	In the entire qualitative research process, the researcher keeps a focus on learning the meaning that the participants hold about the problem or issue and not the meaning that the researchers bring to the research or opinions of other writers expressed in the literature.	This case study focused on the views and opinions at the interviews of the participants including the focus group regarding research transformation at MUT. Moreover, the utilisation of the SD approach revealed the mental models of the participants and that of the focus group members.
Emergent designs	The qualitative research process is emergent. Whilst an initial research plan is in place, it cannot be rigidly applied. The reason being that changes in any of the research process may emerge which needs to be considered when collecting data. The fundamental source of qualitative research is to gather information about the problem from the participants to address the research questions posed.	This case study was informed by a particular research process. It was inevitable that certain changes had to be made as the process unfolded. A case in point was due to lack of time and understanding the detailed complexity of the full SD methodology, the researcher approached the SD model from a qualitative perspective rather than the complex and prolonged quantitative mathematical modelling aspects of the SD.
Theoretical lens	Qualitative researchers often apply a particular theoretical lens to frame their studies, such as	The theoretical lens applied in this case study was implemented from SD. The core principles of SD are that of Holism,

<b>Characteristics of qualitative research</b>	<b>Explanation</b>	<b>Pertinent to this case study</b>
	concept of culture or racial or class differences. At times, the research may focus on identifying the social, political or historical context of the problem being investigated.	feedbacks and feedback loops from identified variables, the mental models of the participants and acknowledging the issues that emerge as a result of interaction with all the endogenous and exogenous variables.
Interpretive inquiry	Interpretive enquiry is fundamental to qualitative research process. The qualitative researcher interprets what s/he sees, hears and understands, which cannot be detached from their own historical background of prior understandings. Likewise, participants and readers interpret research results from their own perspective resulting in multiple views emerging of the problem.	Based on the SD approach, each participant interprets the problems from their own perspective (mental model). Thus, the views of the participants and that of the focus group were valued in this case study.
Holistic account	Qualitative researchers attempt to formulate a multifaceted complex picture of the problem being investigated. Thus, the skill of qualitative research embraces a holistic approach by identifying numerous factors involved in a situation. This means that during the research process, the views of all participants are considered in creating a holistic picture.	This case study provided a holistic account of research transformation at MUT by considering participants' views and various applicable documents at MUT, NRF and DHET. Holism inculcates the researcher to view the problem currently at hand by compiling numerous cause and effect variables, their interconnectivity and feedbacks between them to exemplify a bigger picture of the problem by creating causal loop diagrams. This is illustrated in Chapter Six of this case study.

**SOURCE:** Creswell (2009: 175-176). Adapted.

## **4.5 DATA SOURCES**

Researchers are interested in the overall patterns of data instead of the microscopic detail and therefore use data reduction to arrive at a broader picture (Waters and Waters 2008). Data is defined as the facts presented by the researcher from the study's environment (Cooper and Schindler 2014). Multiple data collection in qualitative research is fundamental since it is meant to contribute to a systematic understanding of a theoretical framework (Maxwell 2013). Data can be obtained through two main sources, namely, primary and secondary data sources (Creswell 2009) and (Kumar 2011).

### **4.5.1 Primary data**

Primary data refers to information collected directly from participants by the researcher on the research questions being investigated using data collection methods (Sreejesh 2014). Primary data is pursued because of its proximity to the truth; control over error and that the data is updated and reliable (Waters and Waters 2008; Cooper and Schindler 2014). Primary sources of data are the most authoritative form of raw data that symbolises an official opinion or position without interpretations nor infiltration by a second party, for example, memos; letters; individual and focus group interviews in audio, video or written transcripts, open-ended questions, participant observations; court decisions; government data including census (Given 2008; Cooper and Schindler 2014; Sreejesh 2014).

The emphasis is for the researcher to access one or more of these research tools to obtain the best related information from the participants on the phenomenon. It is important to obtain data from participants that reveal their viewpoints, mental modes and interpretations of the phenomenon being investigated. Other internal sources of primary data accessed by the researcher include financial data, human resources and research records from the respective administrative departments of the institution.

Primary data for this study involved repeated interviews obtained through an open-ended interviewing schedule (Annexure D) that was self-administered with participants and a focus group as a data-gathering instrument. Furthermore, whilst quantitative

approaches utilise hypotheses testing, the inductive nature of qualitative research allows for theory to emerge from the real-life actual experiences of research participants. The interviewing schedule (Annexure D) comprised of open-ended questions administered by the researcher that enabled the participants to respond extensively to the questions without being restricted. The participants remained anonymous and were able to voice their real-life perceptions and experiences which typifies the qualitative interpretative nature of the related research questions. More importantly, in the context of using the qualitative paradigm, the collated responses from the interviews were also juxtaposed to the mental models of the research participants and thus aligned with the system dynamics methodology. Thereafter, the primary data from the participants and focus group interviews were recorded at the researcher's office and converted into a text-based document to make inferences from the participants on this case study being investigated.

#### **4.5.2 Secondary data**

Secondary data are interpretations of primary data when someone else has already collected and analysed data for other purposes (Cooper and Schindler 2014; Bryman 2016). Furthermore, secondary data would have had at least one level of interpretation inserted between the event and the subsequent recording (Cooper and Schindler 2014).

Secondary data is significant in describing the historical background and current situation in a community or country (Given 2008). Secondary data might be published by other organisations, available from research studies, published by the government and already accessible within an organisation (Waters and Waters 2008). Researchers at universities are encouraged to store their data in archives to enable others to analyse the data that had been collected, and reveal the findings of their studies (Bryman 2016). Unlike primary data, secondary data provides a source of information that is both permanent and available in a form that can be easily accessible by others (Denscombe 2014). Furthermore, Waters and Waters (2008) and Bryman (2016) concur that secondary data has the advantages of being cheaper, faster and easier to collect without having to undergo time-consuming processes of collecting primary data. However, Creswell (2007) cautions that a researcher should be very



selective when utilising secondary data. For this qualitative empirical analysis, a wide spread of related textbooks, journal articles, media articles, internet publications, government publications, applicable dissertation thesis and archival information from the institution's repository was obtained in the form of secondary data.

#### **4.6 TARGET POPULATION**

A target population is defined as the total collection of possible data sources in which the researcher wishes to make some inferences and generalisations (Given 2008; Cooper and Schindler 2014). Furthermore, Bryman (2016) states that a population is basically a universe of units from which a sample needs to be selected. A target population is the entire set of people of interest to a researcher to determine certain characteristics (Bless, Higson-Smith and Sithole 2013) (Gravetter and Forzano 2018). Thus, the target population for this study was academic staff currently employed in the three academic faculties of MUT. At this juncture, caution should be expressed that this study adopted the qualitative research design. The discussion is relevant as it embodies the various facets of research methodology and design.

#### **4.7 THE SAMPLING PROCEDURE**

Patton (2015) concedes that the actual sample specification must originate with the identification of a population to be surveyed. The advantages cited for sampling qualitative design, compared to the collection of data on the whole population are that gathering data from a sample is less time-consuming and cost-effective (Bless, Higson-Smith and Sithole 2013). Moreover, sampling is a practical method of data collection if the population is large. Furthermore, Bless, Higson-Smith and Sithole (2013) explain sampling as the subset of the whole population, which is actually investigated by a researcher and whose population characteristics will be generalised to the entire population. Studying the chosen sample would enable the researcher to have an overview of the results and draw conclusions about the entire population (Cooper and Schindler 2014). Probability sampling and non-probability sampling are two major categories of sampling methods (Sekaran and Bougie 2013; Zikmund *et al.* 2013).

#### **4.7.1 Probability versus Non-Probability Sampling**

A researcher has two choices of sampling, namely, probability sampling and non-probability sampling techniques (Cooper and Schindler 2014). Probability sampling used mainly for quantitative studies refers to a sample that has been selected using random selection to enable each unit in the population of having an equal chance to be selected (Bryman 2016). Moreover, it is distinctive that with probability sampling a researcher can make probability-based confidence estimates of several limitations that cannot be applied to non-probability sampling (Cooper and Schindler 2014). The probability sampling strategy is an attempt made to create an accurate representative sample that has mathematically foreseeable errors, namely, margin of sample errors (Neuman 2014). The following methods of probability sampling have a measure of randomness built into them and therefore have a degree of generalisability (Cohen, Manion, Morrison and Morrison 2007; Sekaran and Bougie 2013).

- ❖ simple random samples,
- ❖ systematic samples,
- ❖ stratified samples,
- ❖ cluster samples,
- ❖ stage samples,
- ❖ area sampling,
- ❖ double sampling and
- ❖ multi-phase sample.

Researchers use non-probability samples for qualitative studies in the social sciences to examine research locations when one cannot select the kinds of probability samples used in large-scale surveys which conform to restricted needs of probability samples (Berg 2004). Non-probability sampling offers the benefits of not including a list of all possible elements in a full population (Berg 2004). In qualitative studies, a researcher encourages interesting and important responses from the participants that cannot be extracted by a probability sampling technique (Berg 2004).

Non-probability sampling methods are used because they satisfactorily meet the limited sampling objectives and it is inexpensive and less time consuming (Cooper and

Schindler 2014). All qualitative research studies rely mainly on non-probability sampling and provide the following categories for non-probability sampling for qualitative researchers (Given 2008) and (Neuman 2014) :

- ❖ Convenience,
- ❖ Quota,
- ❖ Purposive,
- ❖ Snowball,
- ❖ Deviant Case,
- ❖ Sequential,
- ❖ Theoretical and
- ❖ Adaptive.

The research design for this case study is in the form of a qualitative methodology paradigm. The purposive sampling method was applied as a non-probability sampling technique for the qualitative research design.

#### **4.7.2 Purposive Sampling**

Purposive sampling produces information-rich cases for in-depth study to extract relevant issues for the purposive inquiry specifically applicable to qualitative research (Patton 2015). Moreover, participants are purposely and deliberately chosen in a manner to provide “rich-information” required for an action-research case study (Kumar and Govindarajo 2014). Qualitative researchers use purposive sampling, deliberately to select participants strategically with a set list of characteristics on the phenomenon that will be relevant to comprehend the case study questions, aims and objectives to add value for the research and disregard others (Du Plooy-Cilliers, Davis and Bezuidenhout 2014; Robinson 2014). Maxwell (2008) asserts that purposeful sampling sufficiently encapsulates the diversity in the population to ascertain that the conclusions satisfactorily represent the entire range of heterogeneity rather than only the selected members of this range.

The researcher in this qualitative case study purposefully selected voluntary participants who were familiar and knowledgeable with the research problems, aims and questions of the study (Bowen 2008) and (Creswell 2009). Moreover, to obtain

rich data for the perseverance of this investigation, the selected academic participants were in the employ of MUT and were familiar with the research initiatives and challenges at the institution. Furthermore, individual interviews were conducted with five academic staff from each of the three faculties equating to fifteen participants, to minimise selection bias or until data saturation had been reached through the quality of meaningful data and until valid results were established (Marshall *et al.* 2013).

#### **4.7.3 Use of focus groups**

The use of a focus group was to encourage the selected participants to be comfortable and unrestricted to relate their personal experiences within the group discussion. Furthermore, these interactive discussions amongst participants may lead to unanticipated data resulting in new insights.

The role of the researcher (sometimes referred to as facilitator or moderator) in a focus group is to ensure that all the participants have an equal opportunity to express their viewpoints and that the relevant questions have been adequately addressed for data capturing. The main advantages of focus group interviews are the low-cost benefit and the rich information and knowledge acquired from participatory discussions. Furthermore, Flick (2009) concedes that focus groups generate diversity, besides they interact with each other to reminisce over past personal experiences of the case study, which is not possible with single participants.

Interviews with a focus group of six participants representing two academic staff from each of the three faculties with similar interests and agendas were conducted. These focus group participants were employed at MUT for a minimum period of 10 years. The focus group interview was independent of the fifteen participants selected from the three Faculties to ensure validity, creditworthiness, trustworthiness and reliability of responses from the individual interviews to corroborate data for triangulation. All interviews were held in the researcher's office which was convenient to all participants. All the interviews were audio-recorded personally by the researcher.

#### 4.8 SELECTION OF THE SAMPLE (RESEARCH PARTICIPANTS)

Sampling is the process of selecting some of the elements of a population on interest from which one can draw broad conclusions about the entire population, based on results obtained with the selected sample (Marczyk, DeMatteo and Festinger 2005; Cooper and Schindler 2014). Moreover, Bowen (2008) maintains that an in-depth investigation with a reasonable sample size should be undertaken, which is characteristic of qualitative research. For this empirical study, the purposive sampling technique was used to select the participants for the interviews using the Interviewing Schedule (Annexure D) as the focal instrument to obtain the responses. Qualitative researchers conducting individual interviews and focus groups usually strategize a sampling plan at the beginning of the research, which will enable them to ascertain the type of population and people who can fittingly provide rich information about the phenomena of interest (Tracy 2013). Thus, since this study adopted a qualitative paradigm, using an Interviewing Schedule (Annexure D), the researcher opted to select a representative group of participants. The following procedure was adopted to select the academic research participants and subject to the following provisos or guidelines for this empirical case study investigation:

- That they were permanently employed at the MUT for a minimum of 10 years;
- That they were all knowledgeable about the research interventions and the concomitant challenges facing research transformation at MUT;
- That they were all *au fait* with the topic under investigation by the researcher;
- That they acknowledged the value-added commensurate benefits that their participation would yield in respect of the study.

Thus, using the above guidelines of purposive sampling, 15 individual academic participants were selected from the 3 Faculties namely:

- Faculty of Management Sciences - 5 participants
- Faculty of Natural Sciences 5 participants
- Faculty of Engineering 5 participants

In addition, applying the same guidelines to augment the qualitative interviews, for the holistic focus group interview, the selection of academic participants equated to six, namely:

- Faculty of Management Sciences - 2 participants
- Faculty of Natural Sciences - 2 participants
- Faculty of Engineering - 2 participants

This then formed the *modus operandi* for the selection of the research participants, who were all academics, for the qualitative design of the study under investigation. Moreover, the selected participants were representative of the homogeneity aspect at the MUT and there was gender balance as well. It was envisaged that the cross-sectional views of the fifteen participants and those of the focus group would yield credible, dependable, objective, goodness of data and coal face information with respect to the views expressed. This assertion was reinforced by Tobin and Begley (2004) and Houghton, Casey, Shaw and Murphy (2013) in relation to the concepts of trustworthiness in a qualitative study.

It should be noted that for a qualitative study, it is impractical to include every member of a population of interest in a research study due to time, money and resources being negating factors. Therefore, researchers are forced to study a representative subset, namely, a representative sample of the population of interest (Marczyk, DeMatteo and Festinger 2005). The selection of a sampling technique guides the judgement of the researcher to select the sample from the population (Babbie 2010).

#### **4.9 INTERVIEWING SCHEDULE AS THE MEASURING INSTRUMENT**

Measurement is fundamental to any research. According to Lieber and Weisner (2010), measurement tools are instruments used by researchers to assist in the assessment of a variety of variables. For the qualitative component of this study, an Interviewing Schedule (Annexure D) with a list of open-ended questions was compiled by the researcher to interview both the selected participants (15) and the focus Group (6 participants). Furthermore, the access of archival data in the form of historical data, reports, policies and annual reports provided background information as well as

research transformation data for MUT. This was necessary not only to provide richness of the trustworthy data but also essential for triangulation. Thus, interviews and scrutiny of archival data formed the root source from which data were accumulated, assimilated and synthesised by the researcher, thereby contributing to the essential and concrete findings of this case study and the springboard for the formulation of the Causal Loop Diagram Model.

#### **4.9.1 Pre-testing**

According to Yin (2015), pre-testing aims to test the usability, understandability and clarity, as well as refine one or more aspects of the interviewing schedule if it is necessary for any empirical study.

The purpose of pre-testing the open-ended interviewing schedule is to maximise the chances of participants answering questions correctly and to minimise any ambiguity in their responses (Saunders, Lewis and Thornhill 2009). This is further reinforced by Du Plooy-Cilliers, Davis and Bezuidenhout (2014) who assert that pretesting ensures common acceptance of the terminology and participants understand all the questions in the interviewing schedule. This will enable the interviewer to identify in advance any problems of the instrument and administer the structured interviewing schedule with a greater sense clarity and confidence.

A pre-test interview of the interviewing schedule was administered to one academic staff (an acting Head of Department) who was not included in the final sampling of the participants for this empirical study. Suggestions indicated by this academic staff were taken into consideration for revision before administering the actual open-ended questions in the interviewing schedule to the selected participants.

#### **4.10 RELIABILITY AND VALIDITY AS A MEASURING INSTRUMENT**

Reliability and validity are commonly used terms in quantitative research methods to generate measurable, numerical and statistical results (Du Plooy-Cilliers, Davis and Bezuidenhout 2014). For a research study to be accurate, consistent and dependable, it is essential for the findings to be both reliable and valid since they deal with

psychological characteristics of measurement and precision of the same phenomenon when replicated (Tracy 2013). However, a researcher should never assume validity no matter how reliable the measurements are (Singh 2007).

Validity refers to the soundness of the research design being used to characteristically construct accurate and meaningful results being measured and draw legitimate conclusions about the sample population (Bryman 2016). Furthermore, Andrew and Halcomb (2009) claim that for a research study to be valid, it must be able to draw meaningful and truthful findings conclusions that can be generalisable to the whole population based on the results obtained from a sample. Moreover, Johnson, Louw and Smit (2010) assert that a study can be reliable but not valid and it cannot be valid without first being reliable (Bryman 2016).

However, for this qualitative study Creswell (2009), affirms that reliability and validity in qualitative research studies, do not carry the same inferences as in quantitative studies. Moreover, Creswell (2009) contends that for qualitative reliability, the researcher's approach is consistent across different researchers and projects, whilst in qualitative validity the researcher checks for the accuracy of the findings by employing certain procedures. Table 4.3 illustrates the reliability and validity procedures for the qualitative paradigm that were applied to assess the accuracy of the findings in this case study.

**TABLE 4.3 RELIABILITY AND VALIDITY PROCEDURES APPLIED IN THIS CASE STUDY**

NATURE OF RELIABILITY PROCEDURE	APPLICATION TO THIS CASE STUDY
1. Verify transcripts to ensure the accuracy of transcription.	1 Transcripts were verified with audio recordings of the interviews for accuracy. Transcriptions matched the audio recordings of the participants.
2. Confirm the verification process of coding to ensure there is no deviation from the defined codes used by regular comparison of the original data with the transcription.	2. The raw data were categorised into codes and reviewed to ensure the accuracy of the defined codes. This was accomplished by constantly comparing the data with the codes.
3. Cross-check codes established by other researchers on the same data	3. This process was not utilised since one researcher conducted this case study in-house.



4. Cross-check codes with an independent person to reach a consensus on the codes utilised by the researcher.	4. An independent academic at MUT who was not a participant cross-checked the codes for consensus and relevance.
<b>NATURE OF VALIDITY PROCEDURE</b>	<b>APPLICATION OF THIS CASE STUDY</b>
1. Triangulation of various sources of data for coherence and justification of themes.	1. Data sources from interviews, archival and other documentation from MUT were undertaken for coherence and validating themes.
2. The accuracy of the qualitative findings by member checking. This means that participants have another opportunity to comment on the accuracy of the themes and the findings.	2. Due to time constraints, only two of the participants confirmed the themes and the findings.
3. To add to the validity of the findings, the use of rich, thick descriptions conveys the findings. The results become realistic and richer with detailed descriptions and themes	3. The findings of this case study were abundantly supplemented with direct quotes from participants to corroborate their validity.
4. Explain any bias and self-reflection the researcher brings to the findings by their background and contextual setting e.g., gender, historical experience, worldviews and socioeconomic origin.	4. The researcher took a reflective approach by declaring how her historical experience, assumptions and worldviews influenced the nature of this case study at MUT.
5. Present any negative or discrepant information that is contrary to the identified themes to add credibility to the study.	5. To ensure that all the data were afforded inclusivity, any negative information counter to the themes were also mentioned.
6. To enhance the accuracy of the findings, use a peer debriefer (an independent person) who will analyse and ask questions about the qualitative case study to echo the same opinions of the researcher to that of other people.	6. The research supervisor was utilised as an independent person who provided valuable feedback throughout the stages of this case study.

**SOURCE:** Creswell, J.W. (2009: 190-193). Adapted.

#### 4.11 TRUSTWORTHINESS

Given (2008) asserts that trustworthiness has become a significant concept in qualitative research since it allows researchers to describe the intrinsic values of qualitative terms outside of the constraints which are characteristically applied in

quantitative research. Furthermore, trustworthiness allows qualitative researchers the autonomy to illustrate the overall rigour of qualitative research study without translating it into a quantitative model (Given 2008). Moreover, Bryman (2016) concurs that trustworthiness refers to a set of criteria for assessing the quality of qualitative research. Terms such as credibility, transferability, dependability and confirmability are commonly used criteria for assessing trustworthiness in a qualitative study (Creswell 2007). Furthermore, Yin (2015) acknowledges that the combination and merging of these concepts will add to the study's credibility and trustworthiness. To reinforce its importance, Table 4.4 provides concepts of trustworthiness in determining the authenticity of the qualitative research for this case study.

**TABLE 4.4 CONCEPTS OF TRUSTWORTHINESS IN QUALITATIVE STUDY**

APPROACHES	PROCESSES
Credibility	Refers to the value and believability of the findings, conducting the research in a believable manner and being able to demonstrate credibility. Triangulation enhances credibility, which uses several methods to study one phenomenon.
Dependability	Refers to how stable the data are.
Confirmability	Refers to the neutrality and stability of the data. This study compared data gathered from multiple sources to determine the extent to which findings could be verified and be consistent to increase confidence in the credibility of the findings e.g. interviews, institutional reports, archival data from the repository and DHET reports.
Transferability	Refers to whether particular findings can be transferred to another similar context or situation, while still preserving the meanings and inferences from the completed study. The results of this study are only pertinent to MUT.
Goodness	Another criterion against which trustworthiness and authenticity of qualitative research can be measured. Goodness is an integral component of the research method and evaluates the robustness of the study. In this study, goodness is an overarching principle of qualitative inquiry and an interactive process that is reflected in the entire research study process.

**SOURCES:** Tobin and Begley (2004) and Houghton *et al.* (2013). Adapted.

Moreover, Given (2008) maintains that qualitative research depends upon the integrity of the richness of data collection and description, the robustness and thoroughness of

the investigation processes. Examining different sources of data relating to the same phenomenon enables the researcher to have a better understanding of the complexity of the case study and increases the trustworthiness and interpretations of the rich data collected from multiple sources (Given 2008). Furthermore, Given (2008) elaborates that a qualitative researcher seeks trustworthiness by conducting iterative analyses, seeking confirmatory data through systematic triangulation and providing supporting models for the resulting conclusions.

#### **4.12 TRIANGULATION**

Bryman (2016) describes triangulation as a combination of methods of data collection tools and theoretical perspectives in a single study to enhance credibility. Carter, Bryant-Lukosius, DiCenso, Blythe and Neville (2014) postulate that triangulation also applies to qualitative studies to provide an increased depth of understanding on this case study and further counteract the threats of validity.

However, Yin (2015) claims that when using information from a variety of data sources for collection, for example, interviews, focus groups, and the inspection of archival documents from the repository; the study's conclusion should lead to transparency by triangulating data from exhaustive sources of evidence. Furthermore, triangulation from sets of non-numeric data provides trustworthiness and credibility to a study since they demonstrate the research participants' perspective of the problem under investigation (Creswell 2009). For this case study, apart from individual interviews and the focus group interview, institutional archival data and government documents were accessed for triangulation to reinforce and cross-check the findings from these sources.

#### **4.13 ETHICAL CONSIDERATIONS**

Any research must take cognisance of ethical considerations especially when qualitative studies are undertaken due to their in-depth unstructured nature. However, Mertens (2009) states that ethical choices in research and evaluation need to include an understanding that discrimination and control are inescapable. Moreover, Mertens (2009) emphasises that researchers have a moral obligation to understand the

participants' working environment in order to contest current processes that allow the *status quo* to dominate. According to Ritchie *et al.* (2013), ethical research with broad consensus at a high level of thought processes involves the following.:

- ❖ Research should be worthwhile and should not make unreasonable demands on participants;
- ❖ Objectivity of the researcher should always be maintained;
- ❖ Participation in research should be based on informed consent;
- ❖ Participation should be voluntary and free from coercion or undue pressure, and
- ❖ Confidentiality of information provided by participants and their anonymity be maintained and always respected.

The above ethical considerations applied to all fifteen participants and the focus group. All the participants were informed about the nature of this case study and assured that they were entitled to participate. They were informed that participation was voluntary and the right to withdraw at any time during the interview process if they felt uncomfortable to continuing with the interview. All the participants were informed about the research topic and a brief description of the nature of the research (Annexure A). In addition, all the participants had to sign a letter of informed consent (Annexure B) regarding their participation. All the participants were informed that there was no monetary value attached to their participation.

A gatekeeper letter (Annexure F) providing consent was obtained from MUT's Research Ethics and Research Publications Committees prior to the commencement of the research being undertaken.

All the participants were assured that all the data will not be disclosed to any third party and will be destroyed; whilst keeping the documents for a reasonable duration of time (Kumar and Govindarajo 2014). Prior to the actual interviews, both parties were guaranteed that their anonymity would be maintained during all stages of this research study. Moreover, they were also informed that a summary of the main findings of this case study would be made available to the Executive Management of the institution

without disclosing any names of the participants to protect their fundamental human rights.

#### 4.14 DATA COLLECTION

Kumar (2011) explains that data collection as a technique enables researchers to methodically collect information to obtain responses in the most optimum manner. Table 4.5 highlights the criteria for data collection *vis-à-vis* purposive sampling for this empirical investigation.

**TABLE 4.5 CRITERIA AND DATA COLLECTION TECHNIQUES IN QUALITATIVE STUDIES**

CRITERIA	FACE TO FACE INTERVIEWS WITH PARTICIPANTS AND FOCUS GROUPS
Cost and time	Most expensive since researcher spends a considerable amount of time on interviews with participants and focus group.
Speed	Slowest. Interviews with participants had to be undertaken at their convenience and availability.
Accuracy	Most accurate. The data recorded from the participants' interviews are accurate and available for scrutiny which is stored on a recorder.
Amount of data	Voluminous amount of data collected for transcription since participants were able to provide their own perspectives and historical background of their own experiences.
Response rate	The response rate was the highest because participants were purposively identified for the interviews.
Flexibility	Most flexible to suit the participant's availability
Control <ul style="list-style-type: none"> <li>▪ Sample</li> <li>▪ Interview</li> <li>▪ Administration</li> </ul>	<ul style="list-style-type: none"> <li>-Purposively selected</li> <li>-Best (allows the researcher control over the line of questioning)</li> <li>-Worst</li> </ul>

**SOURCE:** Chantiri (2010) and (Sharma 2010). Adapted.

#### **4.15 ANALYSIS OF DATA**








According to Creswell (2009), analysing qualitative data from recorded interviews comprise making logic out of all the amassed information in the form of textual data. Furthermore, Creswell (2009) asserts that this process involves data analysis, conducting different analyses, obtaining a deeper understanding and representation of the volumes of collected data and making an interpretation of the larger meaning of the data.

Thus far, the researcher relied on existing opinions and insights from participants of the topic under investigation. However, after the interviews, an objective analysis of the topic emerged with direct quotations from the participants. At this stage, apart from the researcher, any third party, would not be able to establish the participants' voices, notwithstanding the fact that the researcher's focus and existence are immersed in the study being investigated. Moreover, this includes the mental framework of the researcher's line of exploration during data collection to maintain the focus on the case study and sensitising the researcher to the identification of relevant evidence, both supportive and divergent from the interview responses, reports and archival data (Yin 2015). In all types of research, data is analysed, filtered and interpreted through the researcher's preferred mental framework taking cognisance of a worldview perspective to increase the understanding of this case study.

Data for this study was obtained from the fifteen participants, a focus group of six members arising from the interviews, reports, and archival data from this UoT to analyse the information holistically in a systematic way using inductive reasoning. Thus, Yin (2015) maintains that the inductive approach facilitates the data to lead to the emergence of concepts that are used in most qualitative research whereby valuable ideas are formed using a "bottom-up" approach to advance to the development of broader concepts.

The analysis and interpretation of data in this qualitative study as illustrated in Table 4.6 was adapted from Creswell's (2009) explanation and generic steps applicable to most qualitative analysis:

**TABLE 4.6 STEPS IN QUALITATIVE DATA ANALYSIS AND INTERPRETATION**

STEPS	DESCRIPTION
1	Manage raw data: transcripts from individual participants and focus groups 
2	Creating, organising and preparing data for analysis 
3	Reading through all the data to form initial codes 
4	Coding the data into categories 
5	Developing themes, patterns and descriptions 
6	Interrelating themes, patterns and descriptions 
7	Interpreting the meaning of themes/patterns and description 

**SOURCE:** Creswell (2009: 156). Adapted.

The above steps (Table 4.6) are discussed hereunder to demonstrate how it is applicable to this study.

### **STEP 1: Raw data**

Raw data were obtained from interviews with participants and focus groups. Additional information from the institution in the form of reports, archival data and repository was also accessed for further analysis.

## **STEP 2: Creating, organising and preparing data for analysis**

This process involved transcribing all the interviews conducted by the interviewer. However, additional notes were made on the interviewing schedule during the interviewing process. These notes assisted the researcher when transcribing the interviews to ascertain the participants' non-verbal behaviour, body language, tone and anxiousness in response to specific questions. Further notes were recorded on qualifications at appointment and current qualifications, age category, gender, position held, and the actual number of years employed at MUT.

## **STEP 3: Reading through all the data**

Initially, this step involved reading through all the transcripts, additional notes and documentation to obtain an overview of the information and a general sense of what emerged from the participants' interviews. The second reading of all the transcripts was to ascertain overall commonalities, depth and credibility between the interviewees and documentation examined. At this stage, additional note-taking on the questions for each participant also contributed towards the general ideas and concepts about the data being compiled. In qualitative studies, it is essential to examine the data from different sources to disclose any discrepancies that may emerge. This process resulted in arriving at an overall understanding of the research transformation imperatives encountered at MUT.

## **STEP 4: Coding the data**

In qualitative studies, an abundance of data is collected. Hence, the first step is to reduce the data through codes and categories. The ultimate resolve of coding is to draw meaningful interpretations and conclusions about the collected data (Saldaña 2013). Moreover, Creswell (2009) states that the rationale for coding is to analyse all the data from the interviews by disassembling it systematically to a higher conceptual level from different records in different ways, for example, similar and dissimilar groups to examine the related features and gain insight from them. Furthermore, Corbin and



Strauss (2014) recommend that for a study to be ranked excellent, the coding should be done excellently.

This case study gathered data from emerging codes using the inductive approach, which is used in most qualitative research to develop valuable ideas using a “bottom-up” approach to advance to the development of broader concepts (Creswell 2009; Yin 2015). Codes for this study were not preconceived, but instead, the inductive approach was utilised to search for concepts, ideas, themes and categories that assisted the researcher to organise and interpret the data. Due to the limited nature of the case study being investigated, it was worthwhile initially to “hand-code” the qualitative transcripts of interviews by using colour codes, noting keywords, as well as labels to form similar categories of data as illustrated by Creswell (2009). Additional notes, where necessary, were made in the margins of the interviewing schedule as well as on the transcription. Each transcription was read and re-read as an iterative process to form relationships and connections amongst all the other transcriptions. The researcher framed codes whilst reading and re-reading the transcripts from raw data. This process was followed on all the transcriptions to categorise data into similar codes including data that were dissimilar to determine the relationships that were emerging (Yin 2015). Documents from institutional reports and archival data were also examined and analysed to generate theory relating to the findings.

### **STEP 5: Developing themes, patterns and descriptions**

The next step after coding data into similar categories and sub-categories inductively with keywords and phrases was to generate an overview of the themes by preparing a table so that the researcher could get a synopsis of the commonalities as well as any divergent view of the data. The commonalities from coding the raw data allowed the researcher to form themes, which became the principal focal area of this case study that formed the basis of the analysis of the findings and discussion in the following chapter.

The identified themes and relevant institutional documents enabled the researcher to create causal loop diagrams as a model conceptualisation (Chapter Six) that is

synonymous with system dynamics modelling in a qualitative study. The significance for the latter is to investigate the inherent research transformation concerns and challenges at this institution.

#### **STEP 6: Interrelating themes, patterns and descriptions**

At this stage, the description and themes from the above step followed a qualitative narrative in the next chapter to discuss the findings of the analysis, taking into account the responses that unfolded at this institution that was obtained from participants, institutional reports and archival data. Furthermore, it was essential to identify interconnectivity between themes from all the sources of data to ensure that a holistic view emerged instead of using each set of data in isolation. Moreover, this accelerated an in-depth examination and meaning of the themes and descriptions emerging from this study into more complex theme connections (Creswell 2009).

#### **STEP 7: Interpreting the meaning of themes/patterns and descriptions**

This is the final step towards data analysis, namely, the researcher making sense of and interpretation of the themes and descriptions to form the concluding essence of this research. The imperatives of research transformation at MUT were the focal point of this case study and therefore a holistic approach was applied. The researcher's personal historical experiences and knowledge of the culture at the institution in addition to the data analysis, added value to provide a worldview of the phenomenon. Moreover, a comparison of the findings of the literature reviewed and the findings from the data analysis gave credibility and goodness of fit to the empirical study under investigation. Therefore, the researcher interpreted the data by applying a theoretical lens to view social reality as a guiding framework for reform and change (Creswell 2009).

The participants' initial responses were transcribed and recorded on a Word document to avoid loss of data, trustworthiness and quality. Thereafter, manual qualitative data coding through an iterative process categorised the bulk of the data into manageable

themes and sub-themes. The researcher made regular comparisons, commencing with data, then compared the results with the interpretations. Thereafter, the researcher proceeded to code and categorise data including any additional data. Core categories and subcategories were identified from the responses. Whilst collecting and analysing the data, the researcher ensured that the comparison of data within and among the responses was done with the theoretical framework guiding the subject of this research case study in mind.

#### **4.16 INCLUSION OF SYSTEM DYNAMICS FOR NON-LINEAR RELATIONSHIPS OF VARIABLES**

The above steps to analyse raw data were indispensable in extracting variables and themes. Further analysis and rereading of the raw data were done to gain insights into the complex issues surrounding the themes. Moreover, the inclusion of system dynamics is to assist in identifying the causal loop feedback effect between and amongst the variables. Furthermore, the causal loop diagramming contributed towards a better understanding of the themes and the overall dynamics and interconnected nature of this case study. Additionally, the variables with respective themes facilitated the creation of a qualitative system dynamics model illustrating the overall feedbacks and the influence of the variables of this case study.

It is hereby acknowledged, that the full spectrum of quantitative system dynamics modelling steps from problem articulation to computer equation modelling was not implemented due to insufficient training, time constraints and the fact that the researcher was a novice to system dynamics methodology. However, this study utilised the qualitative characteristics of system dynamics incorporating causal loop diagramming as exemplified in Chapter Six.

#### **4.17 CONCLUSION**

This chapter elaborated on the systematic description of the research methods that were undertaken for the study in order to ascertain optimum responses for the research questions. Furthermore, a rigorous qualitative approach was systematically applied, which was suitable for the nature of this study, namely, an interviewing schedule,

interviews with participants as well as a focus group, application of Creswell's (2009) characteristics of qualitative research and guidelines for qualitative data analysis and interpretation assisted in producing a highly credible and robust chapter for this study. The next chapter presents the overall data analysis and discussion of the findings.

## **CHAPTER FIVE**

### **ANALYSIS OF DATA**

#### **5.1 INTRODUCTION**

This chapter presents the way data was analysed and interpreted. The items used were framed to yield data from participants with respect to their insights and perspectives regarding the research questions. Qualitative data is strong when it is coded properly. This can only be achieved if an aspiring researcher who desires to show dexterity in qualitative research endeavours to easily and correctly, code collected information. The researcher chose to use content analysis in this case study because it was methodical, objective and could reduce data into manageable categories and subcategories. Moreover, Bengtsson (2016) emphasises that the main purpose of content analysis is to establish and produce meaning and draw conclusions from the collected data. Therefore, each participants' responses were scrutinised to achieve adequate content analysis.

The researcher maintained focus on the empirical investigation and was directed by the meanings that the participants attributed to the entire set of interview questions. Data from both individual interviews and focus group sources were analysed to achieve methodological triangulation in the study.

#### **5.2 PROCEDURE AND REPORTING**

The participants and focus group in this case study remained anonymous and were sequentially numbered from P1 to P15 and F1 to F6 respectively. The responses were documented initially on a spreadsheet to avoid data loss and to ensure trustworthiness, credibility and quality. Thereafter, the captured data using content analysis was coded into manageable groups and subgroups. Coding was done inductively to identify emergent ideas and themes correlated to the data (Braun and Clarke 2006; Saldaña 2013). From the coded and categorised data, core themes and sub-themes emerged. The researcher ensured proper data comparison within and among the responses

whilst bearing in mind, the variables of a research transformation agenda at MUT and guiding this case study.

### **5.3 INTRODUCTION TO THE DATA ANALYSIS**

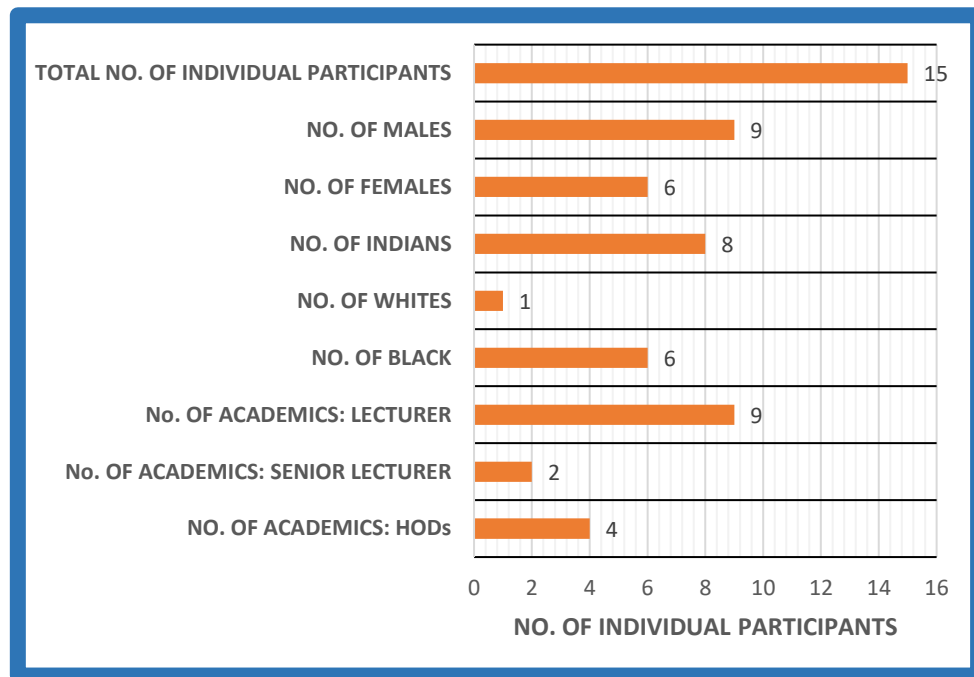
To ensure methodological triangulation, this study collected data from interviews with the selected participants and a focus group interview discussion at MUT. The data from both sources seemed to agree on all factors. A significant disclosure is the fact that all the responses identified through the interview data from participants and the focus group showed a very close correlation. To present both outcomes in this narrative will be onerous both to the reader and the researcher and to avoid duplication. Hence, the relevant related responses from the focus group discussions were selected from time to time where necessary to further substantiate the findings.

Whilst not part of the interview schedule, this study also analysed the number of years the participants had been at MUT, their present age, and their qualification at the time of entry and in the present period. The four research questions for the case study were as follows and the analysis of the data are reported hereunder:

1. What are the contributing factors to the low research output at MUT?
2. What capacity-building initiatives are in place towards the advancement of research transformation for MUT?
3. What are the institutional enablers for academic research transformation at the MUT?
4. What are the critical factors to support a research culture at MUT?

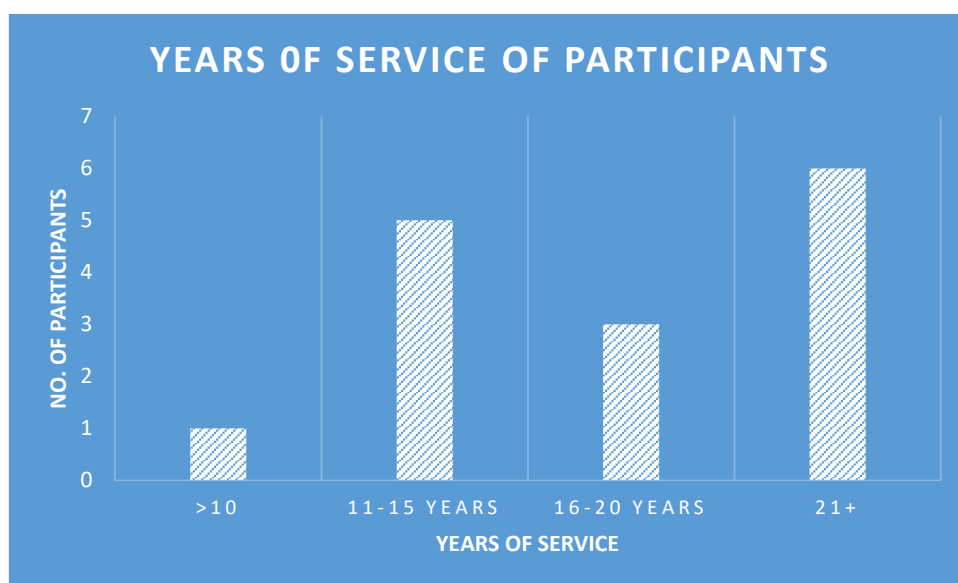
#### **5.3.1 Demographics and attributes**

The demographics and attributes of the selected individual research participants [15] are presented in Figure 5.1. The findings are as follows:



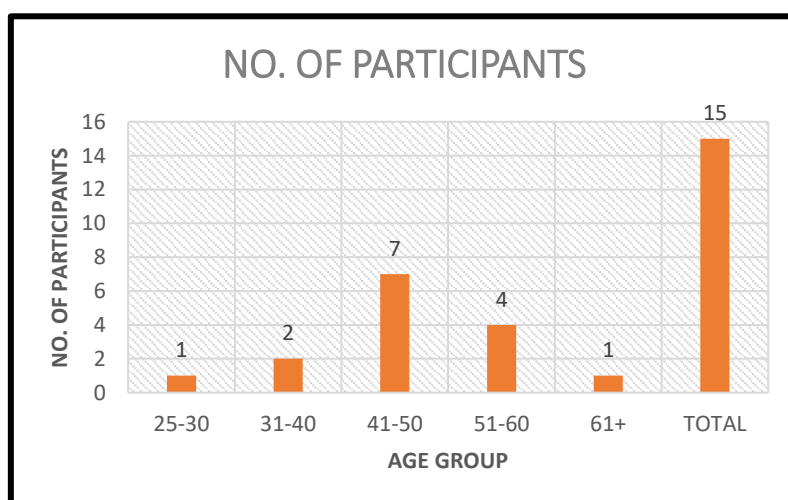
**FIGURE 5.1 DEMOGRAPHICS AND ATTRIBUTES OF THE PARTICIPANTS**

According to the gender distribution as shown in Figure 5.1 above, nine were males (60%) and six were female (40%) participants of which eight were Indians (53%), six were Blacks (40%) and one was White (7%). Analysis of the designation of the participants revealed nine were lecturers (60%), two were senior lecturers (13%) and four were heads of departments (27%).



**FIGURE 5.2 NUMBER OF YEARS OF SERVICE AT MUT**

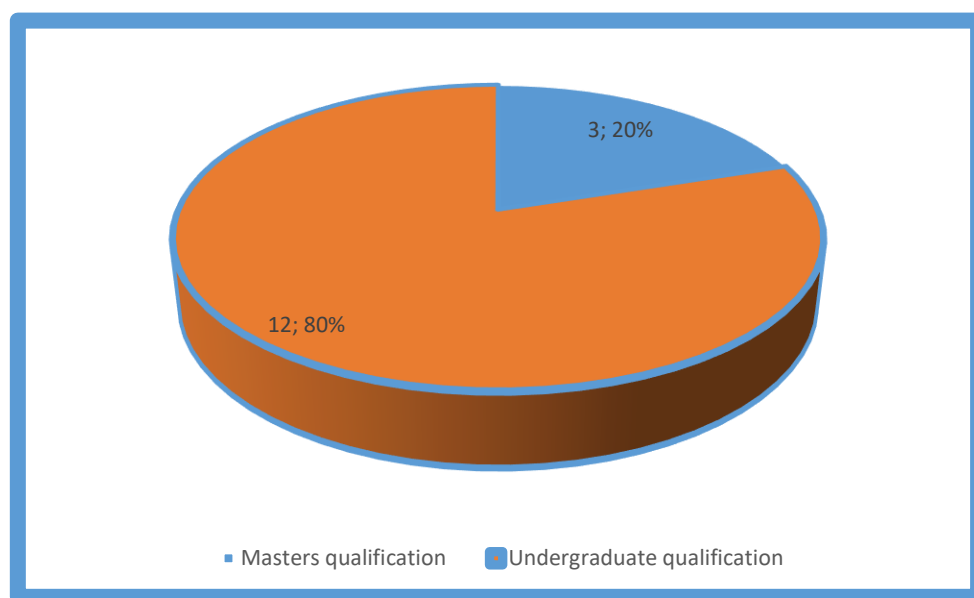
From Figure 5.2 above, the majority of the participants (40% or 6) were employed for over 20 years in the service of MUT, whilst a fewer number of participants (20% or 3) were employed between 16 to 20 years in service. On the other hand, a few of the participants (33% or 5) were employed between 11 to 15 years in the service, and only one participant (7%) was employed for less than 10 years at MUT. The reason for only one participant who served the institution for less than 10 years related to an nGAP lecturer who was recently employed. Inclusion of this participant in the study was necessary to ascertain the extent of research assistance and mentoring support that was afforded to the nGAP academic staff at MUT.



**FIGURE 5.3 AGE GROUP OF PARTICIPANTS**

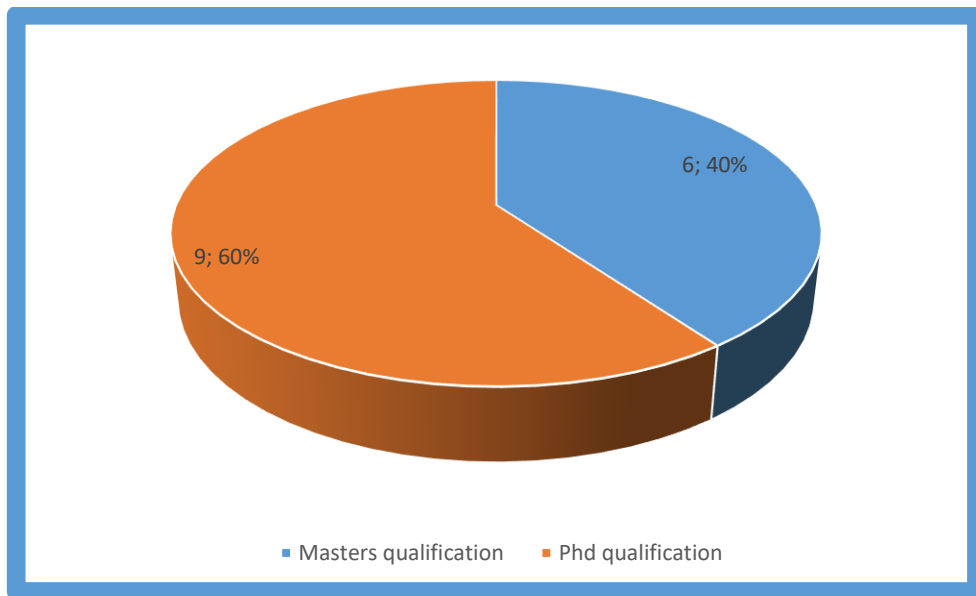


Figure 5.3 above shows that seven (47%) of the participants' ages were between 41 to 50 years, followed by four (26%) participants whose ages ranged from 51 to 60 years. Two (20%) participants' ages were between 31 to 40 years and one (7%) participant was 61 years and above. Only one nGAP participant was in the 25 to 30 years age group.



**FIGURE 5.4 QUALIFICATION AT APPOINTMENT**

As illustrated in Figure 5.4 above, and on appointment, most participants (12) or (80%) had only obtained bachelor's degrees, National Higher Diplomas or Bachelor of Technology qualifications. Very few of the participants [3] or [20%] had obtained a Master's Degree and none of them had a PhD qualification prior to their appointment at MUT.



**FIGURE 5.5 CURRENT STUDIES OF PARTICIPANTS**

The pie chart in Figure 5.5 above illustrates that the majority of the participants (60%) were striving to obtain a PhD qualification whilst 40% of the participants had yet to complete a Master's qualification since being employed at the institution, indicating that they had not improved their vertical qualification since being employed at MUT.

#### **5.4 CONTRIBUTING FACTORS FOR THE LOW RESEARCH OUTPUT AT MUT**

In the empirical qualitative analysis, the two themes that emerged are categorised into individual factors and institutional factors. The analysis of responses below presents the way the research participants answered the research questions. Moreover, the common threads arising from the participants' interviews are highlighted under appropriate headings to reflect their accordingly.

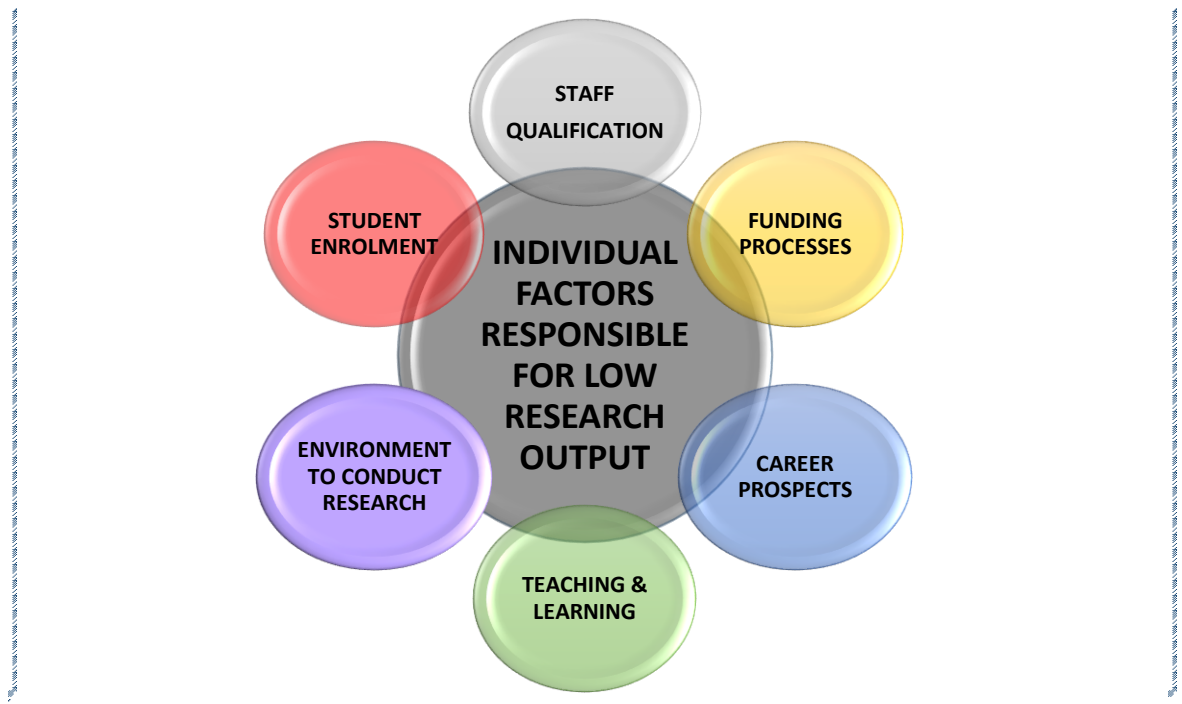
##### **5.4.1 Responses to Research Question 1.**

*What are the contributing factors to the low research output at MUT?*

Individual and institutional factors were considered significant to answer this research question. Firstly, the individual factors are explained as follows:

#### 5.4.1.1 Individual factors

The individuals referred to in this study who were the participants for the interview were academic employees of MUT. An academic's research productivity is influenced by a combination of individual and institutional characteristics. Moreover, the importance of research-orientated leadership at MUT cannot be underestimated. In this study, the participants' opinions on the individual challenges that contributed to the low research output at MUT are presented in Figure 5.6 and highlights some of the reasons for their poor research output. Each of the reasons as revealed by the participants are discussed hereunder.



**FIGURE 5.6 INDIVIDUAL FACTORS RESPONSIBLE FOR LOW RESEARCH OUTPUT AT MUT**

**SOURCE:** Self-generated (2020).

##### i. Academic staff qualification and background

From the responses below, several academics at MUT had a background in 'industry experience'. This implies that they believed that as technical/mechanical experts, they

had little or no concern with research output. The mind-set is that academics with research backgrounds should engage in research while those from the industry should focus on imparting technical knowledge through teaching and learning practices. This mind-set could be counter-productive to research. The verbatim responses of the participants were articulated as follows:

*“Remember we are coming from an industry background with technical/practical experience. You know exactly how to design and what it is all about. So, this is what you teach your students as well. So, as for research background, you come here with no information. And then you need somebody who brings it down to what you will understand from industry.” Participant P7*

*“You must understand that most of them (academics) do not come from a research background. So, now we are trying to assist them in developing a taste for research.” Participant P6*

*“The mandate of a Technikon was to teach, and now we have changed to a University of Technology. But I guess we have changed in name only. Yes, there are initiatives now, we have a research professor and even a DVC position was established, and now we have recently recruited research professors. So, the culture is gradually changing. I guess if you are a University, even if it is a University of Technology, there should be a focus on research. But obviously, you would hear in all the meetings, that Executive Management are still saying we are a research-informed not a research-led institution, even though research is important, but we still are not a traditional University.” Participant P3*

From the foregoing, it could be perceived that most of the participants agreed that their academic backgrounds in so-called non-research areas had impacted negatively on their research productivity. However, they agreed that MUT had made concerted efforts to recently employ human resources i.e., retired research professors to assist them with the challenges related to their industry background issues.

Furthermore, all the participants pursuing either a Master's or Doctoral qualification inclusive of having normal teaching workloads attested that it was difficult to transit from being academics to students and struggled to balance research as well as establish a publication record with a teaching workload. However, a few participants indicated that the additional initiatives provided by the University had made a positive impression on them and most likely strengthened their interest and appetite for improving not only their research but also their vertical qualifications that may also lead to possible future promotions as indicated by the following participant:

*"I attended a writing skills workshop to sharpen my skills in terms of preparing an article for journals. The research department of the MUT hosted it. I learnt a lot from that workshop because previously coming from an accounting background, pursuing the Chartered Accountant stream, there is no research component. You can study for seven years to become an accountant, and you do no research at all. So, for me, that workshop really helped me to understand how you take information from your Master's or PhD thesis and convert that into a paper. So, that was really valuable to me." Participant P1*

It is contended that such optimism cannot be interpreted as a 'general feeling' amongst the participants even though the research component had been given impetus throughout the MUT community. Taking a solely conservative approach means disregarding the notion that times change, and that new needs must be met. In higher education, it is essential that new knowledge is created through research, which must be transferred to students in the teaching space. However, staff still preferred to operate under conservative traditional circumstances and preferred the old ways rather than adapting to prevailing circumstances. Some of the responses in relation to conservative approaches are as follows:

*"We should actually stick to that pattern.... Correct, you must know that there is a market out there. The demand is not looking at what the traditional qualification is, but the demand is still for the B.Tech or the diploma qualification because that is...like you need people who are doers based on theory."*  
Participant P6

*"Unfortunately, I still do not see the reason for that, because you do not need a Master's to teach at a level at which we are. Now surely, why you need to have your Master's and Doctorate eventually is that you have chosen an academic career." Participant P7*

The individual participant's perceptions show that traditionalism could be 'king' in their analysis of the evolving MUT as a research-informed institution. Such perceptions hinder research pursuits and frustrate performance or achievement of positive outcomes. Moreover, the responses paint a picture of despondence on the part of the participants as it also indicates the possibility of an attitude of negativism, not only in respect of the elevation of research and knowledge production but also in respect of their own career prospects and advancement as academics and researchers. When some professional academics state that there is no reason to advance his/her qualifications to a Master's or PhD. degree, then the possibilities for research outputs to increase in the next few years seem to be an illusion.

## ii. Funding approval processes: bottlenecks and bureaucracy

Most of the participants were unsure about the financing of research for academics at MUT. Their responses included:

*“At this point in time, if you look at the research sector, there are no finances available. They make it so difficult for us to perform some sort of research. There is too much paperwork, and by the time that money is released, the research is already done, using your own finances.” Participant P6*

*“No, I think that is discrimination on funding for research, you know. I am 53 and I am still studying. And if I am 53, how many years am I left with to retire? That is quite a few years, and I can still contribute...give back to the institution. Why am I not allowed to do that? It’s a bit of restriction on funding, really.” Participant P2*

*I believe that from the beginning when money is spent every time, it is being checked by people, directors and so on. There are invoices and evidence as to why and where the money is being spent. I definitely feel that the money should be carried forward, as long as I am still a registered student making progress.” Participant P1*

One of the key complaints expressed by several participants was that the National Research Foundation/Research and Innovation Support and Advancement (NRF|RISA) (2019) excludes funding for staff older than 45 years, a factor that is instrumental in demotivating staff aspiring to pursue higher qualifications towards their research endeavours.

Overall, there was a general feeling amongst the participants that at the research office, there were no clear guidelines regarding the availability of finances for research at MUT. This perception makes it difficult for interested academics to perform in terms of research transformation. This reality is exacerbated by extensive paperwork and existing restrictions that play a role in the negative attitude of several of the participants. Additionally, the participants perceived that the University community appeared not to have a comprehensive knowledge of the steps in the process of an accredited publication and knowledge production nationally and internationally and how the subsidy was calculated and allocated.

It could be contended that the factors that affect an individual's productivity in research are complex. There are dynamics that affect the individual negatively and positively, for example, bottlenecks are those policy conditions that limit, restrict or delay the funding approval processes of doing things in a work environment. The participants in the qualitative interviews described the following bottlenecks and bureaucracy in their funding approval processes at MUT.

*"...if they want to develop us, they should understand that we are not complaining for the reason of complaining. You cannot expect us to improve on teaching, do research, do community engagement. Or it takes so long for it to be approved that you die before it gets approved [laughs]." Participant P7*

*"I just feel that sometimes the administrative red tape at MUT really weighs us down. I do feel administratively, we are being knocked down because a meeting did not take place, or signatures are not on a document." Participant P1*

*"I think the challenges have been mainly systematic, in the sense of how MUT has been structuring or operating in its academic portfolio." Participant P4*

The participants agreed on the fact that policy; administration and routine expectations constitute serious bureaucracy and bottlenecks in their quest to improve on their personal research transformation.

The existing gap between the MUT Executive Management as articulated in the responses is the perception that too much is expected from the academic staff at all levels, whilst it is felt that despite its efforts the University does not follow its own undertakings as expected nor the activities monitored for research capacity building initiatives.

### **iii. Career prospects for academic staff**

Where the career prospects of an institution are not clearly articulated, academics struggle to find meaning for efforts or reasons to produce the requirements placed on them to improve on the research transformation at MUT. The responses of participants on career prospects are as follows:

*“In Engineering strange enough, it is very difficult for people to have Master’s and doctorate because in industry they do not need it. Actually, if you have achieved a Master’s or a doctorate qualification for that matter, you are totally overrated in industry, and you won’t get a job. To be honest. So, it is kind of a catch if you want to be at a UoT.” Participant P7*

Academics especially in the Engineering Faculty are unsure about the next level of career prospects, namely, remain in academia or join the corporate world. Hence, they felt comfortable in their current position rather than face the challenges of vertical qualifications for an undetermined position or progress in their career path at MUT.

*“Over time, it was a conflicting pursuit for myself because I started with honours in Management Accounting; I had to complete Master’s in Accounting. Instead of continuing with research or PhD, which would have landed me in a proper research area, I decided to make a U-turn and go back to Postgraduate Diploma in Accounting Sciences, because I wanted to have more technical knowledge and expertise in the field of accounting.” Participant P4*

At times, academic staff are unsure which career path to follow as revealed by participant P4 above. However, some staff are willing to pursue a career in a professional discipline to enhance their teaching subject knowledge to transfer to students in lieu of vertical qualifications leading towards a research career path. Whilst students benefit from updated knowledge, it also lends itself to negating research transformation at MUT.

Either such sentiments expressed above can be judged as pessimistic or realistic given the realities faced by the academic staff of MUT. In many ways, these attitudes are based on the understanding of the University itself and its approach towards both the present and the future growth trajectory of MUT’s research transformation. The way academic staff members interpret the existing circumstances determines their own present and future career plans, actions and behaviour.

The responses from the participants indicate that they did not have all the working years to build a career in research. Furthermore, the qualitative responses arising from the interviews revealed that because of the unawareness of incentives on career prospects, some participants were considering leaving academia for the industry. The following participants felt that time allocated to meeting the deadlines of attaining vertical qualification was impractical:



*“Well, in the first place it was motivation. That was my biggest problem. Well, motivated in the sense that by telling you that by 2017 you must have completed your qualification, you have at least a Master’s, which we all agreed. However, I also struggled simply because timewise, it was almost impossible. Because there is not enough time to lecture to do all the admin work and to study. And age-wise, it is really counting for me, it is too difficult.” Participant P7*

The participants felt that the initial steps of the University’s executive leadership were encouraging for the staff to pursue vertical qualifications. However, this initial encouragement was compromised because the expectations of the academic staff members were not fulfilled, especially concerning the timeframe demanded by the executive leadership to complete the Master’s and PhD qualifications without providing the requisite support.

Most of the participants indicated that the expected timeframes were extremely tight for the completion of a vertical qualification such as a Master’s qualification. This was attributed to the high lecturing workload, heavy administrative responsibilities, massification of students and lack of spare time to be dedicated to full-time study on the part of the lecturers.

In this study when the participant’s commitment, goals, tasks and aspirations were not achieved, the individual felt demotivated. Many participants reported that motivation was the biggest challenge. Additionally, the University had given a deadline to all academic staff to attain at least a Master’s Degree by 2017. Those who complied and completed their degrees felt that the “once off payment” instead of a higher notch in salary was demeaning and did not offer any tangible rewards for staff to engage in research initiatives at all. Participants interviewed in this study did not perceive that they were motivated to give their best towards research output because time deadlines and financial incentives were inadequate.

#### **iv. Environment towards a research culture**

To augment research transformation at MUT, it was imperative to provide the concomitant work environmental factors. The perception of the participants regarding their work environment and their research productivity are as follows:

*“You know our offices, to be honest are not very conducive for research. We have open plan offices. The noise factor is extremely disturbing and not easy to get work done.” Participant P14*

This participant clearly articulated the sentiment of most of the other participants regarding the research environment at MUT and its disruptiveness where research activities are concerned.

#### **v. Focus on Teaching and Learning**

The primary mission of the former South African Technikons was teaching and learning. SA DHET upgraded the status of these Technikons to Universities of Technology and emphasised scholarly research output. This then affected the research performance of academics in the UoT sector as many academics struggled to transition from the ethos of teaching and learning to embracing research or pursue higher vertical qualifications. The participants reported as follows:

*“But I think we should not be focusing primarily on research, reason being that, if you look at the calibre of students that we are admitting, our focus should be on teaching and learning. Yes, teaching and learning, a hundred percent.” Participant P6*

*“When we think of teaching and learning it is not only about going to the classroom and delivering a lecture. It is about the preparation time in terms of lectures, setting the exams, setting the tests, marking the exams, and marking the tests. It is all about all the administrative work that goes with it. It is about seeing to the students through consultations. So, the teaching and learning ends up eating away about 70% of the time that you spend at the University.” Participant P2*

A participant (P4) felt that there was a lack of a variety of choices as the concentration is on lecturing on specific subjects; a situation that denies flexibility, especially for someone who aspires to expand his/her research initiatives.

*“You have lecturers solely responsible for their subjects. So, then it leaves less flexibility to focus on other pertinent issues.” Participant P4*

Most of the students enrolled at MUT come from disadvantaged backgrounds including rural and township schools. As a result, academics focus their attention more on teaching and learning. Whilst research was also a priority in terms of the University's

policy, the commitment to students and the life of the University was more important at the present juncture. Such a priority demands a tremendous amount of determination from the academics as it is crucial that their preparation for teaching and learning is of utmost importance. Thus, the role of academics, their determination and passion to engage in research as well as their expressed interest in research is low while others explicitly indicated that they were more passionate about teaching and learning rather than research.

**vi. Quality of Students at enrolment impacting on teaching and learning**

The participants asserted that the large numbers of students that they were working with needed more than in-class teaching and learning activities but sometimes hands-on support. They further highlighted that the quality of students that they teach are underprepared for the rigours of HE and aggravated by the fact that the majority of the students come from disadvantaged backgrounds. The participants in this regard responded as follows:

*"Look you must bear in mind that about 90% of them are disadvantaged. They come with poor basic education. But then again you get a small percentage, that will aspire to bigger things, in other words, higher qualifications. We should give them that opportunity, while still maintaining the practical aspect of it. .... We are looking for more hands-on people, not just those that are at Master's and PhD level."*

*Participant 6*

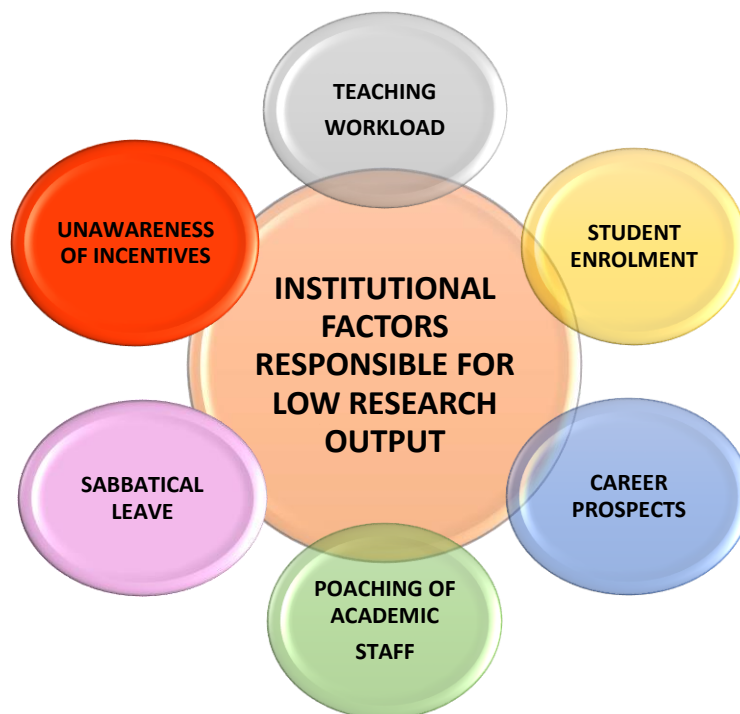
Whilst *Participant P10's* response was as follows:

*"I would like to point out as well, that the students that we are lecturing here, we are actually preparing them...like in mechanical engineering, we are preparing them for industry, to become technicians. And we need to teach them about industry skills. The skills that they need to have to enter industry. It is very important, then to solve theoretical problems. You need to know the practical part as well. It is very important; you need to assist them often."*

In summary, the factors contributing to the low individual research output at MUT are academic staff qualifications, funding approval processes, career prospects, the work environment, focus on teaching and learning and quality of students at enrolment. These factors in addition to the following institutional challenges explain why there is low research transformation at MUT.

#### 5.4.1.2 Institutional factors

Figure 5.7 represents the flow of information from participants (15) in respect of the institutional factors that hinder research transformation at MUT. The factors categorised as institutional factors are those that are pertinent to the capacity building efforts of MUT, and difficulties arising from teaching workload, student enrolment, career prospects, poaching of academic staff, sabbatical leave and unawareness of incentives as represented in Figure 5.7 further explored and contextualised for the purpose of this case study.



**FIGURE 5.7 INSTITUTIONAL FACTORS INFLUENCING LOW RESEARCH OUTPUT AT MUT**

**SOURCE:** SELF-GENERATED 2020.

##### **i. Large Student Numbers: Massification**

The participants commented on the large number of students enrolled at MUT in contrast to the available infrastructure and staffing needs. MUT enrolls a large number of students from all over the country. Academics in the University have been critical of the implication of large student numbers on their workload and research

transformation. Some of the participant's responses arising from the qualitative interviews are presented below:

*"I'll give you an example, a traditional University, say look at quantity surveying in UKZN, it has got 40 students. per year on average. We have got an average of 180 students per year. We have to deal with huge groups of class sizes, especially in S1, S2, and even right up to S4." Participant P6*

*"We must remember we also get visited by our statutory bodies from the engineering field, and one of the things that always comes up as a red flag is the staff/student ratio, which is very significant. And they also, in their report back, mentioned that it is not conducive for research in the institution, with the workload that the staff member is carrying." Participant P8*

*"And obviously, we still have this high student/staff ratio as well in this Faculty compared to others. And that is not taken into consideration in the workload model. That is why I am saying, that in this Faculty, when you look at the number of hours, it is much, much higher than the others." Participant P3*

It was asserted by the participants in general that massification of students was a serious burden at MUT with reference to class sizes. Whilst statutory body accreditations, advisory boards meetings and visits to applicable academic departments at the University raised the issue of large classes, there has not been a positive improvement in respect of the staff/student ratio. This was a very serious impediment to research transformation for both staff and the University as the workload model was unsatisfactory for academics' working conditions.

The participants indicated that in certain faculties and departments where evening classes were offered, it was compulsory for academics to teach the same subjects in the day and evening to maintain consistency including assessments. This compounded their personal dilemma to divert some attention towards research initiatives. Therefore, finding time to rest coupled with family responsibilities as well as engaging with research activities was a daunting task for most academics.

## **ii. Workload of academic staff**

Most of the participants indicated that the three pillars of HEIs, namely, teaching and learning, research and community engagement were not communicated in-depth to academics by applying the workload model. As a result, the application and distribution of the current workload model was not consistent and confusing in terms of the three

pillars of HEIs. Most participants emphasised that the workload at MUT was heavy and affords little or no time for research. The verbatim responses of some of the participants are presented hereunder:

*“And the thing is we are not doing much in terms of research, because of the heavy teaching load.”*  
Participant P3

*“Well, the most important thing is that you need staffing. I mean right now an average lecturer is lecturing about 60 hours, or let us put it this way, a workload analysis reported 60 hours.”* Participant P6

*“This workload model, I am not one hundred percent sure if everything is taken into consideration, because if I have got three hundred students in a class, and another staff has ten students in class. It is totally different, because as a matter of fact, when it comes to submission of marks you are still expected to submit your marks within 7-10 days. Compared to other departments, which is much smaller, I mean this is not possible.”* Participant 9

*Yes, it is good to have a workload model, but I think it should be lenient, and more...obviously within the department. You cannot generalise. Because engineering is different, we have got practicals, we have to visit students, we have to take them on site visits...and the large number of students is becoming unmanageable, administratively.”* Participant P7

Hence, the participants felt that it was impossible to work and contribute towards any meaningful research transformation under such a heavy workload burden as it acted as a deterrent to pursue higher qualifications and produce research outputs.

### **iii. Career prospects of academic staff**

This is experienced in a workplace where there are no clear pathways for career evolution and progression. The skewed allocation of duties and responsibilities forces employees to compete fiercely leading to disenchantment and poor job satisfaction. It is a counter-productive phenomenon towards achieving the vision and mission of MUT. Career ambiguity throws professionals into desperation to acquire more education in their quest to pursue higher qualifications. Rapid technological advancement and globalisation have also contributed to career ambiguity in the contemporary workplace. Below are some of the comments highlighted by the participants in this study regarding career ambiguity:

*"There is a mismatch in terms of your career progression, the promotion is based on research, but the nature of the job is that you teach." Participant P3*

*"I would say that a rotational structure would perhaps have helped so that when one is away from lecturing duties, one could then incorporate some element of research activities. It is mainly the structure, but also, it would be personal goals of academic staff members. Because if you want to achieve anything, you have to work at it. So, I believe that academics should then decide whether they want to embrace research or not. If they really want to, they will be able to find time. And once they have started researching, they will always continue researching, because they would have already established some kind of routine." Participant P4*

*"I think that the procedures sometimes are not really clear... how to balance the time to do your research and finish in time. So, somewhere, somehow, the policies...I think that there needs to be some clarity there so that it can be clear. To me, if possible, the research professors, if available, their job description should be clarified. Then, we know how to work with them, so that it is easier with the support they are giving to staff members. In terms of research, it can really help us." Participant P13*

The participants pointed out that a rotational teaching structure could help; if one is relieved from lecturing duties, one could then incorporate some element of research activities. Such situations depend on the structure, but also the personal goals of academic staff members, as their achievements can only occur through hard work. This means that the decision to pursue research or not is the prerogative and decision of the individual academic based on prevailing circumstances.

In this process, the dissonance facing the participants was that the combination of research and teaching has been pronounced a 'mismatch' because, in terms of career progression, the ad hominem promotion criteria also include a component of research, but the nature of the job is that the bulk of an academic's time is focused on teaching. Participants felt that the procedures sometimes were not clear in respect of balancing research and teaching and that further clarity was needed. In this context, it was stated that the research professors should operate through a carefully planned job description and communicate it to the University community.

Often, the participants confused their careers with the need to improve the research transformation agenda of MUT. Since the career path is not linked systematically to educational achievement and research productivity, these participants did not see much

need for research transformation and felt that they could abandon research and focus mainly on their careers.

#### **iv. Poaching of academic staff**

Academic poaching is the migration of excellent academics from where they are presently employed to a more financially rewarding, HE institution. In the case of MUT, it is known that the corporate sector poaches academics with masters and Doctoral degrees with the enticement of financial incentives, flexible work arrangements and possibly additional perks. Academic staff are also poached by other HEIs or leave on their own accord for lucrative positions at other HE institutions. Some of the responses from the participants have been indicated hereunder as follows:

*“Yes, and even if they are not headhunted, that is poaching, there are other opportunities that people are seeking for various reasons.” Participant P3*

*“.. if I am expected to have a Master’s, minimum, then my salary should be increased. Not a once-off small amount. I am saying that there should be an incentive. If you have got a Master’s qualification, your salary range will be this...if you have got a doctorate, your salary will be this. I am motivated to stay because there are attractive incentives.” Participant P7*

*“So, you got your Master’s and so what, your lecturing load is not decreased. And many of our staff gets poached by industry. So, for the simple reason that they can get better salaries doing less work.” Participant P12*

However, the general view asserted by participants at the interviews was that they would seek other opportunities external to MUT for various reasons. They admitted that if an academic staff member attains a Master’s as a minimum qualification or a Doctoral qualification, then the salary should be increased as an incentive that needs to be based on a transparent and specific salary scale.

#### **v. Sabbatical Leave Policy**

Sabbatical leave provides academics with an extended absence from vested academic duties routine for many reasons. These include *inter alia*, to complete their vertical qualifications, to improve on scholarly activities, professional development, to broaden their knowledge, engage in research productivity, stimulate intellectual interests and



strengthen networks with the global community of scholars, thus enhancing their contribution to the University on their return. Responses from participants on their understanding of sabbatical leave were as follows:

*"My understanding is that you have to accumulate a certain amount of leave, and you can utilize that leave to complete your Master's or PhD or whatever and then take the sabbatical leave. Is there a sabbatical leave policy that I am aware of at this University? Not that I can recall." Participant P8*

*"In my view, I think after about 8 or 10 years of working and you could apply and get it. I do not think that anyone of my colleagues has taken up sabbatical leave in my department. There may be some who have, I do not know. But certainly, it is something that needs to be promoted in order to improve research. So, that is my view on it." Participant P9*

*"To be 100 percent sure I am not aware about the sabbatical leave policy is." Participant P7*

*"You see at this UoT, the policy is blurred. When you ask for sabbatical leave, the first thing that comes up is how much of leave you have available. Basically, you must have your own leave available first, and then the University will match you one for one, which is understandable because you want that time off, and it is fair." Participant P2*

*No, it does not exist. And there is no policy on sabbatical leave. And in this institution, there is no understanding between the ring-fenced leave and sabbatical leave. We still need clarity on that." Participant P1*

There was an array of responses on this key issue related to the accumulation of leave that allows a staff member to pursue postgraduate degrees and there have been uncertainties regarding sabbatical leave. It was acknowledged by the participants that for a staff member to go on sabbatical leave, s/he must have days of accumulated leave available. However, there are no clear guidelines and there was consensus from all participants that they had no knowledge of a co-worker who had obtained a sabbatical leave. Additionally, several participants believed that no sabbatical leave policy existed at MUT and they had no knowledge of it. However, what exists is an application form for long study leave/sabbatical leave provided that the staff member has sufficient accumulated leave to pursue and complete higher post graduate qualifications.

## **vi. Unawareness of Incentives for research**

Grants and funds are available to South African HE institutions to incentivise and support research. However, many researchers as well as most academics are either unaware of the existence of the incentive policy or the process of accessing them. This scenario features prominently in the organisational climate expressed by participants hereunder as follows:

*“But I also feel that many staff members do not have the knowledge of what is available, and what the University is offering to potential researchers.” Participant P8*

*“I am not too aware of all the incentives that are available. Nevertheless, I do know that there are incentives. I do not think that it is enough.” Participant P9*

*There is even a policy on that, but the problem is that nobody even knows about that policy. I have not heard anybody talk about it in this institution. If nobody talks about it, then it means that they are not aware.” Participant P3*

One participant (P1) indicated that there were incentives for publications. However, when there is a publication in an accredited journal by an academic, then a portion of the funding from DHET goes to the University funds, a portion goes to the department and a portion goes to the staff member's Research Trust Fund used specifically for research purposes.

There was a perception by some participants that there were no incentives, except that a staff who engages in post-graduate studies was entitled to some monetary rewards as well as another incremental amount if a publication was achieved.

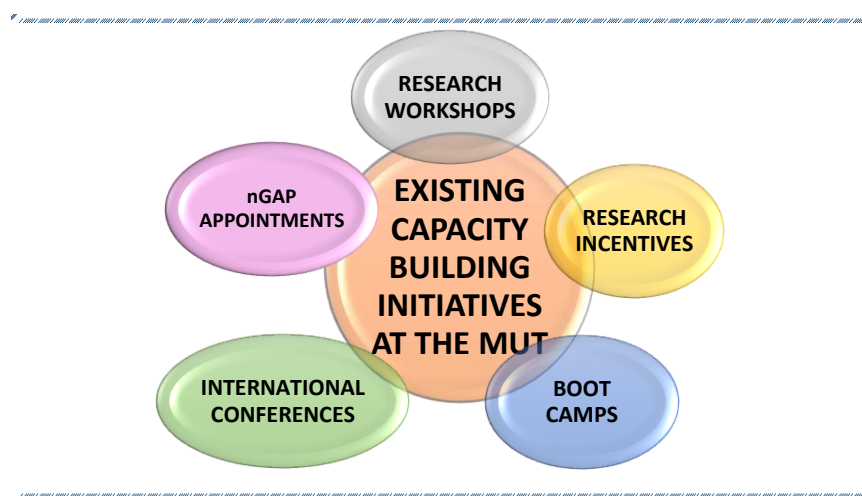
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This section provided a comprehensive analysis to research question 1 regarding the various individual and institutional factors that contributed to low research output at MUT in South Africa.

### **5.4.2 Responses to Research Question 2.**

*What capacity-building initiatives are in place towards the advancement of research transformation at MUT?*

Research capacity can be developed across three inter-related domains (people, settings, and activities). The responses to research question 2 requires existing capacity building initiatives at MUT to be identified. The responses are clustered under common themes that were correlated with appropriate headings to report the views generated by the participants to highlight the data analysis for this empirical component of the study. The initiatives found to be in place at MUT are represented in Figure 5.8 and expounded on thereafter.



**FIGURE 5.8 EXISTING CAPACITY BUILDING INITIATIVES (CBIS) IN PLACE AT MUT**

**SOURCE:** Self-generated (2020).

#### 5.4.2.1 Research Workshops and Training

Research workshops are supposed to put researcher development programmes at the forefront of their agendas and cater for the needs of uninformed ardent academics. Therefore, it was important to ascertain what factors hindered research transformation by academic staff and address them through workshops where necessary. Participants seem to agree with the importance of research workshops, stating that there were workshop arrangements at MUT. Below were some of the responses from participants in relation to this common thread:

*“I just found that they were very general, and some of the facilitators, in as much as they have got wonderful CV’s, they do not make it specific to us, because of us being a UoT. For me, it is as though...you are University researchers, and they deliver that content. Also, you will find that the University spends a*

*lot of money, we have workshops outside of campus, beautiful locations, I have also been privy to that, and so, there is nothing that follows thereafter. They do not check the progress, as opposed to having somebody that is going to monitor you, take you from step A to delivery of your thesis.” Participant P12*

*“I attended a few of Prof’s research workshops. I attended maybe 6 to 7. It is beneficial because now he guides us through every step of research; how research should be conducted and how to do further research. For example, I have one conference paper in one journal. So, he assisted me a lot.” Participant P6*

Although the opinions of each participant may differ, all the participants agreed that MUT has structures in place that provide research workshops as an initiative to stimulate research transformation at the University. Some participants found the research workshops value-adding while others suggested a more hands-on approach should be integrated into the workshops to make them more beneficial. Novice researchers felt the need to have a closer collaboration for supervision and monitoring to see the end results of their vertical qualifications. Most participants felt that the timing of the research workshops was not conducive since it clashed with their lecturing timetables.

#### **5.4.2.2 Boot camps for research purposes**

The research office coordinates and puts programmes in place which promote research activities at the University without seriously disrupting or clashing with the academic programme of the institution. One such programme is the boot camp project during recess. Fortunately, MUT has organised such retreats to enhance research productivity as acknowledged by the following participants:

*“We have had boot camps that I have attended, where we were in the process of finalising our statistical analysis. We would have hands-on help and advice; our supervisor was there helping us. So, I think they were very beneficial.” Participant P8*

Additionally, the following *participant* confirmed benefitting from the boot camp:

*“I have attended some writing retreats hosted by this University which was beneficial.” Participant P13*

#### **5.4.2.3 Research Incentives**

MUT has several research incentives in place; however, the participants commented as follows:

*"I, personally feel like the incentives are not enough because to prepare a paper, that is of a high standard, to get it into a journal that is well recognised that is not a predatory journal, it takes a lot of work. Sometimes, it can take up to two years to get an article published in a journal, by the time that it is rigorously reviewed, and you get the corrections, and it is accepted. You are making many sacrifices, at the end of the process you get a small amount, which is fully taxed, and most academics really feel like it is not worth it." Participant P1*

*"I think it is in a process of being developed. I do believe that since I have been getting more involved in research, I have learnt that the policies involved in research and promoting research is developing. So, I think that it is moving in the right direction." Participant P8*

The participants at the interviews claimed that the academic staff of the University were not familiar with all the research incentives, support and access available to them for research purposes.

#### **5.4.2.4 International Conferences**

All academics need to be informed that there are funds made available for international conferences with a proviso that one must have published previously in a SA DHET approved accredited journal. Some of the responses from the participants are documented hereunder:

*"Yes, if you want to go overseas to a conference, you get those benefits as well...I am aware of that." Participant P10*

*"Funding has been pushed in the direction of research where we have been asked to participate in research and to get involved in presenting papers and getting journal articles out and so on." Participant P1*

At MUT, there seem to be myriads of views surrounding international conferences as presented by the participants' responses below:

*"Generally, most universities will not pay for you to attend a conference or a workshop if you are not presenting. I find that a bit harsh because if you are not presenting, you are not being given a chance to attend and get the exposure and the networking opportunity and meeting other colleagues from other universities in the same discipline. If you are not going to get that first time experience, you are not going to get the courage to move ahead." Participant P1*

*“Maybe if there can be a quota to say that, perhaps before you can go to a bigger platform, you can attend two or three local conferences. You know, just to build you, so that when the time comes for you to go and present a paper, you have attended, and you know exactly what is expected of you as a presenter or as a publisher of a research paper. And that is how you would build the confidence.” Participant P2*

#### **5.4.2.5 New Generations of Academic Programme (nGAP)**

The participant acknowledged that the nGAP programme at MUT is allocated adequate funds. If a staff member needs to travel to research current studies, then funds are accessible for those staff members on the nGAP programme.

However, one unforeseen revelation by the participant was the lack of suitable mentors available within MUT to provide structured guidance towards the PhD studies.

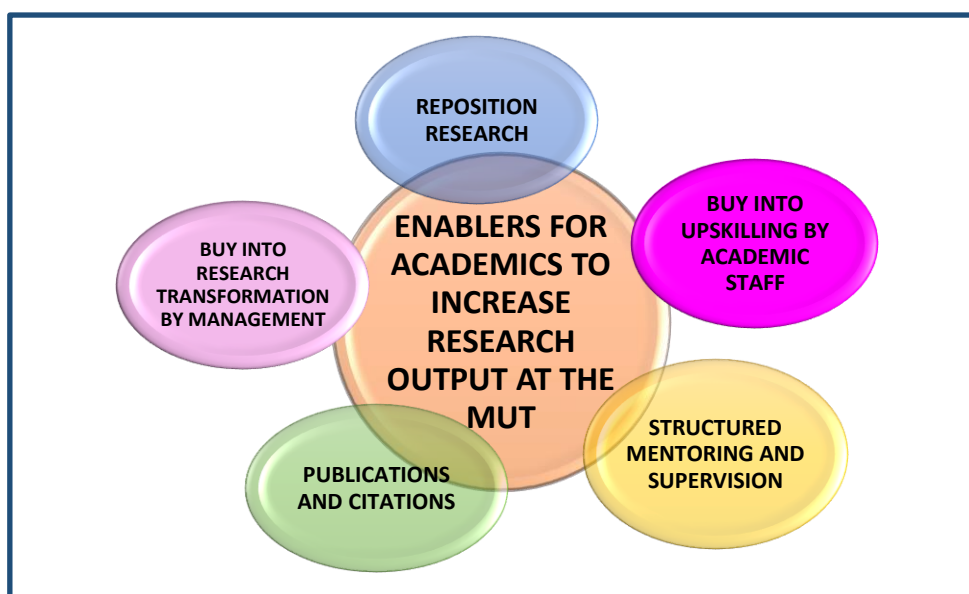
In conclusion, the present study found five existing capacity building initiatives in place towards the advancement of research transformation at MUT as presented in Figure 5.8 above and explained in this section. Similarly, the focus group discussion yielded the same comments with respect to initiatives existing to improve research transformation at MUT.

The above section pertains to responses by the participants related to research question 2 in order to investigate the capacity building initiatives available at MUT to advance positive research transformation at MUT.

#### **5.4.3 Responses to Research Question 3.**

*What are the institutional enablers for academic research transformation at MUT?*

This case study gathered information from the participants concerning the enablers that are critical internal conditions for improving research transformation at MUT. The enablers to improve research transformation suggested by participants are illustrated in Figure 5.9 in answering research question 3 and expounded on thereafter. These are repositioning research with collaborative assistance, buying into upskilling by academic staff, structured mentoring and supervision, encouraging publications and citation of scholars, and buy-in from management regarding research transformation.



**FIGURE 5.9 ENABLERS FOR ACADEMIC RESEARCH TRANSFORMATION AT MUT**

**SOURCE:** Self-generated (2020).

#### **5.4.3.1 Buy into upskilling by academic staff (vertical qualifications)**

The DHET (2016a) emphasised the need for HEIs to embrace research as a driver to teaching and learning activities. This would require that qualifications offered by the newly formed UoTs be reviewed upwards to include advanced diplomas, degrees, and postgraduate qualifications where possible. Accordingly, academic staff in the UoTs were mandated to improve on their vertical educational qualifications to service the new qualifications. With respect to this common theme, the following comments of the participants in this study are reported:

*“It is encouraging that it is going in this direction because when you are researching, you are updating your knowledge, you are upskilling yourself. And when you update your knowledge, you become more relevant, and your CPD, your professional development is up to date and you bring that knowledge into the classroom, otherwise, you become outdated. Definitely, with a Master’s and a Doctoral qualification takes you to a level of thinking that is different.” Participant P1*

*“Then you would obviously think of your students, we need to introduce courses that will enhance Master’s and doctorates eventually. Otherwise, it is of no use. So, if we cannot plan on having Master’s students, you do not need a Master’s to lecture to the S4 students.” Participant P7*

*"In ICT, there is that push for horizontal articulation. I need to familiarise myself with the current trends in IT. Not to spend 2 or 3 years in a classroom achieving my Master's or PhD, but I have to be relevant so that students will then leave my class, with the most recent knowledge when it comes to IT." Participant P15*

#### **5.4.3.2 Structured mentoring and supervision**

The overwhelming way in which most participants commented about supervision indicates a concerning issue with this theme. Participants felt that internal supervision within MUT was ad hoc, and support was unsystematic. Participants P5 and P9 responded to mentoring and supervision as follows:

*"The one challenge that we did experience in the beginning was a mentor. An nGAP lecturer needs a mentor. That was a challenge because of the scarcity of internal mentors at MUT." Participant P5*

*"I think for me personally, I would find it more beneficial if a more structured...step by step, yah. I think certainly for me; we need to have a more structured approach towards our research." Participant P9*

One participant commented on having problems and challenges with supervisors, especially suitable ones as the examining University determines the allocation. This meant that it took a long time for the examining University to reallocate a competent and experienced supervisor, hence the progress was impeded.

Furthermore, several participants stated that the research supervision and coaching processes at MUT would be effective if the guidance for mentoring was structured.

#### **5.4.3.3 Reposition Research**

In order to develop and enhance research transformation, the culture to drive journal article writing should be adopted. However, to achieve this new research ethos, there is a need to reposition research as an essential ingredient in academic and institutional growth at MUT. The following comment from Participant P7 lends credence to this facet arising the interviews conducted:

*"I think for any tertiary institution, especially, apart from the core function, the research component is extremely important, due to the fact that tertiary institutions exist for developing new ideas in all fields; be it sciences, management sciences and yes... it is important for the progression of the country to progress."*



*"We really need to up our game in terms of research." Participant P7*

#### **5.4.3.4 Publications and Citations of academic staff**

Academics whose publications are frequently cited in SA DHET accredited journals are motivated to work harder and encourage those academics whose work was rarely cited to make improvements. This would facilitate research productivity among the academics at MUT. The responses from the participants in respect of this theme, are as follows:

*"Yes, I think that it is a win-win situation if we are allocated more time towards research because we will have more time and support in getting involved in publications and journals. We would be more recognised as an institution as well as individually as academic staff...and we will get a whole more respect in the academic environment." Participant P8*

*"I will be able to do research... Your ego is boosted by the publications that you have, and the citations that you have, and going to Taylor and Francis...just being an established researcher." Participant P3*

#### **5.4.3.5 Buy into research transformation by MUT Executive Management**

When Executive Management is not seen as engaged and committed to the process of research transformation and other research initiatives, every activity and expenditure of energy will be an effort in futility. For instance, a profound comment from focus group participant F6 sums up this theme as follows:

*"Yes, judging from the past, being a teaching-focused institution, we never paid any attention to the research side of it. And that is why it now becomes important that the research part of it...this buy-in to research needs to be institutional because we need to change the culture at this University. And most of us have struggled over the years to grasp this research culture because we were so teaching-intensive. So, it has really put us in the back foot now to say, if we compare ourselves with traditional universities, and other UoT's as well." Participant F6*

In summation, the above enablers identified and proposed by the participants would assist Executive Management and academics at MUT towards research transformation and an improved ranking of the research output in the higher education sector. This section espoused the responses of participants to research question 3 arising from the empirical interviews conducted for this case study.

#### 5.4.4 Responses to Research Question 4.

*What are the critical factors to support a research culture at MUT?*

In order to highlight the responses research question 4, the participants identified several overarching critical factors to support a research culture at MUT as illustrated in Figure 5.10 and the comments reported thereafter:



**FIGURE 5.10 CRITICAL FACTORS TO SUPPORT A RESEARCH CULTURE AT MUT**

**SOURCE:** Self-generated (2020).

##### 5.4.4.1 Employ support staff and tutors

With respect to this theme, the comments from participants below indicated that HODs (P6 and P7) are obligated to perform a wide range of administrative duties and responsibilities, whereas it would be more appropriate to employ support staff or tutors for such basic tasks. Participant 8 felt that the allocation of excessive marking by lecturers in addition to other academic administrative work, could be supported by hiring additional tutors.

*“...As HODs we do a lot of admin stuff, they should get an admin person to do all of this.” Participant 6*

*“Yes, all the marking, you have got to put the marks out, and nobody else can do that but the lecturer. So, we need assistance in that.” Participant 7*

*“I think what would help with marking, also getting support in some of the administrative parts of our workload.” Participant 8*

Due to the heavy teaching workload as articulated earlier, academics appealed for relief from academic administrative responsibilities at MUT to divert some attention to research transformation. This relief could include the hiring of tutors or upskilling of present tutors to assistant lecturers. With respect to this theme, the participants further commented as follows:

*“Also tutors...yes, getting more tutors involved. So yah, those are the things that would help us tremendously. Because it will free up a lot of time, where we can concentrate on our research.”*

*Participant P8*

*“I think having teaching assistants or tutors to assist, especially when it comes to assessments, it would be a great help. So yeah, given more time to do research and reducing the workload would definitely help.” Participant P14*

Participants overwhelmingly agreed that they were “bogged down” with disproportionate administrative work, which could be done by support staff and tutors.

#### **5.4.4.2 Workload model at MUT**

Universities, nationally and internationally, have utilised workload models to assist in the achievement of fair, transparent, safe, healthy, and equitable workloads for academics. However, arising from the interviews conducted, several disconcerting issues related to workload models at MUT were highlighted by participants, namely:

*“Ok, I personally feel that the workload model is not effective at the moment, because we are generally saying that you should be teaching two subjects, but we are not taking other factors into account like the student numbers. We are not taking into account that some subjects have very small numbers, and some subjects have very large numbers.” Participant P1*

*“Yes, I do think that it should be re-visited. I think that there should be more engagement from those that come up with these models, and then also engage with the lecturers and academic staff.” Participant P8*

*I think it is a difficult thing, but I call it a systematic thing. The Head of Departments, the head of units would really have to come down, and properly assess what a workload of an academic should be. Taking into account the need to do research.” Participant P10*

A uniform workload model cannot be applicable across all departments at MUT considering different departments have other compelling issues, for example, constraints with limited access to laboratories which leads to fewer students in a class to accommodate a practical session. This sentiment was echoed by several participants.

One of the participants reinforced the view that the structure is important as academics are bound to be in front of the classroom constantly. Moreover, to provide some relief from teaching and divert attention to research, proper team teaching, or block relief could produce immense benefits. This means that lecturers who are capable in one aspect of the course can group with colleagues, so the process becomes collective and as sustainable as possible.

#### **5.4.4.3 Career prospects of academic staff for growth**

An academic appointment includes the requirement to teach, conduct research and community service. Research activity is one of the criteria for appointments and promotions. The participants in this case study appeared to be unsure of the implications that additional qualifications would have on their career prospects as revealed in the comments below:

*“What value these PhD academics will have to add if the programmes are not growing enough to be able to have to need the services of these highly academically qualified academics.” Participant P4*

*“It is mandatory that you should have a qualification one level higher than the qualification in which you teach. If you are offering a Master’s Degree programme in your department, then obviously you must have a PhD. And besides, with having a qualification like a PhD, you will be able to enhance your research profile, and at the same time you will be able to supervise.” Participant P3*

Most employees would like to work hard and make progress in their careers. Hence, it is unlikely that employees will be satisfied with remaining at the lower levels of an institution for long periods even after achieving vertical qualifications. According to the

comments presented by these participants they also needed clarity on an equitable distribution between teaching and learning including administrative functions, research and community service at various job titles. With respect to this theme, the participants reported as follows:

*“... So those that are research inclined to relieve them of their teaching loads and put more teaching loads on the ones who are not so research inclined.” Participant P10*

*“I am a lecturer, and even if I get my Master’s, I do not think that it is going to help me with progression quite frankly, I have been here for 22 years and maybe it is my fault. I do not want to blame anyone, but I have not moved up anywhere.” Participant P9*

#### **5.4.4.4 Awareness of incentives for research productivity**

When research productivity is effectively related to incentives, it can motivate, attract and retain key research contributors. The comments from participants regarding awareness of research incentives are reported as follows:

*“The motivation that you can give a person like you can probably buy... a piece of equipment that the person will use. More especially because if a person graduates with a PhD for instance, that person will be embarking on writing articles for journals, so there are incentives that can help to motivate that person. But the incentives, I do not think that we offer enough incentives.” Participant P2*

*“So maybe they need to promote that, and show what incentives are offered to the staff members so that they can be motivated to get involved in research.” Participant P8*

*“Incentivise, so that the University gives more towards people that are publishing.” Participant P9*

Overall, participants felt that more awareness of incentives related to research productivity needed to be communicated clearly to the academic community at MUT.

#### **5.4.4.5 Create a Strong Research Culture and ethos**

Whilst MUT promotes research transformation by recognising established and emerging researchers financially at the institution’s Annual Research Day, there are however very few active emerging researchers. Below are the comments of participants in this regard:

*“I think we have been a UoT since 2007. A Technikon culture was mainly teaching and learning-based. If you want to be called a UoT, I think that we need to develop our research component of the institution. We need to be research informed. Yeah, I think the research component in this University is a work in progress. I think we have made some strides, but I think we need to move faster regarding developing research in this institution.” Participant P8*

*“I believe it is not just this research institution, but all UoTs should have an institutional research culture.” Participant P10*

The ethos of changing and restructuring from a Technikon to a UoT underscored the importance of creating a strong research culture and ethos at MUT. Thus, the academic staff who operated under the old name should have been prepared to engage with the new demands of the UoT in respect of research transformation. From the comments of the participants, the institution that changed from a Technikon to a UoT assumed a new research focussed mandate, but the academic staff still worked and approached their jobs with the same mind-set.

#### **5.4.4.6 Attractive Remuneration Packages**

A contented academic workforce with competitive remuneration packages and more enabling working conditions are indispensable for a productive knowledge system. The following comment from a participant attests to this assertion:

*“...Before we lose them, offer them better packages to stay. Because it is important to have qualifications, plus experience. So, if we want to achieve those results, we need to incentivise.” Participant P10*

Arising from the interviews conducted, the participants felt that MUT needed to improve the remuneration packages of existing and prospective talented academics including productive researchers before they are lost to other HEIs by being either head-hunted or through being disenchanted. This could mainly happen if other institutions offered better remuneration packages to join them. It is well known that monetary and other lucrative incentives are important factors that create enthusiasm for academics to join another HEI.

#### 5.4.4.7 Recruitment and Retention of Talented Academics

The effective enactment of the tasks of all three tenets of HEIs is dependent on the institution's recruitment and retention policy of academics who are adequately qualified and self-motivated to work effectively and seamlessly to produce concomitant results. A striking comment from participant P7 is noted below:

*"We better get something in place because it is true, people making you offers, and I know for a fact if I have got my Doctorate I can leave immediately. I have my Master's through a University, and they have already earmarked me to come and work for them. Because Engineering is a scarce skill. You seldom find academics with doctorates. So, with Engineering especially as a matter of fact, you are already poachable." Participant P7*

MUT provides financial assistance and study leave to staff who aim to pursue vertical qualifications. The proviso of this benefit to the employee is that once you have acquired your vertical qualification, you must serve the institution for the same period of study leave taken. Some employees do take advantage of this benefit. However, they also seek greener pastures when the opportunity arises even though MUT has invested in the employee by funding a vertical qualification. Effectively this means that there is no loyalty to remain with the institution if a lucrative job offer is obtained from another HEI.

Notwithstanding this reality, MUT is perceived by the participants as not doing enough to retain staff, which is exacerbated by the omission of a retention policy. This is combined with the issue of inadequate incentives provided for academics who attain vertical qualifications to remain at MUT and to plough back into the institution. However, staff can apply for the ad hominem promotion when the opportunity arises which is a post level above the current position of the academic.

Furthermore, the perception by participants was that the current incentives are inclined to be unattractive to retain academic staff at the institution and this is the reason why academic staff are poached or headhunted by other institutions as soon as MUT staff obtain their post-graduate qualifications. One of the alarming consequences participants reported was when MUT academics acquire vertical qualifications they immediately seek offers from traditional universities. As a productive researcher at a traditional

University, once an academic staff member obtains a PhD qualification, then the teaching workload is reduced, thereby affording the academic to increase his/her research productivity. Whereas, at MUT obtaining a vertical qualification does not affect the workload of academic staff. As a consequence, thereof, staff members who attain a Master's or PhD qualifications are destined to seek lucrative positions outside of MUT, and that means there is a brain drain. MUT has not been able to retain its staff because there is not much that binds academic staff to remain with the institution. A participant responded on this issue as follows:

*"She came, and she says she owes all of her success, at the time she was about to graduate with her PhD, through MUT. She was crying tears. She was going to a better institution, relatively better, but she did not want to leave. Circumstances forced her to leave. She did not want to leave, she felt like she needed to give back because MUT made her what she is today." Participant 11*

In the case of MUT, the participants felt that there were no strategies to retain academic staff even those who were funded to achieve vertical qualifications. A participant's comment reinforces this claim as follows:

*"I think that there should be a specific retention strategy, otherwise we continue to lose people here immediately when they get their qualifications to other institutions so that they can continue their research. So, there must be, a sort of retention strategy." Participant P13*

Several of the participants arising from the interviews conducted shared similar sentiments in this case study.

#### **5.4.4.8 Clarity on Sabbatical leave**

There is inconsistency in the way sabbatical leave is applied at MUT because several participants regarded sabbatical leave and ring-fenced leave as the same. The responses from the participants regarding sabbatical leave are as follows:

*I am not sure if the institution has an approved sabbatical leave policy. But we really need as people who are busy studying, we really need this policy so that you get proper guidance. You know there has been a lot of issues around people who want to take sabbatical... the one on one, you need to save your days so that you are able to take your leave." Participant P2*



*“Yes, there should be clarity, and those two are completely different. But there is no understanding of the difference between the two. And there is an inconsistency even in the way it is applied. Because with some people, they would regard them as one and the same, some people would regard them as different.”*  
Participant P3

*So maybe there needs to be a rider attached to that. You have worked five years, we will give you a year off, we will support you, you fill in progress reports to say that you are completing your PhD or your Master’s, and then after, that you have got to serve the institution for a further one year or two years. You got to be tied down to give back. I feel that you cannot just get something for nothing.”* Participant P1

A few participants in this case study indicated that some staff take advantage of sabbatical leave with minimal progress towards their studies. A few participants agreed that other academics benefitted from sabbatical leave to complete their studies and then leave the University when an opportunity arose. This means that the University is disadvantaged by investing in the academic staff when they leave the institution. It is evident from the above responses that the participants are unsure of the utilisation of sabbatical leave at MUT.

This section addressed research question 4, namely, what are the critical factors to support a research culture at MUT? The above responses under the respective themes, provided an honest understanding that could be undermining research transformation and research productivity at MUT.

## **5.5 IMPLICATIONS ON DATA ANALYSIS**

This section analysed the qualitative data responses from the combined correlated individual and focus group interviews as well as reviewing the institutional repository documentation. This then brought to light the variables at the forefront at MUT concerning research transformation. This was a three-pronged approach to answer the four research questions as broad themes. Thereafter, each of the research questions was translated into several variables, which were a combination of individual and institutional factors contributing to the honest coal face responses from the participants that generated rich and trustworthy data analysis.

Table 5.1 provides a synopsis in analysing the research questions into the themes, sub-themes and respective variables that contribute towards the quest for research transformation at MUT.

**TABLE 5.1 SYNOPSIS OF RESEARCH TRANSFORMATION ISSUES AT MUT**

<b>Research question 1:</b> <b>What are the contributing factors to the low research output at MUT</b>	
<b>Individual challenges</b>	<b>Institutional challenges</b>
<ul style="list-style-type: none"> <li>❖ Academic staff qualifications</li> <li>❖ Funding approval processes</li> <li>❖ Career prospects</li> <li>❖ Environment towards a research culture</li> <li>❖ Focus on Teaching and Learning</li> <li>❖ Student enrolment</li> </ul>	<ul style="list-style-type: none"> <li>❖ Teaching workload</li> <li>❖ Large student numbers</li> <li>❖ Career prospects</li> <li>❖ Poaching of academics</li> <li>❖ Sabbatical leave</li> <li>❖ Unawareness of incentives</li> </ul>
<b>Research question 2:</b> <b>What capacity-building initiatives are in place towards the advancement of research transformation at MUT?</b>	
<ul style="list-style-type: none"> <li>❖ Research workshops</li> <li>❖ Research incentives</li> <li>❖ Boot camps</li> <li>❖ Funded International conferencing</li> <li>❖ nGAP appointments</li> </ul>	
<b>Research question 3:</b> <b>What are the enablers to increase research output at MUT?</b>	
<ul style="list-style-type: none"> <li>❖ Buy-into upskilling by academics</li> <li>❖ Structured guidance on mentoring and supervision</li> <li>❖ Reposition research</li> <li>❖ Publications and citations</li> <li>❖ Buy-into research transformation by Management</li> </ul>	
<b>Research question 4</b> <b>What are the critical factors to support a research culture at MUT</b>	
<ul style="list-style-type: none"> <li>❖ Employ support staff and tutors</li> <li>❖ Review workload model</li> <li>❖ Career prospects</li> <li>❖ Research culture</li> <li>❖ Awareness of incentives</li> <li>❖ Improve remuneration package</li> <li>❖ Recruitment and retention of talented academics</li> <li>❖ Formalised sabbatical leave policy</li> </ul>	

**Source:** Self-generated 2020.

## **5.6 CONCLUSION**

This chapter analysed the main themes, sub-themes and variables that influence the overall research transformation at MUT. The 4 Research Questions were used with sub-themes to generate the candid and objective responses from the face-to-face interviews pertaining to the empirical component of this case study. The relationships and interconnectivity between these are further complemented and verified in detail in the next chapter via the development of a qualitative system dynamics model using of causal loop diagrams.

# **CHAPTER SIX**

## **DEVELOPMENT OF A QUALITATIVE SYSTEM DYNAMICS MODEL**

### **6.1 INTRODUCTION**

This chapter focuses on the original development of the system dynamics modelling with various causal loop feedback diagramming related to themes supported by the principles of systems thinking to understand MUT's research transformation related to current practices and organisational structure. The development of the model in this chapter emanated from the empirical analysis of the responses obtained from the research questions and the responses arising from the interviews conducted with the individual and focus group participants in this study which were analysed holistically. The foundation of the construction of the causal loop feedback diagrams originated from the common themes and its accompanying variables identified from the previous chapter. This chapter exhibits techniques as to how the variables influence and interact with one another to create feedback loops and the resultant consequences of these fragmented feedback loops leading to the development of the final composite qualitative SD causal loop diagram (CLD) towards research transformation at MUT.

### **6.2 CAUSE AND EFFECT ON CAUSAL LOOP DIAGRAMMING**

The researcher being at MUT was able to identify and visually display complex processes and root causes of the problem from the data analysis through the construction of the CLDs. Furthermore, the use of CLDs assists to better understand the interrelationships of credible trustworthy data responses with a system's structure. CLDs introduce the systematic feedback in processes by revealing how variable A influences variable B and in turn how variable B influences variable C through a series of causes and effects. By examining the interactions of all the variables in this case study, the modelling of the entire system can be developed holistically with its numerous causes and effects. The key objectives of CLDs are to explain the behaviour of the variables which are influential to an institution's goals. CLDs comprise arrows linking variables that illustrate how one variable influences another variable as

illustrated in Table 6. The first variable A indicates that if there are more academics with research Master's at an HEI, then the research productivity will increase. Additionally, the second variable indicates that if there are more academics with PhD qualifications, then research productivity will increase.

**TABLE 6.1 VARIABLE (A) INFLUENCING VARIABLE (B)**

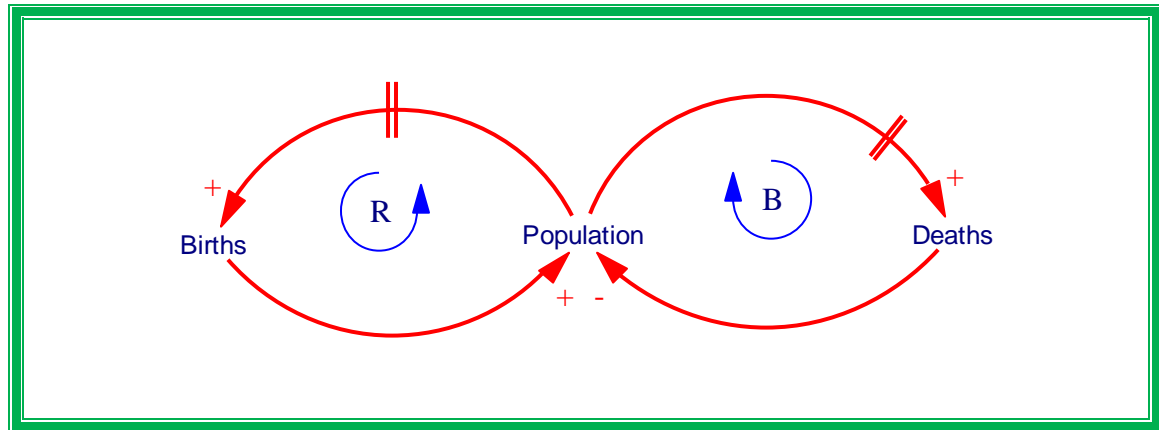
Variable A	(+/increases)	Variable B	(+/increases)
1. Number of academics with research Master's qualifications	(+/increases)	research productivity	(+/increases)
2. Number of academics with PhD qualifications	(+/increases)	research productivity	(+/increases)

### 6.3 ELEMENTS AND DESCRIPTION OF CAUSAL LOOP DIAGRAMS

The main elements of causal loop diagrams used in this case study to present the findings are the following:

- ❖ **Variables** that exist and interconnect with each other to illustrate cause and effect.
- ❖ **Polarity** is the directions of the arrows linked between variables.
- ❖ **Feedback loops** arise from relationships between variables. Only plus signs (+) or an even number of negative (-) signs indicate a reinforcing (R) or positive feedback loop. However, an odd number of minus signs (-), regardless of the number of plus (+) signs indicate a balancing (B) or negative feedback loop. The small arrows around R and B indicate the direction in which the loop can be read, either clockwise or anti-clockwise.
- ❖ **Delays** Sterman (2000) defines delays in CLDs as a process whereby the output lags its input in some manner and takes time to measure and report information to finalise decisions that affect the state of a system. Delays in CLDs are shown as two small parallel lines (||) on the line connecting variables.

A basic example of a CLD illustrating interconnectivity between births, population and deaths with the above elements are exhibited in Figure 6.1.



**FIGURE 6.1 CAUSAL LOOP DIAGRAM BETWEEN BIRTHS, POPULATION AND DEATHS**

**Source:** (Sterman 2000: 138). Adapted.

The interconnected variables in Figure 6.1 are depicted as births, population and deaths. Thus, the direction of the arrows explains the influences between the variables.

As **births** increase, the **population** will also increase. Thus, the arrowhead at the population is signposted with a (+) symbol.

As the **population** increases over time (i.e., delay ||), the **birth** rates will continue to increase. Thus, the arrowhead at the birth is signposted with a (+) symbol. Thus, this feedback process can be read in an anticlockwise direction as indicated by the reinforcing loop hence, labelled R. As **population** increases over time (delay ||) there will also be an increase in **deaths**. Thus, the arrowhead at deaths is signposted with a (+) symbol.

The increase in **deaths** will eventually result in the **population** decreasing with a (-) symbol. Thus, the arrowhead from deaths to population is signposted with a (-) symbol. Hence, this feedback process can be read in a clockwise direction as indicated by the balancing loop labelled as B.

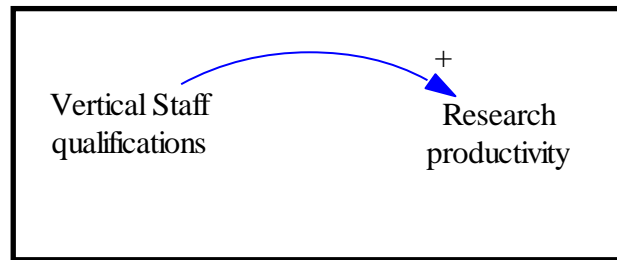
Figure 6.1 is a basic causal loop diagram. However, as more variables were included and feedback interconnectivity realised, the CLDs in this case study became more complex. The variables identified in this case study were extracted from the responses to the themes as shown in Chapter Five to make categorical sense and appreciation of the development of the CLDs. It is anticipated that the variable behaviours will either increase or decrease and show the impact on research transformation and research productivity at MUT. Furthermore, the variables that emanated from the research questions per the data analysis were explained as fragments from each theme and sub-themes as illustrated in Table 5.4 previously. Thereafter the construction of a composite SD: causal loop diagram described how all the variables interconnect and influence one another holistically at the MUT.

#### **6.4 CLDs ON INDIVIDUAL CHALLENGES OF ACADEMIC STAFF INFLUENCING LOW RESEARCH PRODUCTIVITY AT THE MUT**

As per theme, 1.1 participants acknowledged the following inter-connected variables as being dominant from the data analysis and impacting on their low research productivity as individuals at MUT:

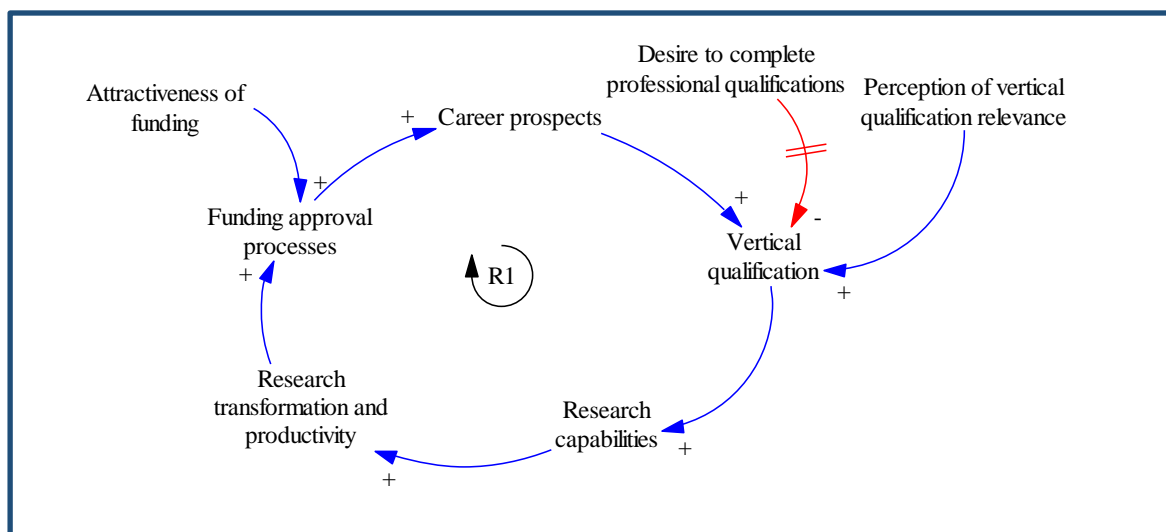
❖ Staff qualification
❖ Funding processes
❖ Career prospects
❖ Teaching and learning
❖ Student enrolment
❖ Environment to conduct research

In addition, Figures 6.2, 6.3 and 6.4 illustrate the causal loops (interconnectedness) and variables of the first theme on individual challenges affecting research productivity at MUT.



**FIGURE 6.2 STAFF QUALIFICATIONS AND RESEARCH PRODUCTIVITY**

As academic staff's vertical qualifications improve to research Master's and PhDs, it is anticipated that research transformation will be apparent and lead to an increase in research productivity. However, this situation can also be negatively impacted when the vertical qualifications of academic staff are not improved. Historically, Technikon staff were mainly employed from industry without acquiring a Master's or PhD qualifications to teach.



**FIGURE 6.3 CLD RELATED TO INDIVIDUAL CHALLENGES BY ACADEMIC STAFF (R1)**

In Figure 6.3 above, the attractiveness of funding for study purposes is currently a lengthy bureaucratic process including those academic staff who can qualify for funding. As academic staff become knowledgeable to the **funding approval processes**, either from within MUT or external sources and submit applications timeously, funding for studies will be approved to increase their **career prospects**. As funding processes become delayed due to bureaucratic procedures, the funding approval time for applications for study purposes also results in delays. This impacts

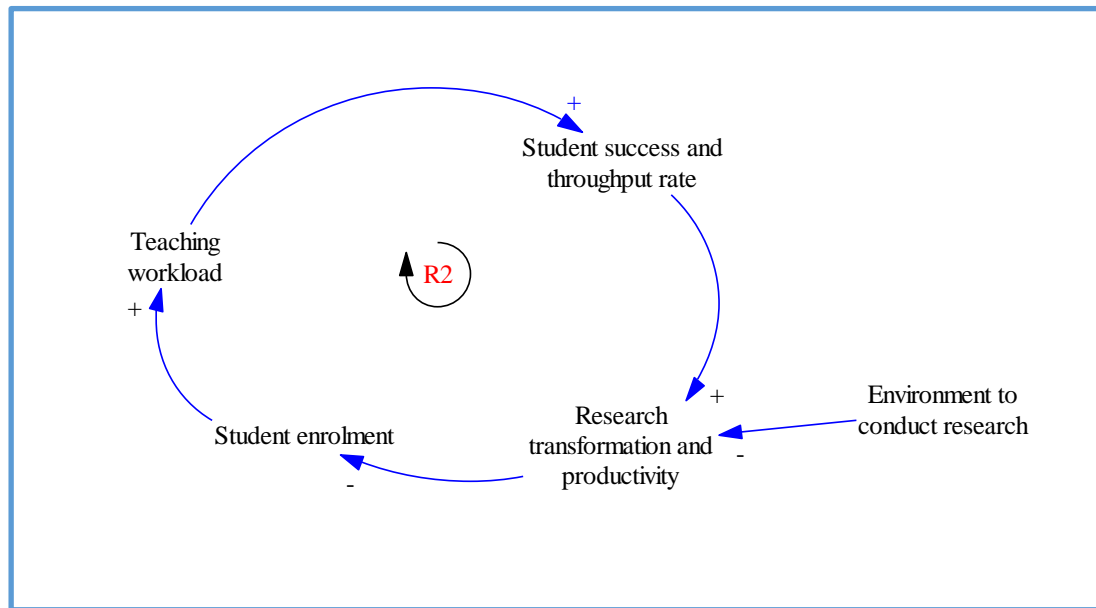


negatively on completion time for vertical qualifications of academic staff. Furthermore, as academic staff **perceive the relevance of vertical qualifications** as a career path, leading to knowledge innovation, creation and its resultant benefits, the **pursuits for vertical qualifications** will increase. Thereafter, it is anticipated that the attainment of vertical qualifications will accelerate the **research capabilities** of these academic staff members resulting in **research transformation and research productivity**.

However, some academics from the Engineering Faculty **desire to prioritise completing a professional qualification** as a requirement by the professional body, for example, the Engineering Council of South Africa, which also delays the completion time for vertical qualification with a research emphasis. This narrates to a preferred sequence delay (two parallel lines) between professional qualification and vertical qualification. The reason for some academic staff to complete a professional qualification before a vertical qualification is twofold. Firstly, staff pursue professional qualifications that are aligned and linked for compliance purposes for affiliation to professional bodies. Secondly, an added value is to acquire in-depth discipline-specific knowledge to impart to students thereby improving their knowledge and success rates.

As more staff **complete their vertical qualifications**, the **attractiveness of funding** for the academic staff and MUT increases in the form of research publications and grant applications.

As academic staff become aware of the attractiveness for funding and the various revenue streams the motivation to improve on vertical qualifications will increase. As academic staff and MUT generate additional funding, it is anticipated that the **funding approval processes** (for new applications) will increase with efficient human resource capability.



**FIGURE 6.4 CLD RELATED INDIVIDUAL CHALLENGES OF ACADEMIC STAFF (R2)**

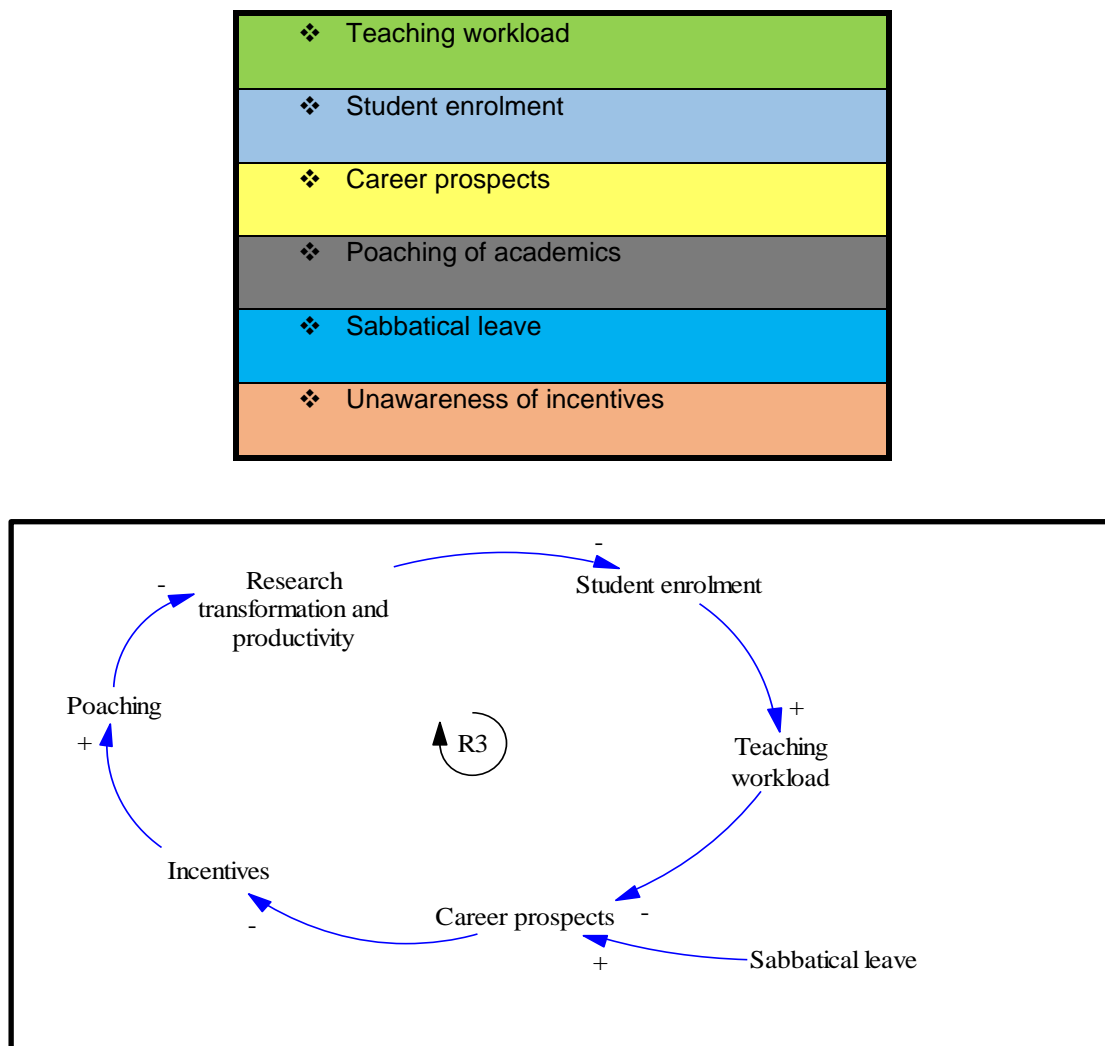
Figure 6.4 above illustrates the inter-connections of variables related to individual challenges experienced by academic staff contributing towards low research output at MUT. As MUT attracts more than 90% of its **student enrolment** from rural areas who are disadvantaged and underprepared for higher education. Thus, the **teaching workload** of academic staff increases since the **time spent on teaching and learning** activities by academic staff increases. Furthermore, considering the background and under-preparedness of students, academics spend more time with students either in class or during individual consultation to enhance **students' success and throughput rates**.

Furthermore, academics extend themselves by educating students with graduate attributes. which consequently results in less time available to academics to conduct research resulting in low **research transformation and research productivity**. Additionally, most of the prospective students from rural areas are aware that MUT focuses on teaching and learning which impacts on the increase in **student enrolment**. Hence, the under-preparedness of students enrolled at MUT negatively impacts on academics who are unable to devote much time towards **research transformation and productivity**. Moreover, the **environment to conduct research** is not conducive due to insufficient resources, lack of infrastructure, unsupportive research culture and commitment of executive leadership impacts on the morale and

motivation of academic staff to engage in **research transformation and productivity**. Furthermore, this has a negative impact on **student enrolment** for postgraduate studies especially when staff do not have the requisite vertical qualifications to teach and supervise at this level.

## 6.5 CLDs ON INSTITUTIONAL CHALLENGES (R3)

According to theme 1.2, participants acknowledged the following inter-connected variables as being dominant from the data analysis and impacting on their low research productivity from an institutional perspective towards promoting research transformation:



**FIGURE 6.5 CLD INSTITUTIONAL CHALLENGES IMPACTING ON LOW RESEARCH OUTPUT (R3)**

Figure 6.5 above shows that an increase in **student enrolment** due to massification and access to higher education has increased the **teaching workload** of academics relating to large class sizes, additional academic administration associated with setting, moderating and marking of all forms of assessments. The increased teaching workload of academics impacts negatively on having very little time devoted towards **career prospects** with limited guidance, especially those academics who have not yet obtained any vertical qualifications. Furthermore, **sabbatical leave** has not been well articulated and explained to academic staff to take advantage of, which also impacts negatively on completion of their **career prospects** and hinders achievements towards research transformation.

As academic staff become aware of a formalised sabbatical leave or study leave, they can then take advantage of such leave. Furthermore, once sabbatical/study leave is approved for academic staff, there will be consequential pressure to complete their vertical qualification and improve on research productivity. However, if academics have not accumulated or ring-fenced any annual leave days for study purposes, their study pace to complete vertical qualifications (**career prospects**) will be delayed. The researcher is aware that recently academics who had commenced with their studies towards vertical qualification were able to utilise funds from the UCDG to find a replacement lecturer to enable them to make substantive progress to complete their vertical qualifications.

Since, MUT is encouraging academics to pursue vertical qualifications, some academic staff members' responses from the interviews was that the status quo should remain, namely, there is no need for Master's nor PhD qualifications to teach at the undergraduate level. Hence, their negative attitude towards research transformation is inhibited, resulting in not improving research productivity at MUT. This type of negative attitude amongst a few academics indicates a non-futuristic research endeavour and defeats the objective of the transformation of HEIs, especially at MUT being an HDI and a UoT which needs to improve its research output. Of critical importance is that academics should be cognisant that teaching and learning and research are not mutually exclusive in terms of the mandate of DHET.

Academics are **unaware of all the incentives** available from pursuing **career prospects** at MUT due to a lack of communication and transparency. However, research productivity is expected to improve as academics attain their vertical qualifications. Additionally, as academics improve on their vertical qualifications, they are alerted to the commensurate benefits and attractiveness of obtaining scholarly funding mechanisms outside of MUT.

The unawareness of all the research incentives available at MUT, results in academics being **poached** or “head-hunted” by other HEIs, corporate sector or leave voluntarily for greener pastures. Moreover, after having acquired vertical qualifications and research capabilities, academic-careered staff seek better opportunities at other HEIs, especially at research-led universities that are well-resourced for research productivity as well as offering a range of postgraduate qualifications and supervision options.

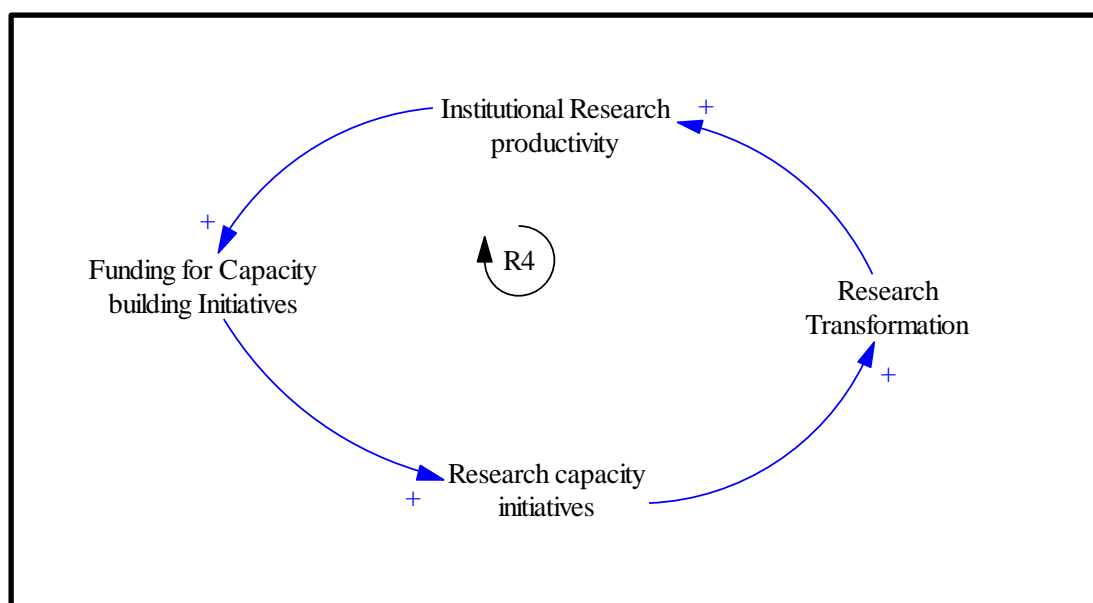
Academics who are poached result in a decrease in institutional research productivity. Further, no mentoring or research support to existing academics is offered nor sharing their recently acquired research knowledge to those who seek advice on research activities. Despite the poaching of academics, there is still a need for existing academic staff to complete their vertical qualification. Furthermore, the time lag for resignation and appointment demotivates existing academic staff for short periods who then must absorb an additional workload. This further exacerbates the problem of **research transformation and research productivity** at MUT which impacts negatively on student enrolment at the postgraduate level with limited available support structures at MUT.

## **6.6 CLD ON CAPACITY BUILDING INITIATIVES FOR RESEARCH TRANSFORMATION**

According to theme 2, the following inter-connected variables below were identified as capacity building initiatives towards research transformation and research productivity at MUT:

❖	Research workshops
❖	Boot camps
❖	Funding for international conferencing
❖	nGAP appointments
❖	Attractiveness of research incentives

It is fundamental to provide capacity building initiatives as highlighted above, for academics to empower them with the appropriate resources and incentives towards the research transformation agenda at MUT.



**FIGURE 6.6 CLD ON CAPACITY BUILDING INITIATIVES FOR RESEARCH PRODUCTIVITY (R4)**

Figure 6.6 above indicates that there have been several capacity building initiatives to augment research transformation and research productivity at MUT. As more **research workshops** are held, for example, proposal writing, academic writing for publications, statistical package for the social sciences (SPSS) software and research skills, then it will provide the impetus on dissertation writing. As a rejoinder such interventions would positively impact on **research transformation** and **research productivity** at MUT.

Boot camps are held over a few days to increase capacity building initiatives towards the scholarship of teaching and learning, improving academic skills, enhancing

research transformation as well as collaboration with academic staff from other faculties to promote interdisciplinary research productivity. As more research-related **boot camps** are held, it is expected that MUT would increase its research productivity.

As more staff engage in research productivity, the **more research incentives** they will be awarded. In return, this will have a positive effect on research transformation and research productivity at MUT.

Furthermore, Figure 6.6 above indicates that as staff become familiar and aware of the timeous procedures for funding applications for **international conference presentations** the turnaround time for approving conference funding can be improved without prejudicing any applicant. Whilst conference presentations are viewed as improving **capacity building initiatives for research productivity**, novice researchers maintain that they should be afforded an opportunity to attend at least one conference without presenting. The rationale for attending conferences for novice researchers are considered as steppingstones for publications and encourage prospects for networking. Moreover, this would boost their presentation skills at future conferences with confidence.

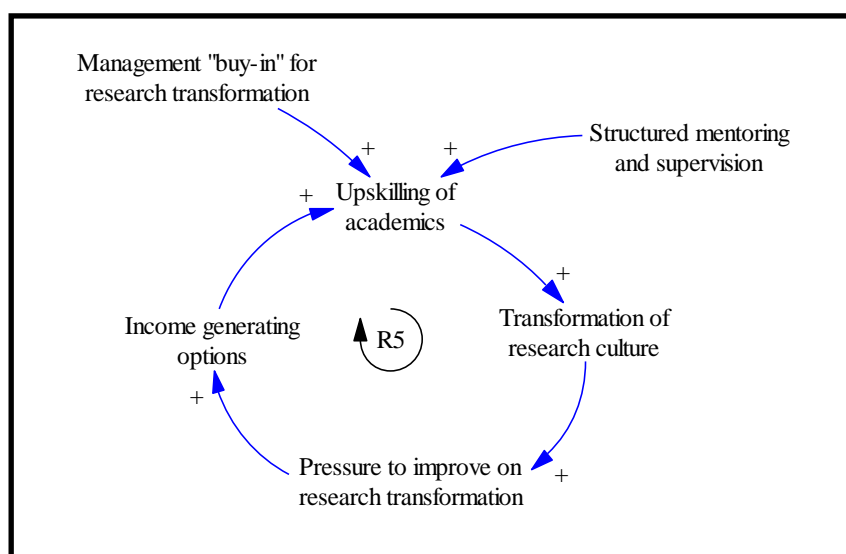
As more funding becomes available from DHET, additional nGAP appointments should be formalised based on strategic institutional capacity to fill available academic posts and imminent academic retirees. It is evident that the use of nGAP appointments are to provide capacity building initiatives to support early career academics in their personal and professional career development opportunities including teaching, research and community engagement.

The capacity building initiatives (i.e., research workshops, boot camps, international conferencing, research incentives and nGAP appointments) implemented at MUT are all endeavours towards supporting **research transformation** to ultimately increase its **research productivity**. However, academic staff have not fully utilised these initiatives due to a series of impediments in their teaching and administrative workload.

## 6.7 ENABLERS FOR ACADEMICS TO INCREASE RESEARCH OUTPUT

According to theme 3, the following inter-connected variables were identified as enablers for academics to improve the research transformation and research productivity at MUT:

❖ Buy-into upskilling by academics
❖ Mentoring and supervision support
❖ Pressure to improve on research transformation
❖ Reposition research transformation (publications and citations)
❖ Buy-into research transformation by Executive Management



**FIGURE 6.7 ENABLERS TO INCREASE RESEARCH PRODUCTIVITY (R5)**

Figure 6.7 above illustrates MUT's Executive Management "**buy-in**" for research transformation that is critical to provide institutional and individual support systems as enablers to **upskill academic staff** qualifications to Master's and Doctoral qualifications as a result of DHET's mandate to HEIs. As academic staff take advantage of these support systems, they will be upskilled by completing their vertical qualifications thereby accelerating **transformation towards a research culture**.

However, MUT's target to improve staff qualification within a specified time without the essential institutional support structures was unattainable (MUT 2014). Moreover, as



institutional support structures improve together with an enabling environmental support system (i.e., management support, mentoring and supervision support culture, requisite infrastructure as well as support from senior experienced colleagues) as key constructs, then academic staff will be motivated to complete their vertical qualifications.

Additionally, this will result in more staff “buy-in” and completing vertical qualifications with research emphasis. The benefits of completing vertical qualification will lead to the proficiency of academic staff’s research capabilities; thus, increasing MUT’s contributions towards research productivity. In the event of increased research productivity, there is an expectancy that other staff will realise the perceived relevance of vertical qualifications and thus contribute towards an upward trajectory of improved higher qualifications and subsequently on research transformation at MUT.

Furthermore, it is essential that as more structured instead of ad hoc **mentoring and supervision** meetings are established, this will then contribute to the upskilling of academic staff including the acquisition of research skills. Moreover, unstructured and inconsistent mentoring and supervision interventions may result in a further delay in enhancing a research culture and ethos. It is envisaged that the upskilling of academics will enable them to hone their research skills. Subsequently, this will result in bringing self-awareness towards the **transformation of research culture** which impacts on the **pressure to improve on research transformation** as a multiplier effect.

The **pressure to improve on research transformation** will result in academic staff taking advantage of **income-generating options** as perceived benefits in the form of increasing publications, presentation at conferences, attracting donor funding as well as servicing new vertical postgraduate qualifications. This in turn attracts better full-time equivalent (FTE) subsidy funding from DHET. Thus, income from these latter activities will contribute immensely towards the institution’s financial growth. However, subsidy **income-generating options** will only proliferate once there is an increase in the **upskilling of academic staff** by attaining vertical qualifications and acquiring the requisite research skills.

## 6.8 CRITICAL FACTORS TO SUPPORT A RESEARCH CULTURE AT MUT

According to theme 4, the following inter-connected variables were identified as critical factors to support a research culture at MUT towards research transformation and research productivity:

❖	Employ support staff and tutors
❖	Review workload model
❖	Career prospects
❖	Research culture
❖	Awareness of incentives
❖	Improve remuneration package
❖	Recruitment of talented academics
❖	Sabbatical leave policy
❖	Retention of talented academics

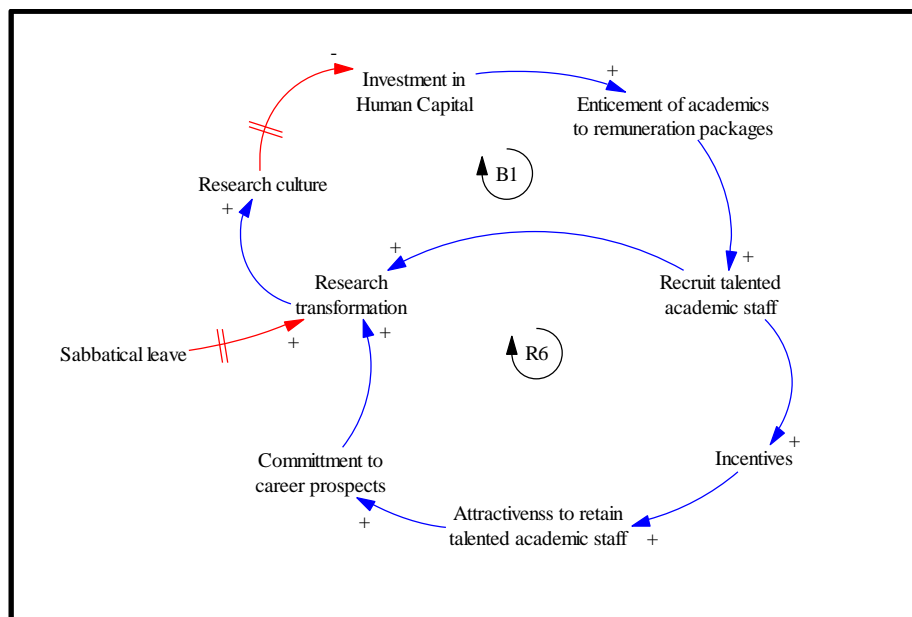
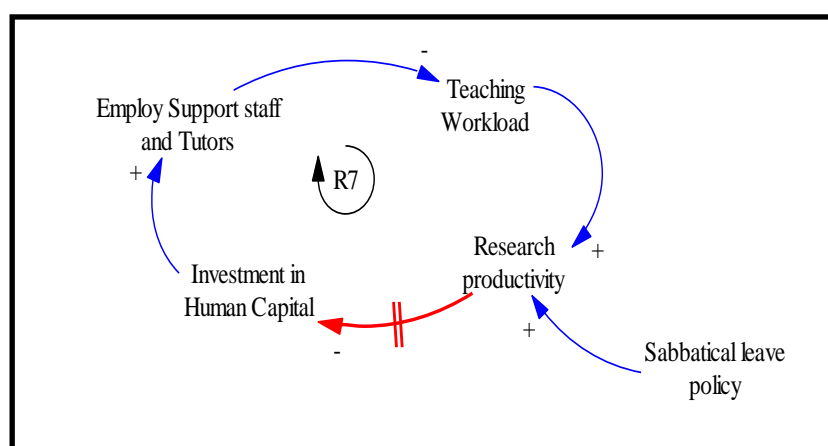


FIGURE 6.8 CRITICAL FACTORS TO SUPPORT A RESEARCH CULTURE (R6 AND B1)

In Figure 6.8 above, MUT foresees ploughing **investment in human capital** to **enticing academics with attractive remuneration packages** to **recruit talented academic staff** with the requisite profile to promote a research culture (**B1**). The recruitment of talented academic staff will intensify and escalate by stimulating the **awareness of research incentives** offered at MUT. As the evidence of research productivity increases amongst talented academics, MUT should implement processes

to **attract and retain** talented academic staff. This will be seen as a positive initiative by existing academic staff to emulate talented academics by a **commitment to career prospects (R6)**. Career prospects of academic staff can improve when they become mindful of taking advantage of a formalised “**sabbatical leave**” procedure. Once sabbatical leave is monitored, the pressure to improve **research transformation** with the requisite support will increase exponentially towards a positive **research culture** over time at MUT. Furthermore, as staff realise the benefits of research productivity by “word of mouth”, the awareness of research productivity will increase resulting in more staff engaging in pursuing higher vertical qualifications and thereby promoting a vibrant **research culture** and ethos at MUT.

The long-term benefit of recruiting talented academic personnel means that research transformation and productivity can be realised with an embedded research culture and consequentially reducing the **investment in human capital** over a period indicated with a delay sign. Currently, there are very few academics who publish at MUT. However, as academics become familiar with a formalised **sabbatical/study leave** policy, they will be able to take advantage of such incentives to improve on vertical qualifications and research transformation. However, research productivity will not improve if the investment in human capital and retention is not sustained.



**FIGURE 6.9 INVESTMENT IN HUMAN CAPITAL (R7)**

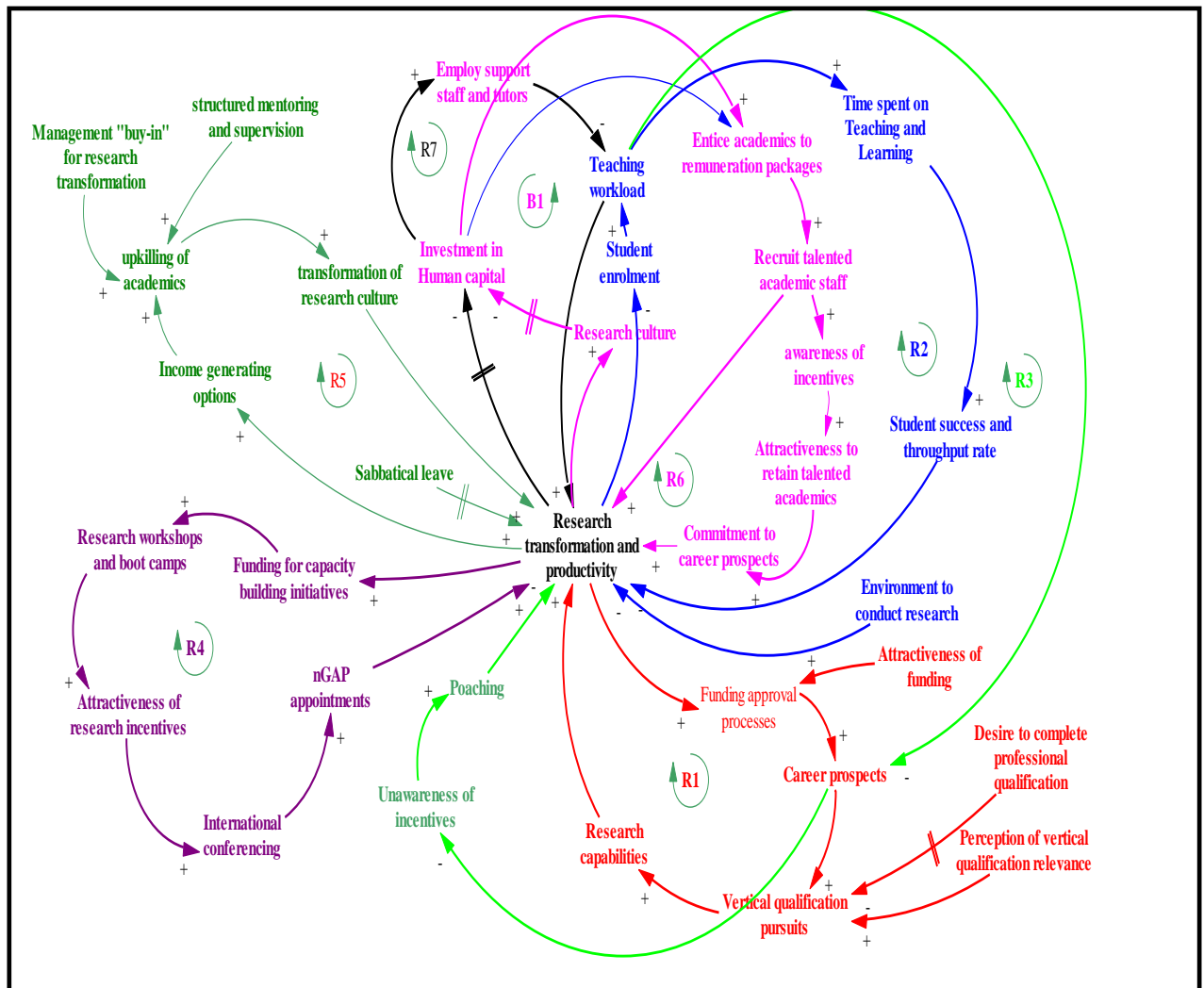
According to Figure 6.9 above, as MUT leverages investment in human capital with the appointment of capable and efficient **support staff and tutors**, it is anticipated that

this will partially ease the **teaching workload** of academics from the time spent marking and capturing assessment marks to consultation time with students. It is also contended that academics will have this released time to focus on **research productivity (R7)**. It is envisaged that academic staff who take advantage of **sabbatical leave** for study purposes or research purposes will increase the institutional **research productivity**. As research productivity increases over time, then **investment in human capital** for support staff and tutors will decrease (hence delay sign between research productivity and investment in human capital).

Furthermore, investment in human capital is vital considering that the HE sector as knowledge producers is continuously transforming underpinning the dynamic behaviour of the HE sector. Thus, by investing in human capital, MUT can entice academics with attractive remuneration packages that serve a dual purpose. Firstly, MUT must provide an enabling environment that is competitive in the HE sectors to attract and retain talented academics for the intended purpose of their employment. Secondly, when all the support structures are provided, the commitment to career prospects (attaining vertical qualifications) by academic staff to remain in the employment of MUT are greater by strengthening loyalty to the institution. Once the intention of talented academics in the employ of MUT remains for the foreseeable future, the investment in human capital will decrease and the return of human capital will be rewarded accordingly.

## **6.9 THE COMPOSITE QUALITATIVE SD MODEL**

The original composite qualitative SD model in Figure 6.10 was created by constructing and bringing together a holistic synopsis of the small fragments of CLDs (R1, R2, R3, R4, R5, R6, R7 and B1) relating to each of the four main themes and associated variables that were explained above individually in this chapter. This composite SD model depicts an overview of the feedback structure illustrating how all the main themes relate to each other as a system holistically that impact on the overall research transformation and research productivity at MUT.



**FIGURE 6.10 COMPOSITE QUALITATIVE SYSTEM DYNAMICS MODEL OF RESEARCH TRANSFORMATION AT MUT**

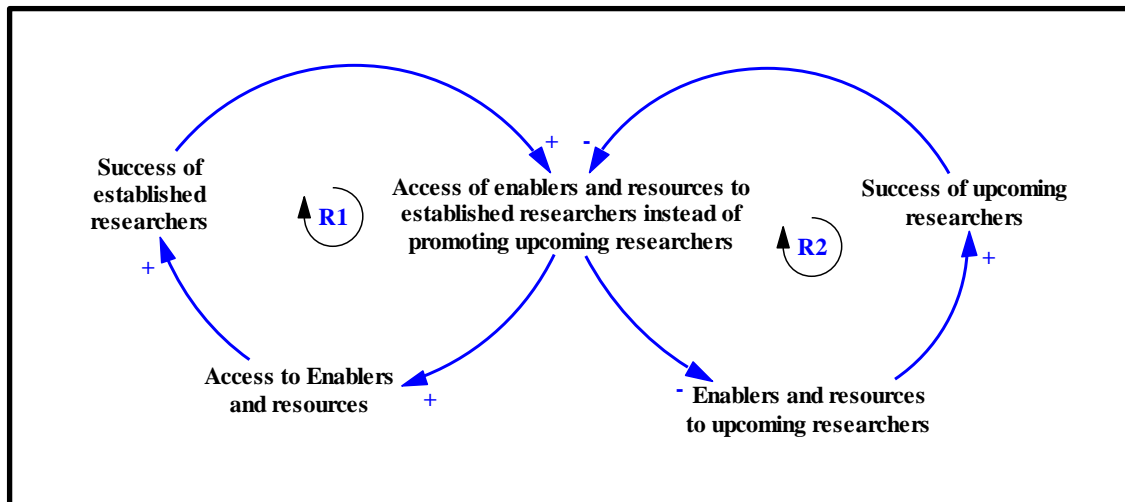
SD offers both quantitative computer simulation modelling to reinforce the scientific aspect of SD as well as qualitative tools in the form of CLDs and system archetypes for augmented understanding and analysis of the behaviour of a system over time. According to Singh (2015), computer simulations in SD result in meticulousness and scientific authority on future behaviour, whilst archetypes provide awareness regarding such behaviour. The application of the composite qualitative SD model is discussed hereunder to identify archetypes that have an over-arching and facilitating role in the status of research transformation at MUT.

## **6.10 CONCEPT OF ARCHETYPES**

The concept of archetype is used in this case study to describe common patterns of behaviour that exist within HE institutions to operationalise University transformation. It works by the configuration of structures and processes of organising according to a common orientation or interpretive scheme. According to Senge (2006), there are 10 archetypes, each with its distinctive characteristic to understand systems thinking. The efficacy of system archetypes in this case study is a way of disseminating perceptions evolving from the composite SD model. Thereafter, strategies would be devised from these archetypes on how to implement them at MUT. However, the difference between systems thinking and reductionist pathways is that in systems thinking one can then refer to the individual CLDs and the composite CLD. In the composite CLD all the connections were established and how they influenced the system holistically. This prevents strategies that are done without establishing linkages and counter-intuitive policies. By contrast, the reductionist approach considers the behaviour of a system into separate components unlike holism of systems thinking which considers all parts of a system as a whole. Three key archetypes were identified and discussed hereunder.

### **6.10.1 Archetype 1: Success to the successful**

It was ascertained that there is a general lack of funding awareness which is affecting research transformation and productivity at MUT. The difference between conventional approaches and systems thinking is that in conventional approaches the institution will go on an overdrive to attract funding which will flag research transformation and productivity amongst established researchers for a certain time until MUT reverts to the status quo or diminish initial gains.



**FIGURE 6.11 ARCHETYPE – SUCCESS TO THE SUCCESSFUL**

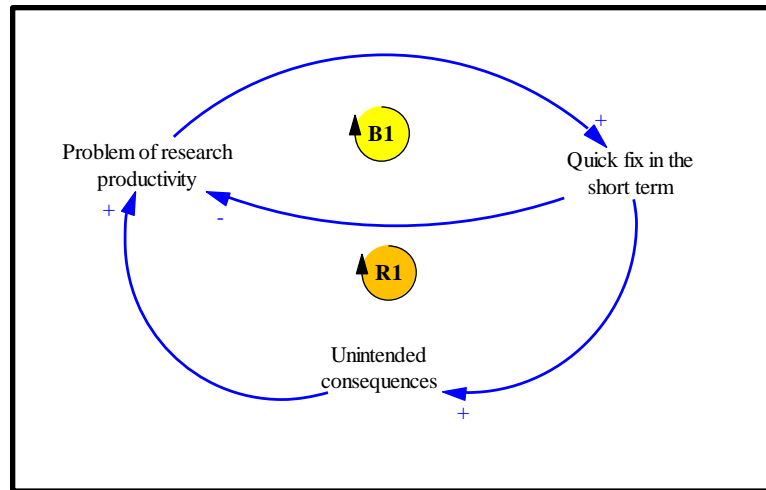
Figure 6.11 above exemplifies the success of the successful archetype prevalent within MUT. This is because access to funding, enablers and resources will propel established researchers' success which is counter-intuitive to promoting upcoming researchers who will not have upgraded to vertical qualifications or could not access enablers and resources that enhance research transformation and hence will be less successful.

The inference of this archetype further compounds the notion that novice researchers will not be successful because they have not acquired the requisite competencies, capabilities or dedication. A further impediment for novice researchers' failures may be attributable to the fact they are unable to access the existing funding, enablers and resources. Additionally, the system in which they function constantly differentiates against them as a starting point. This adds to their failure to achieve research transformation even deeper, whilst augmenting the success of the successful. While established researchers will be deemed winners and leave MUT as they are proving to be successful, the system becomes even less research-productive in the long run. Ultimately future strategies need to be in place and formalised as informed by the individual and composite CLDs.

### 6.10.2 Archetype 2: Fixes that fail

"Fixes that Fail" archetype signifies a problem in the structure which is brought to the attention of Executive Management to implement a quick fix solution for the underlying

problem of improving research productivity without investigating the root causes of the problem. For example, appointing post-doctorates on a tenure basis to improve research productivity, but it begs the question, How tangible are such benefits to the existing academic staff?

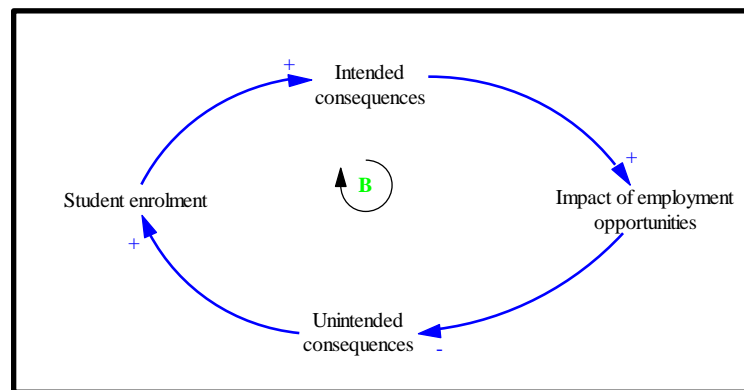


**FIGURE 6.12 ARCHETYPE: FIXES THAT FAIL**

Figure 6.12 above illustrates that whilst this initiative (fix) has intended solutions for an interim period, it also manifests unintended consequences (failure) in the long term for two reasons. Firstly, the appointed post doctorates have a short-term contract with no continuity to sustain research productivity at MUT since they are seeking permanent academic positions elsewhere which are not available at MUT. Secondly, this creates a vacuum when they exit the system resulting in an unsustainable research environment to the disadvantage of MUT, thereby triggering the original status quo to resurface after some delay and worsening the problem.



### 6.10.3 Archetype 3. Limits to success



**FIGURE 6.13 ARCHETYPE: LIMITS TO SUCCESS**

Limits to success archetype as illustrated in Figure 6.13 above demonstrates an intended consequence of increasing access to student enrolment, thereby providing improved employment opportunities to prospective graduates as well as growth in the economy. However, the unintended consequences are increased class sizes because of massification, increased workload of academic staff and poor morale of academic staff which discourages them to improve their vertical qualifications as an impeding factor. Limits to success archetype hypothesises that ongoing efforts of increasing student enrolment will impact on reduced returns for research transformation without taking cognisance of limitations on infrastructure resources for both staff and students. However, a holistic approach to this issue as a long-term strategy would be to increase academic appointments with appropriate qualifications aligned with increased student enrolment and staff: student complement.

## 6.11 CONCLUSION

This chapter aimed to discuss the consequences, suggestions and inferences of what was revealed during the data analysis from interviews with participants as well as institutional data. A striking feature of systems thinking methodology and system dynamics is to incorporate as many stakeholders as possible. However, due to time restrictions on the part of the researcher, the CLDs were constructed from the data analysed from interviews with the participants and applicable documents from the institutional repository.

The four broad themes were identified and interrogated as being critical to research transformation at MUT. They were further synthesized through the construction of CLDs in fragments, whilst depicting feedback loops amongst them to ultimately create a composite qualitative system dynamics model. Whilst this case study did not advance to a scientific computer simulation stage, system archetypes were introduced to illustrate insights into future systemic behaviour.

It should be acknowledged that the identified themes and feedback loops were specifically related to the case study at MUT. It is possible to apply them as a powerful tool of departure to similar HEIs, especially within the UoT sector and HDIs for future studies related to research transformation, although situational factors may differ or be more divergent. The next chapter presents a detailed discussion of the findings emanating from the research questions and empirical analysis of the data.

## **CHAPTER SEVEN**

### **DISCUSSION OF FINDINGS**

#### **7.1 INTRODUCTION**

In the preceding chapter, the responses of participants from the data analysis were specifically presented in the form of a qualitative SD causal loop model. This chapter provides a detailed discussion of the findings emanating from the data analysis. The discussion focuses on the problem statement and research questions. Furthermore, this section presents a synopsis of how the findings from the qualitative data analysis align/misalign with previous studies. It aims to ascertain whether the research questions have been answered or not. Additionally, the results of the discussion from the research questions explain and/or corroborate the assumptions of theories, reinforced with extant literature on the research transformation of MUT into a research-informed UoT.

#### **7.2 PROBLEM STATEMENT**

The historical background of MUT compounded by the massification of student enrolment, increased academic and associated administrative workload, high staff/student ratio, and academic staff not acquiring the relevant vertical qualification, environmental dynamics at play has handicapped academic staff with research skills to promote research transformation. This, despite providing financial incentives towards research productivity. Bunting, Cloete and van Schalkwyk (2014) concur that high administrative and teaching workloads contribute to the low research productivity of academic staff.

#### **7.3 SUMMARY OF FINDINGS BASED ON THE RESEARCH QUESTIONS**

The discussions of the findings emanating from the research questions are presented below.

##### **7.3.1 Factors contributing to low research output at MUT**

*Response to research question 1.*

The findings pertaining to research question 1 with regard to low research outputs in this study identified two major sub-themes, namely, individual factors and institutional factors.

#### **7.3.1.1 Individual factors contributing to low research output**

The outcome of individual research productivity by academic staff is affected by a combination of factors. The significance of these factors is not to be underestimated. They have been factored in to be the reasons for the low research productivity at MUT. The following six critical individual factors and findings were identified by participants contributing towards low research output at MUT.

##### **i. Academic staff qualifications**

The profile of the academics in this case study referred to the level of the academic staff's vertical qualifications. Evidently, both professional development and obtaining vertical qualifications are of equal relevance. However, which one to prioritise is a catch 22 situation and the individual preference of an academic.

This was fundamental in determining the strength of the research capacity of the institution. Specifically, the Doctoral level is the expected level for an academic to attain the required skills of inquiry and application of techniques and the driving forces behind improved research productivity.

In the context of this case study, the findings revealed that the number of participants with PhD degrees was nil, although 60% were registered to pursue a Doctoral qualification. When compared to the aspiration to sustain a research role in the University, the findings of this study concur with Bunting, Cloete and van Schalkwyk (2014), highlighting that the lack of necessary academic qualifications at the Doctoral level required for research productivity is understood to be the result of MUT's institutional environment that places more emphasis on teaching activities rather than encouraging staff to pursue higher vertical qualifications and to promote research transformation.

## **ii. Funding approval processes and challenges**

The findings of this component revealed that complex and multi-faceted difficulties confronting public research funding for HEIs make it difficult to isolate the relative empirical significance of the various aspects of the challenges. According to Drivas, Balafoutis and Rozakis (2015) and Fedderke and Goldschmidt (2015), the scholarly debate is ongoing between research funding and the research output of an institution. Moreover, the findings from the data analysis, revealed an inclination that the existence of administrative weaknesses (i.e., tedious processes and delays in documentation approval) had serious negative effects at all operational and institutional levels for the whole staff component. In addition, the findings of this study revealed that research administrative bottlenecks deterred the research activities of academics. For instance, University research policies and or procedures on research-related activities are often not communicated/explained adequately, thereby potentially creating “red tape” in their execution.

The research transformational process requires the participation of all University faculties, and departments whilst facing myriads of challenges that influence their ability to perform their tasks successfully (Jimenez 2019). Altbach and Salmi (2011) agree that challenges such as bottlenecks, red tape/bureaucratic procedures are counter-productive to transformation in a University. Additionally, Jimenez (2019) believes that they create hindrances and barriers in an institution towards the achievement of institutional overall goals. However, some scholars (Khan and Jabeen 2019) believe that bureaucratic bottlenecks, organisational structure and culture are necessary for institutional existence.

These findings support the views of Angelique, Kyle and Taylor (2002), indicating that participants were frustrated regarding funding. Most participants felt that there were no funds, whilst others were of the view that the finances were insufficient, whilst a clear majority were unaware of options available for research funding. Furthermore, participants felt that such processes demanded many sacrifices even when the success was achieved, it was insufficiently rewarded and fully taxed.

### **iii. Career prospects**

The findings in the empirical analysis of the data analysis revealed that because of a lack of initiatives on career prospects, some participants were considering leaving academia for industry. Clearly defined career prospects are a guide to the aspirations of academics and motivate the desire to achieve requisite research credentials to facilitate one's career growth. Furthermore, scholars Masango (2013) and (Mpofu 2013) assert that academics pursue career and personal technological development because of the need to access promotional opportunities. Whilst birthing from a predominantly teaching environment, current promotion prospects at MUT also include the research productivity of academic staff. As a rejoinder, the intention is to shape and accelerate research transformation.

Motivation is a human psychological factor that contributes to a person's degree of commitment. Pinder (2014) refers to the resolution of achieving a goal, marked by a goal-directed behaviour. A motivated individual tries hard to achieve a given task. However, motivation alone is not enough without action and productivity. An individual who is demotivated does not achieve set personal goals and is less committed to organisational achievement.

### **iv. Environment towards a research culture**

The immediate environment of an academic dictates issues such as good research space, research support culture, research facilities, management support as well as moral and respectable interactions from seasoned research colleagues that are important predictors for University academics' research transformation. However, the findings showed a lack of these environmental factors which exacerbate the low research productivity results at MUT. Samuel and Chipunza (2009) and Maina and Waiganjo (2014) affirm that skilled researchers are always seeking better environments and prospects for their practice.

The findings from the data analysis reiterated the opinions of Abassi and Hollman (2000), Sherman, Alper and Wolfson (2006) and Kisoonduth (2017) concerning the negative impact of an uncondusive work environment on research productivity.

However, there are prospects that academics who graduated from an institution create networks within that institution. Moreover, collaboration with colleagues to undertake research activities is likely to flourish around these academics. Sometimes obtaining a degree from the University where one works as an academic can militate against an individual, especially where the work environment and relationships are toxic.

#### **v. Focus on Teaching and Learning**

The findings with respect to teaching and learning revealed that most of the participants spent the bulk of their time on teaching and learning and related administrative activities. The historical background of MUT offered mainly programmes at the undergraduate level where the focus was on teaching and learning and training students for a particular career path. Furthermore, the findings showed that most of the participants were of the view that for them to increase quality graduates at MUT, their primary attention should be on teaching and learning. Moreover, academics are cognisant of the intake of the previously disadvantaged and underprepared students at MUT and take responsibility by going the extra mile when nurturing teaching and learning interactions including interventions with students who are under-performing to create the will to learn and flourish successfully. Additionally, the participants revealed that engaged learning opportunities with students encouraged lifelong skills and contributed positively towards maintaining or excelling in the throughput and graduation rates.

The findings of this case study are congruent with research conducted by Cloete, Bailey and Pillay (2011), Seale and Cross (2016) and Mtshali and Sooryamoorthy (2019) asserting that most of the then former Technikons struggled to create a research environment immediately after being renamed UoTs where their primary focus was on teaching and learning. Inevitably, to transform to a research-informed UoT is a long-term strategic planning process.

#### **vi. Quality of students at enrolment impacting on teaching and learning**

The findings in respect of the above components revealed that MUT had a few active and many inactive academics in terms of research transformation. Furthermore, the current role of academics, their determination and passion to engage in research as

well as their expressed interest in research was low, whilst others explicitly indicated that they were more passionate about teaching and learning rather than engaging in research.

It is evident that almost 90% of the students enrolled at MUT are disadvantaged and come with poor basic educational backgrounds. Therefore, MUT needs more hands-on academic staff to go the extra mile for these disadvantaged students to ensure they transition seamlessly into the world of work. Furthermore, in respect of Engineering students, the findings from the data analysis showed that they should be prepared with the technical know-how and management knowledge that will make them invaluable in the industry. Hence, in their view, it was important to relate and integrate the theoretical component of the curriculum with the practical problems and solutions.

Coughlan (2006), Hlalele (2010), Smit (2012) and Walton, Bowman and Osman (2015) concur with the findings and acknowledge that many students enter HEIs with inadequate schooling and therefore encounter problems and challenges coping with the skills gap and conceptual knowledge towards their HE studies.

#### **7.3.1.2 Institutional factors that contribute to low research output**

The outcome of individual research by academic staff is affected by a combination of institutional factors which have been factored below as the reasons for low research productivity at MUT. The findings from the data analysis identified the following six critical institutional factors by participants contributing towards low research output at MUT.

##### **i. Large student numbers: Massification**

The findings revealed that if academics are tied down with large student numbers to teach in a class, then there will be no time to engage in research activities. Furthermore, with respect to teaching large numbers of students at MUT, Cadez, Dimovski and Zaman Groff (2017) warn that research-based performance management may be detrimental to high-quality teaching. However, an academic may be a good teacher with good delivery but may not have publications to support his/her good work as one of the promotion criteria. The findings concur with Harle (2013) and Hornsby and Osman



(2014) postulating that massification of student enrolment at universities and large class sizes were a result of students' personal development for tertiary qualification. This is contrary to the position of scholars (Akalu 2016) who felt that massification would undermine quality by promoting limited engaged learning opportunities in large classes and creating challenges for academic staff (Mushemeza 2016; Matovu 2018; Ramsarghey 2020).

Additionally, Benton and Pallett (2013) attest that students in large class sizes were marginalised in terms of nurturing richer learning outcomes in relation to communication, creativity and writing skills especially for most of the historically disadvantaged students at MUT. Moreover, academics were expected to execute both the administrative responsibilities attached to teaching and learning in large classes and aspire to be productive in research. Thus, the expected research output mitigates against research transformation and research productivity.

As much as research is important, there should be a balance between teaching and research time. This is necessary in order not to sacrifice the quality of teaching and learning on the platter of quantity and research outputs as suggested by Babcock and Betts (2009) and Blatchford *et al.* (2016). The staff/student ratio as found in this case study already matched and surpassed the enrolment projections for 2025 (MUT 2019) and rose exponentially from the audit of the UoT in 2012 (CHE 2012) to the extent that growth had to be curtailed.

## **ii Teaching workload of academic staff impacting on research transformation**

With respect to this context, the findings revealed that participants overwhelmingly cited teaching workload to be heavy at MUT exacerbated by mandatory teaching of the same subjects to full-time students in the evening which impacted on research transformation. The teaching workload is the concentration of all numerous activities associated with teaching and learning, which an academic employee is responsible for within a prescribed timeframe. Whilst the focus at MUT is on teaching and learning, it was evident that most of the participants agreed that the disproportionate workload

was intensified for academics to oversee all the other academic administrative related issues. Anderson (2008) and Bates and Kaye (2014) corroborate with the research findings of this case study that academics were overloaded with several duties resulting in unrealistic deadlines and multiple competing priorities.

According to DHET (2017), the UCDP prescribes that transformation in universities should be inclusive of the three tenets of HEIs leading towards enhanced quality, success, and equity in universities. In as much as teaching and learning is one of the fundamental functions of an academic, changes to this concept have been introduced to increase research output and all academics were required to adapt to and comply with the directives of DHET (2017) in this regard.

The findings of this study are congruent with research policy observers and academics who have been vocal in their interests on the potential influence of teaching and research environments at Universities of Technologies (Peake and Mullings 2016). According to Petersen, Riccaboni, Stanley and Pammolli (2012), these concerns were commonly related to contemporary shifts in the institution with a push towards academic research, notwithstanding increased workloads, and the pace of change. Additionally, these findings were similar to research conducted by Kyvik (2013) at Norwegian universities where academic staff work extended hours by exceeding the time required as per the norms of the University.

### **iii Career prospects of academic staff**

The findings in this context identified career ambiguity as a problem that contributed to the low research output at MUT. Furthermore, the findings revealed that the participants would have been better left with teaching and learning, as the value for research was not necessary. Participants did not see the rationale behind focusing on research. Since it did not affect their personal career development, they disregarded the mandate of HEIs. This phenomenon occurs when the institution has not been able to map out a clear career pathway for its academic staff. However, Watermeyer (2015), argues that career progression is a distinctive character associated with academic excellence resulting from the productivity, rank and reputation of the academic as a

researcher. The data analysis revealed that because of a lack of initiatives and guidance on a career path from the employer, some participants were considering leaving the academia for industry. The findings of this study related to career prospects of academic staff by promoting a sense of belonging, personal development and confidence in their career paths that were lacking as supported by Lewis and Simmons (2010).

#### **iv Poaching of academics**

It was conspicuous that head-hunting and poaching were terms used interchangeably by participants, whilst there is a variation to their meanings. According to Deshmukh (2015), headhunting means attracting a person of your choice from competitors by offering lucrative packages to join your organisation. However, Gardner (2002) refers to poaching as offering a job to a competent person from the same industry as a competitor. The findings revealed that the private sector, herein referred to as the 'industry' was poaching highly skilled academics to work in their organisations. Their professional background leaves them with no option but to be lured by industry poachers, namely, government, private sector including other HEIs that are ready to offer attractive remuneration packages.

According to Shore and Wright (2016), the justification for academic poaching was based on reasoning and common sense to minimise expenditure and increase productivity by importing models of financial accounting into the internal governance of HEIs. Participants were of the view that whilst the DHET makes the demand on research productivity and additional vertical qualifications, then MUT should be ready to increase their salary once the demands were met. This is because, the industry would naturally poach the skilled academics and entice them with better financial benefits, reduced workloads and better conditions of work.

The key factor to appointing quality staff is to ensure that an institution can achieve its goals in relation to the three tenets of HEI. Academic poaching enables an institution to appoint a person who can best contribute significantly to MUT's research transformation goals. The poached academic staff with excellence in research productivity in the new

institution were generally compensated with higher remuneration packages including offering a higher-ranked position either as a senior lecturer, an associate professor or full professor. These findings are consistent with studies conducted by Gberville (2006), Ngoben and Bezuidenhout (2011) and Loomes, Owens and McCarthy (2019) on the poaching of academic staff when an institution does not have the necessary capacity to train and develop its own staff due to time and financial constraints. Moreover, the findings corroborate with the research conducted by Zusman (2005) in the USA attesting that PhD graduates were gradually seeking employment outside of academia.

## **v Sabbatical leave**

This case study uncovered substantive information regarding the human resource practices on sabbatical leave at MUT. The concept of sabbatical leave was identified in the literature as an enabler for research (Pagano and Pagano 2009; Davidson *et al.* 2010; Zahir and Fakhri 2011). However, the findings revealed that the academics at MUT were either unaware of the sabbatical policy content or not aware of its policy nor its meaning and importance.

The findings revealed that most of the participants did not understand how sabbatical leave was implemented at MUT. Despite the importance of sabbatical leave, the concept is misunderstood, misapplied and quite obscure at MUT. Therefore, Swenty *et al.* (2011) suggest that the subject should be researched further with firm clarity. However, the views on the sabbatical leave policy component are not consistent with extant literature (Furbish 2009; Miller, Bai and Newman 2012; Heathfield 2019; Bulilan 2020) who affirm that sabbatical leave policies are well established in other institutions, formalised, clearly articulated with strings attached, provides a win-win situation for both employers and employees to promote job satisfaction and pursue their research goals.

Forward-thinking institutions through their human resources and line managers advise academics on the meaning and appropriate time for taking sabbatical leave in their institutions for career development (Pillinger, Lemon, Zand, Foster, Merchant, Kimberly,

Allison, Cronstein, Galeano and Holden-Wiltse 2019). Traditional universities allow a year depending on the policy adopted by the institution. Sabbatical leave affords time for academics to conduct research or to attain vertical qualifications. It becomes a challenge if the HR department of an institution is either not fully *au-fait* with the sabbatical leave/policy or ignores its importance altogether.

## **vi Unawareness of research incentives**

The findings revealed that most of the participants at MUT were unaware of the types of incentives available whether internally or from external sources for studies or research transformation activities. Hence, their professional background leaves them vulnerable to other HEIs or industry poachers who are more than ready to offer attractive incentives. However, existing literature highlights that incentives meaningfully changed the behaviour of academics to accelerate research productivity at HEIs including knowledge spill overs and promoting University-industry collaboration (Woolgar 2007; Sempe 2017).

The findings arising out of the data analysis, in this case study revealed and discussed the various institutional and individual factors that contributed to low research output at MUT. Moreover, the findings of this case study were congruent to those by Johnson and Louw (2014) who highlight similar views on low outputs and research incentives. Thus it would prove beneficial for improving future research outputs at MUT. It also extends knowledge in the study of research transformation by identifying and classifying the reasons for low research output underpinned by institutional and individually driven factors.

In this section, the study aimed to unravel amongst its objectives, the factors that contributed to the low research productivity at MUT. The first research question of the study was achieved and supported by the data analysis illustrated in Figures 5.3 and 5.4. This finding is in line with conventional research on factors influencing research transformation and highlighted the challenges influencing low research output at MUT in South Africa.

## **7.4 CAPACITY BUILDING INITIATIVES AT MUT**

### *Response to research question 2*

In the context of this case study, the capacity building initiatives presently identified at MUT included research workshops and boot camps, research incentives, funding of international conferencing, and nGAP appointments. These were the initiatives participants believed were in place to assist MUT to transform into a research-oriented institution but were not fully utilised by the academics due to their personal commitments and challenges at MUT.

#### **7.4.1 Research workshops and boot camps**

The findings revealed that participants were aware of the available research workshops and boot camps and their associated benefits. Some staff do attend these research workshops. However, most of them do not attend due to their commitment and focus on teaching as per the academic workload timetable. Research workshops are invaluable, open learning activities that offer guidance to academics to augment the research experience and conceivable decision-making by developing both the human and intellectual capital to unravel knowledge and pursue research activities.

In research workshops, academics generally listen, while the facilitator of the workshop speaks generically being unaware of participants' level of research knowledge. Through constructive interactive sessions, value can be added to participants' research knowledge. These findings are consistent with research conducted by Davis and Sutherland (2008); Delgado-Verde, Martín-de Castro and Navas-López (2011); Karsy, Henderson, Tenny, Guan, Amps, Friedman, Spiotta, Patel, Kestle and Jensen (2018) who contend that the spin-offs from research workshops and boot camps can be vital tools to enrich discipline-specific knowledge, promote Doctoral graduates and scholarly output, increase capacity to offer new postgraduate qualifications, programme accreditation and reputation, simplify grant applications, and academic promotion.

#### **7.4.2 Research incentives**

The findings revealed that the research incentives for research productivity are inadequate due to the overwhelming time spent to publish quality articles in DHET accredited journals. Furthermore, it was noted that the research policies related to promoting research are at the developmental phase at MUT.

Studies conducted by Green, Hammer and Star (2009) and Cloete, Bailey and Pillay (2011) concur with the findings of this case study signifying that whilst teaching takes up the bulk of an academic's workload, the imposition on time for research productivity can be a constraining factor. Moreover, providing improved incentives for research productivity as a trade-off served dual purposes. Firstly, improved incentives can generate many publications in peer-reviewed journals from academics once they have obtained higher research qualifications. Secondly, research productivity raises additional income for the University.

#### **7.4.3 Funded international conferencing**

The findings indicate that academics are not funded to attend international conferences if they are not presenting which has a negative impact on research transformation for MUT. However, advocates of research capacity building have reinforced the view that networking, brainstorming and having intellectual face to face discussions at local or international conferences is a sure way to capacitate individual academics (Oester, Cigliano, Hind-Ozan and Parsons 2017; Mitlin, Bennett, Horn, King, Makau and Masimba Nyama 2019)

Furthermore, studies conducted by Sheety, Moy, Parsons, Dunbar, Doult, Faunce and Myers (2016) state that institutional and individual relationships and collaborations with other universities at conferences have proven to be efficient in fostering research development in universities. It is through these relationships and collaborations that talented employees are sought out and their resources harnessed. Further, conferences have a broadening and deepening effect as assets to researchers at various levels of capacity building initiatives.

The DHET mandates academics at each HEI to present a peer-reviewed conference paper and publish the conference proceedings in an accredited journal. Proceedings are published as evidence of presentation at a conference, congress, symposium or other colloquia to distribute their empirical research findings and emerging issues in specific disciplines.

In this context, the essence of the capacity building initiatives, which is to support academics to present at conferences to impart requisite knowledge and expertise, must be borne in mind by MUT. Where possible, internal obstacles to conducting and completing research should be fast-tracked as pointed out by the participants. The influence of these obstacles on research is also supported by Cele and Lekhanya (2014).

#### **7.4.4 nGAP appointments**

The DHET introduced a developmental programme to encourage young and upcoming academics and researchers in South Africa. The findings indicate that the nGAP programme is aimed at assisting MUT with staffing transformation and expanding on research capacity needs. This is radically transforming the higher education subsector of the South African economy. However, as revealed by the participants, very few staff are appointed as part of the nGAP programme at MUT. The findings of this case study are consistent with research conducted by Cele and Lekhanya (2014) attesting that the research office is an integral department of the governance structure within an HEI and is required to offer institution-wide expertise to individual academics, especially nGAP appointments to support vertical qualifications and research transformation of socio-economic relevance.

The above research-related capacity building initiatives are further supported by studies conducted by Lewis and Simmons (2010), and Chantiri (2010) promoting a sense of belonging and confidence that can assist nGAP academics towards their career prospects and professional development.

The findings of this study provided an assessment of the capacity building initiatives in place at MUT that were targeted at advancing positive research transformation. This



was aimed at highlighting prospective initiatives/interventions to capacitate academics including nGAP staff in their research transformation at MUT and improve the University's ranking by the DHET, CHE and NRF. Thus, the second research question of the study was achieved and supported by the empirical evidence towards the capacity-building initiatives as drivers towards the advancement of research transformation at MUT.

## **7.5 ENABLERS OF ACADEMIC RESEARCH TRANSFORMATION AT MUT**

*Response to research question 3.*

Enablers for research transformation in this case study are those institutional factors that empower individual academics to advance knowledge generation and innovation at the climax of the growth trajectory and prosperity. Scholars agree that HEIs must have ideal environments for research scholars to network to seek fresh insight in their pursuit of new knowledge creation (Altbach and Salmi 2011). An ideal environment should have non-academic personnel that perform distinctive roles in supporting relationship building between academics, students, graduates, prospective students, other members of staff (both academic and administrative), employers, recruiters, government and professional bodies. Moreover, it should also include the components of Salmi (2009) adapted model of the characteristics of a research-transformed University as illustrated in Figure 3.2 in Chapter Three.

This case study found several institutional enablers for research transformation at MUT which are discussed hereunder.

### **7.5.1 Buy-into upskilling by academics**

The findings revealed that all the participants held a Master's qualification whilst 60% of them were in the process of obtaining their PhD qualification. On the issue of vertical qualifications, the DHET mandated all HEIs in South Africa that the least academic qualification should be a Master's degree for all undergraduate courses. The requirement demands that all academics at MUT comply with specific timelines knowing that their tenure or promotion depends on compliance with the directive.

Furthermore, the findings highlighted that a few academics at MUT were conservative-minded and therefore resisted change. However, there is a need to transform and where the organisational members find it difficult to abide with the policy imperatives, they constitute serious impediments to research transformation at MUT.

The need to upgrade qualifications from first degrees to Master's and Doctorate degrees has become pertinent with regulation and policy by DHET. Although a few participants resist the qualification upgrading required for research transformation at MUT, the majority of academics seem to believe that the buy-in for upskilling would further enhance research transformation and research productivity. It was encouraging to note that MUT decided to follow this direction. Thus, when there is motivation towards research productivity, there is simultaneous updating of knowledge, and imperative towards 4IR skills elevation. Furthermore, these upskilling achievements lead to continuous upgrading of professional and intellectual development at all levels and the opportunity to bring this new research and the 4IR knowledge enhancement into the classroom.

The credibility of a Master's and a Doctoral qualification takes an academic to a higher level of knowledge dissemination and improvement towards research transformation. Moreover, the vertical qualifications broaden the mind in terms of critical thinking and change the teaching pedagogy in the classroom, including when engaging with the students and colleagues. Thus, critical thinking changes by providing new worldviews with systematic approaches.

Similarly, the effort to transform MUT into a research-informed University can only be successful and meaningful when the leadership of MUT is totally committed to the agenda of upskilling academics. The outcomes of upskilling academics will result in improved teaching and learning, and research transformation for the ultimate benefit of the academics, students, the local as well as the global economic sector in terms of knowledge creation and knowledge production.

Additionally, those academic staff appointed under the nGAP programme are assigned to mentors, who are internal staff members of the University or external research

retirees, charged with the duty of providing essential support to enable them to fast-track completion of their PhD qualification and develop them as emerging young researchers by grasping the fundamentals of research productivity. The DHET (2016a) views mentorship as a strategic enabler but this was highlighted as a shortcoming strategy at MUT, as the participants raised concerns about the scarcity of mentors.

It was assumed that an academic with a Master's degree was at a higher level compared to students who were at their undergraduate level. As a result, students trusted the academic's qualification and trusted him/her with their confidence, capabilities and the imparting of the relevant subject knowledge. This implies that all academics at the institution should further pursue vertical qualifications up to the PhD level, especially when MUT is also in the process of increasing its programme qualification mix [PQM] by offering postgraduate qualifications, for example, Master's and PhD degrees to encourage future financial sustainability.

Other key benefits of academic upskilling are to attain third stream income from research transformation activities for the University (i.e., contract research and commercialisation of research through partnerships with the corporate sector) which also attracts personal financial rewards. Additionally, an academic can strive to become competent and efficient towards supervision of postgraduate students. These benefits mean that having a Master's or a PhD qualification will help all academics to impart new knowledge and experiences to students. More importantly, this will lend impetus to promote research transformation.

Evidence from several authors postulate that academic's educational and professional accomplishments are positively correlated with research productivity, transfer of new knowledge to students, career progressions, including improved remuneration, promotion prospects and employment mobility (Boyd, Lankford, Loeb, Rockoff and Wyckoff 2008; Donaldson 2011; Newland and Byles 2014).

### **7.5.2 Structured mentoring and supervision**

The findings strongly revealed that mentoring and supervision is a matter of concern and needs to be addressed as stated by the participants. There are currently several academics pursuing their vertical qualification who require structured mentoring and supervision to begin a research trajectory. Furthermore, effective mentoring and supervision is the bedrock and culmination of research productivity. However, where mentors or supervisors come in short supply or managed in an ad hoc, inconsistent and unstructured manner, the result is that research transformation is delayed and loses its impetus.

Moreover, the findings highlighted the need for structured mentoring and supervision to enable academics to achieve more that is associated with vertical qualifications and to begin a productive research journey. Structured mentorship was exemplified and reinforced by Gardiner (2005), Darwin and Palmer (2009) and Karsy *et al.* (2018) as an important tool in effective research development.

Furthermore, the findings revealed that although the participants were assigned mentors to coach them in their research work, these mentoring approaches were not structured and proved ineffective in improving research transformation. Additionally, this study is aligned to the views of Pololi and Knight (2005) about the scarcity of mentors and further revealed a frequent misalignment of mentor/protégé relationship among the available mentors.

### **7.5.3 Reposition research**

The findings revealed that participants equally acknowledged the need and imperatives attached to repositioning research. Institutional priority to research transformation is obligatory for most UoTs in South Africa, with a quest to cope with national academic ranking, competition as well as to respond to the demands of globalisation forces.

HEIs are recognised as major contributors to knowledge-based organisations. HEIs are the hub of major knowledge processes such as knowledge creation, knowledge

dissemination, and learning. Research universities provide knowledge; however, there is a need to encourage knowledge collaboration among existing academic researchers and novice academic researchers.

Universities that are highly ranked are known for their specific characteristics, for example, high research output from both postgraduate students and academic staff with vertical qualifications. Financial grants and remuneration of research depend on how well a University performs not merely in terms of the quality of teaching and learning but by the volume of research output annually. The Technikons that converted to Universities of Technology need to face the new challenge that will make their University relevant for sustainability. To achieve this, repositioning research for those institutions, especially UoTs should be the primary imperative. As Harzing (2010) and Tuck and Yang (2014) rightly stated that the refusal to publish is viewed as professional academic misconduct.

These findings are consistent with studies conducted by Youtie and Shapira (2008) and Harle (2013) on the issue of repositioning research by collaborative initiatives within and external to the University including international networks.

#### **7.5.4 Publications and citations**

The findings of this case study revealed that providing enabling conditions to foster high publications and frequent citations are positive enablers towards research transformation. A proven way of developing research is through academic writing, whilst publishing is an important aspect of the academic community at any HEI. To be skilful in academic writing, researchers need to attend publication writing workshops. Writing courses prepare researchers towards free writing (a short period of exploratory writing) and generative writing (a short period of focused writing) as suggested by Botshon and Raimon (2009). Furthermore, at the writer's meetings, articles published in accredited journals are analysed, exposure to the differences between journals, types of publications, research types, the target audience, methodologies and styles of writing are explained. The essence of the writing courses is to enable researchers to publish articles. Publication in peer-reviewed journals is a measure of research skills

in the HE sectors whilst the frequency of citation is a measure of the use and impact of the published article.

The findings of this case study coincide with research conducted by Tourish (2011) emphasising that there is always pressure on academics to publish in DHET accredited journals. Publications in peer-reviewed journals is a measure of research productivity by the DHET, whilst the frequency of citation is a measure of the use and impact of the published article. Similar findings have also been reported by Murray, Steckley and MacLeod (2010) and Monroe, Kumar and Hailemichael (2012) indicating that changing the behaviour of academics regarding academic writing for publication support and recognition could enable them to engage with and be inclined towards improving research productivity.

#### **7.5.5 Buy-into research transformation by Executive Management**

The findings as revealed by the participants highlighted that not much attention was paid by academics and Executive Management to research productivity since MUT was predominantly a teaching-intensive institution. Since becoming a UoT, it thus became imperative that research productivity and research output deserved the recognition and platform by academics. However, the success of research transformation at MUT originates from buy-in from the effectiveness of transformational Executive Management filtered down to mobilising commitment by Deans of faculties, Heads of Department and academics. Moreover, the Executive Management at MUT should be recognised as transformational enhancers of success to encourage and accelerate research outputs by academic staff.

Furthermore, Simplicio (2011) posits that transformational leaders in HEIs are pivotal in a knowledge changing society providing good morale and uplifting the status of the University by creating a nurturing environment for research transformation by maximising available resources. Moreover, studies conducted by Rouse (2016) and Herbst and Garg (2017) concur that institutions require a quantum leap of excellent top-down transformational leadership as drivers of change. Thus, this will ensure that research transformation at MUT becomes aligned and embedded into a new institutional culture with actionable deliverables built into the workload of academics.

However, several HEIs in SA undergoing administrations for various reasons including poor governance (CHE 2016) and thwarted by weak and ineffective leadership (Seale and Cross 2016) are confronted with transformation challenges that require extraordinary visionary executive leadership (Mouton, Louw and Strydom 2013; Ngcamu 2015).

Research universities are institutions recognised as domains of knowledge creation, knowledge processes, knowledge dissemination and knowledge learning (Trifonova and Ronchetti 2006). A University that seeks advancement and growth must have a strategic approach to managing knowledge. A proper assessment of research knowledge and capability by the University Executive Management will enable the institution to implement enablers that will permit growth (Tan and Noor 2013). The enablers postulated in this study are intended to catalyse the research capacity of the University. Additionally, Tan and Noor (2013) supported the notion of using enablers to support research activities in an institution.

The findings of this case study support and extend the frontiers of knowledge by identifying challenges hindering positive research productivity, enabling strategies and making firm commitments to fast-track research transformation and accelerate research outputs in peer-reviewed journals.

## **7.6 CRITICAL FACTORS TO SUPPORT A RESEARCH CULTURE**

### *Response to research question 4*

The success of a research culture at any HEI is dependent on critical factors towards institutional support to enable academics to engage in research transformation and promote research productivity. The findings from the analysis of data revealed the following critical factors to support a research culture.

#### **7.6.1 Employ support staff and tutors**

The findings arising from the interviews of the participants revealed that the academic staff were overstretched with academic administrative obligations leaving them with virtually no time to engage in research transformation. Whilst a few tutors are currently linked with academic staff at MUT, their appeal for additional support staff and tutors

would relieve them of the overload of academic administration, assisting their peers as well as at-risk students. Moreover, it will enable academics to focus on publishing in accredited journals.

Support staff and tutors in a University are those who assist and capacitate academics in performing and accomplishing their responsibilities. This assistance includes general office management, tutoring services to students, assisting academics with marking, compilation of reports/clerical work (including maintaining records and capturing data), or a variation of other assignments. Studies conducted by (Chan 2012), Bray (2013), Hartmann (2013) and Abbot, Graf and Chatfield (2018) concur that tutors have become a standard and requisite component of the education process. Furthermore, studies conducted by Owen (2011), Christie (2014) and Mayet (2016) highlight that hiring of tutors reduces some of the workload of academic staff whilst concomitantly improving the academic competence of at-risk students.

#### **7.6.2 Review of the workload model**

The findings on the academic workload revealed that they were excessively burdened with the workload, compounded by lecturing the same subjects in the evening classes for consistency. Furthermore, the workload model revealed that it cannot be a one-size-fits-all solution that can be applied to all academics given that other extraneous factors need to be considered. A theory-based lecture in a normal setting attracts a larger class size than a lecture with a practical session in a laboratory. Notwithstanding the fact, that a large class size comes with its attendant academic administrative burdens which acts as an impediment to research productivity among its academic staff.

The findings correspond with research conducted by Boyd (2014) on the challenges and the implementation of an effective workload model, especially larger student cohorts, and demands for demonstrable research productivity. Similarly, Barrett and Barrett (2009) conducted research on the management of academic workload and found that in many cases a unified workload model does not really impact on practice within different departments and faculties.



### **7.6.3 Career prospects**

The findings revealed that academics were unsure of their career prospects after acquiring a vertical qualification. Concerning their career prospects, most young staff including nGAP appointees focus very little time beyond an academic career. Hence, they must be provided with the requisite in-depth research training skills at the outset that will enable them to grow, and flourish in research productivity at MUT. Furthermore, having acquired their vertical qualifications embedded with well-grounded research training skills will keep these academics motivated and encourage them to remain at MUT and pursue further higher qualifications.

It is fundamental that academic staff be mindful of teaching and research since vertical qualifications go hand-in-hand with career prospects and promotions, namely, climbing the academic progression ladder from a junior lecturer, lecturer, senior lecturer, associate professor to full professorship and obtaining higher levels of intrinsic job satisfaction. Furthermore, the higher promotion levels focus heavily on research productivity than teaching proficiencies at HEIs. The studies conducted by both Van Balen, Van Arensbergen, Van Der Weijden and Van Den Besselaar (2012) and Van der Weijden, Teelken, de Boer and Drost (2016) highlighted a lack of systematic career policies and related factors which resulted in either staying or exiting academia. Furthermore, studies conducted by Sharma and Jyoti (2009) and Ng'ethe (2014) concur with the findings of this case study asserting that promotion opportunities do arise; nonetheless, procedures are time-consuming, rather stringent and which then frustrate the academics. Moreover, the focus on promotion to higher levels at a HEI, focuses more on the academic's track record of publications in peer-reviewed journals by academics.

### **7.6.4 Research culture**

With regards to research culture, the University cultural landscape worldwide is characterised by changing technologies, knowledge production and research outputs coupled with research collaboration. The emergence of online learning institutions, courses and programmes bring to the fore the need to 'innovate or die'. UoTs must transform to the challenges of competition, research productivity and its relevance in

the global economy. However, little or no evidence is available to show how academics at UoTs perceive these changes (Ion and Castro Ceacero 2017).

The findings of this study concur with the research study conducted by Bernhardt, Andrew and Walker (2011) and Mtshali and Sooryamoorthy (2019) affirming that academics had difficulties transitioning from their Technikon mind-set of teaching and learning to a research-informed UoT with limited advancement towards research productivity. Hence, the need to create a research culture and ethos demonstrated by the mission for efficiency and competitiveness at all levels of the institution is paramount. The results correspond with research findings presented by Cele and Lekhanya (2014) at a UoT underscoring that a research culture in practice includes rewards and recognition of quality research, identification of good research models and administrative support.

Hence, the challenges of institutional changes are fundamental to many of the Technikons that were converted to Universities of Technologies in South Africa as concurred by Chetty (2003), Schultz (2009), Parliamentary Monitoring Group (2011) ) and Cele and Lekhanya (2014). Their findings are beneficial in designing interventions to sustain a vibrant research culture and innovations to address the mind-set of employees especially those that have been in the employment of MUT before the transition from a traditional Technikon to a UoT. Furthermore, Kokt (2015) concedes that it is imperative that UoTs shift away from the traditional teaching culture and entrench a new research culture of continuous innovation and research productivity amongst its academic staff.

#### **7.6.5 Awareness of incentives**

The findings revealed that many academics were not fully aware of all the types of incentives available for research productivity. They stated that incentives should be formulated and conveyed to all staff members so that they can be motivated intrinsically towards research transformation and allow MUT to accordingly incentivise those academics who engage in research productivity. Furthermore, reward systems and procedures must be transparent, clearly articulated and administered, to set a trend for existing academics as well as young emerging researchers. Provision of financial

incentives and gain sharing as forms of gratifying incentives schemes are strategic interventions to promote research transformation and more importantly to retain established and talented research academic staff.

The findings of this case study support the research conducted by (Lach and Schankerman 2008), Caldera and Debande (2010), Hicks (2012), Javed and Liu (2018) and Osifila and Aladetan (2020) who highlight that comprehensible and coherent University policies related to awareness of research incentives conveyed to the University community as a key component will increase research productivity. Furthermore, Mason and Watts (2009) state that traditional economic theory has championed the view that academics will improve and increase research productivity in response to regularised incentive schemes with financial gains.

#### **7.6.6 Improve remuneration package**

Arising from the data analysis, the findings revealed that talented academics and researchers as knowledge producers would leave MUT if the current remuneration packages were not attractive especially after obtaining vertical qualifications, leading to a brain drain. Furthermore, an improved remuneration package is one of the key motivational factors to encourage academics to perform better, increase their level of job satisfaction and remain loyal to MUT.

These findings corroborate with the studies conducted by Waswa and Katana (2008), Sharma and Jyoti (2009), Kipkebut (2010), and Ng'ethe (2014) who confirmed that academic staff were not satisfied with the remuneration packages which contributed to one of the fundamental reasons to exit academia in pursuit of other alternative lucrative options. Additionally, Habib and Morrow (2007) concur that without attractive remuneration packages, the top end of the graduate pool is unlikely to be attracted to academia as a profession.

#### **7.6.7 Recruitment and retention of talented academics**

The findings revealed that MUT was not doing enough to attract, recruit and retain talented academics. An institution that is committed to sustaining a teaching and learning ethos and revolutionising research transformation needs to commit to staff

retention. Furthermore, the sustainability of the institution depends on the strength of its human resource, namely, the high calibre of academics who are focused on research outputs, innovations and research transformation at MUT.

The globalisation phenomenon has put pressure on HEIs to deliver an educational experience that prepares students for global markets and mobility (Caligiuri and Bonache 2016). Achieving this goal is facilitated by the internationalisation of knowledge workers (i.e. academic staff) who function as “service providers,” and are the key source of competitive advantage in knowledge-intensive service industries (Brock 2012; Thomas, Lorange and Sheth 2013). Due to the globalisation phenomenon, labour is more mobile in contemporary times thereby tasking HR practitioners with the challenge to design ways of attracting and retaining skilled personnel. Organisations that do not have cutting edge retention strategies stand the risk of losing qualified skills (Noe, Hollenbeck, Gerhart and Wright 2017).

However, the challenge of retaining talented academics in universities is a global problem. The findings concur with the literature on the implications of poor retention strategies by Allen, Bryant and Vardaman (2010) that adds value to the initiatives on the transformation of MUT to be a research-informed University. Additionally, studies conducted by Hughes and Rog (2008), Mupemhi and Mupemhi (2011) and (Adi 2012) support the findings of this case study reinforcing the view that the University sector is increasingly challenged to attract and retain suitably qualified and experienced academics. Their reasons advanced other factors, namely, uncompetitive remuneration packages, poor working conditions, inadequate research opportunities, poor fit with the institutional culture, competition within the public and private HEIs and that the total remuneration package offered in the corporate sector exceeded that of the UoT sector. For any field or discipline to grow, both human and intellectual capital must be employed and developed to produce innovative knowledge and reduce the professional research-practice gap (Delgado-Verde, Martín-de Castro and Navas-López 2011).

### **7.6.8 Formalised sabbatical leave policy**

The findings on sabbatical leave arising from the data analysis revealed that participants had unclear and mainly personal interpretations of how sabbatical leave was applied at MUT since it had not been discussed frequently nor communicated transparently. Some participants were even unsure whether a sabbatical leave policy existed or even implemented. Moreover, at MUT there is only one application form available to complete for long leave, ring-fenced leave and sabbatical. From the perspective of the participants, this indicates that a formalised sabbatical leave policy is non-existent at MUT. Studies conducted by Miller, Bai and Newman (2012) found that many universities did not mention sabbatical leave policies on their websites.

The inherent benefits of taking sabbatical leave are to improve academic staff qualification, conduct research activities, plough back that knowledge to the students and allow the University to benefit by accelerating research transformation. Sabbatical leave for distinctive research determinations enables an academic to be removed from one's comfort zone of daily activities to engage in a fresh perspective on research productivity. However, this means that there should be clarity on the types of leave available at MUT, as there is no clear understanding of the differences operationalised in the current process as alluded to by the participants.

## **7.7 IMPLICATION OF FINDINGS ON PREVIOUS RESEARCH**

The results obtained in this study complemented the research conducted by Cele and Lekhanya (2014), on the research output at a University of Technology. According to their results, a lack of research writing skills, lack of financial incentives, poor retention strategy, and institutional workload were rated high as primary institutional contributors to low research output. Furthermore, lack of motivation, lack of financial incentives, personal and family circumstances were rated high as individual contributors to low research productivity (Cele and Lekhanya 2014). The findings of this case study show that both individual academics and MUT as a UoT have played marginal roles in improving the research output.

The perceptions of participants in this study revealed a preference for teaching and learning instead of research. A study conducted by Maxwell (2012) documented how to improve research productivity by early injection of initiatives since the academic staff of the University of New England (Australia) preferred teaching and learning to research. Thus, critical factors to support a research culture need to be implemented towards research and development. In supporting a research culture, three major issues are to be considered, namely, people, settings and activities (Brownson *et al.* 2017). Therefore, the initiatives suggested in these findings should be harnessed and sustained in supporting a research culture as drivers to transform research activity, both individually and institutionally at MUT.

Strategic ideas are to be generated by the community of researchers from time to time to meet the short- and long-term challenges of research activities in universities. Janowicz-Panjaitan and Noorderhaven (2009) supported the notion that knowledge support practices were important to overcome the research limitations confronting academic staff members to develop acceptable long-term research strategies among University researchers.

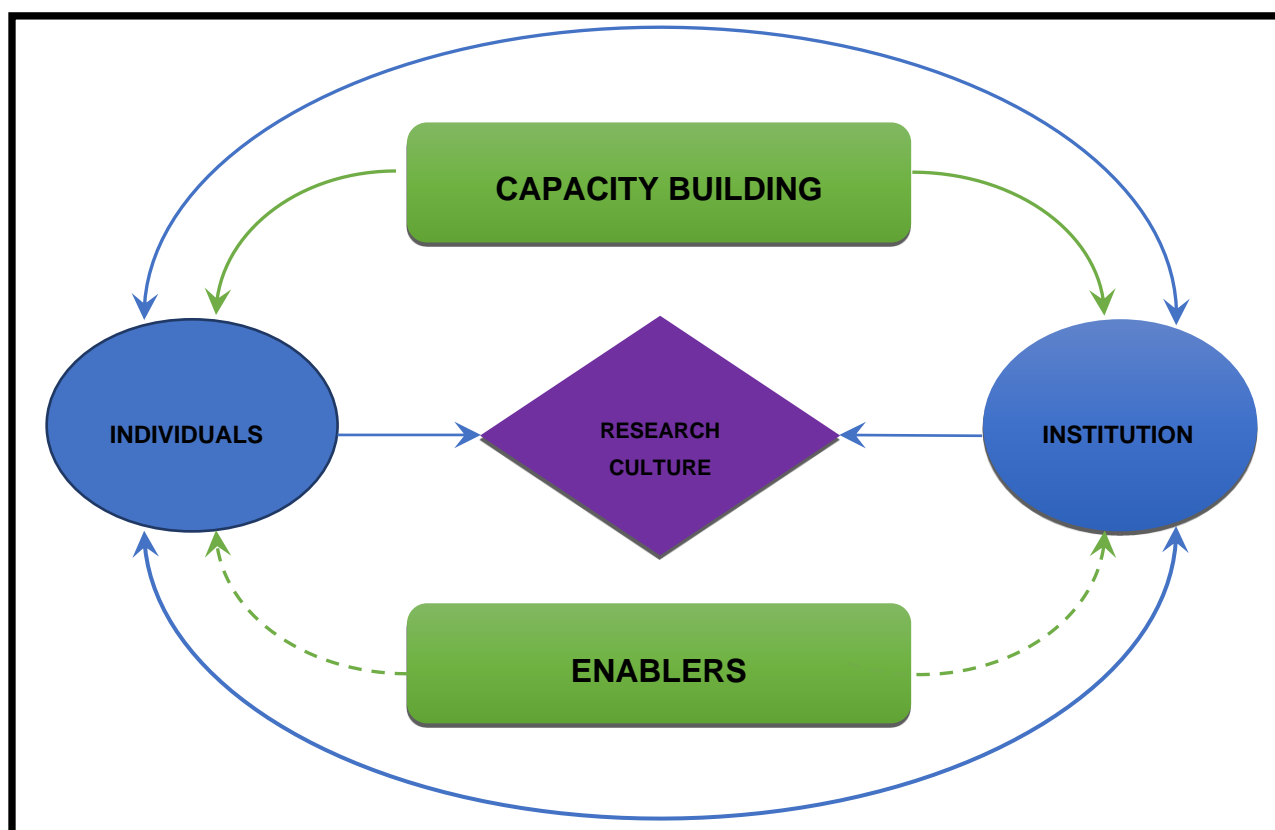
## **7.8 PROCESS TRANSFORMATION**

In order to improve on the research output at MUT, the relevant theories, frameworks and models that can be implemented to address the challenges of low research output need to be studied and evaluated. The following transformational concept, namely process transformation has been used and proven to be effective in the higher education sector by a Dutch University (De Boer, Enders and Leisyte 2007). The indicators for process transformation are more pertinent for institutional transformation and operational criteria. The concept of process transformation aligns with the result of this case study because it allows institutional capacity building and enablers as tools towards research transformation at MUT (Greenwood, Hinings and Whetten 2014). The research transformation translates to process transformation, related results and the underlying meaning of professional work (De Boer, Enders and Leisyte 2007). The concept underscores the following six indicators of research transformation at MUT:

- i. associated change on the systems level;
- ii. creation or development of new University reforms;
- iii. creation of new organisational culture and ideology;
- iv. interactive changes that influence institutional and individual levels;
- v. reconfigure power relationships within the University; and
- vi. changes in the delivery mode and services provided by the University.

It takes the implementation of all the above indicators to fulfil and complete institutional research transformation. Worthington and Lee (2008) concede that the injection of these perspectives to a University reform will change the research landscape of the University. Hence, the aim of applying these transformational concepts is to improve research productivity at MUT, build individual and institutional capacities, encourage research-related activities and develop a strong research culture.

## 7.9 A PROPOSED SYSTEMS MODEL FOR RESEARCH TRANSFORMATION



**FIGURE 7.1 A PROPOSED SYSTEMS MODEL FOR RESEARCH TRANSFORMATION**

**SOURCE:** Self-generated (2021).

Figure 7.1 above illustrates a proposed systemic model for research transformation which would be subject to refinement and further development in the future. The diagnostic analysis identified problems faced by the institution regarding its low research output (*inter alia*, massification of students, increased workload, lack of guidance on career prospects, poaching of academics, explicitness on sabbatical leave and unawareness of research incentives). Furthermore, the diagnostic analysis identified complacency by academics to expedite a research culture due to operational conditions ((*inter alia*, the bulk of the time was concentrated on teaching due to increased student enrolment and quality of students at enrolment, time constraints to improve on vertical qualifications, lack of initiatives on career prospects, lengthy funding approval processes and unconducive research environment to establish a research culture).

Moreover, Figure 7.1 encompasses capacity building initiatives (*inter alia*, research workshops, research incentives, funded international conferencing and nGAP appointments) and enablers of academic research transformation (*inter alia*, buy-into upskilling by academics, structured mentoring and supervision, reposition research, buy-into research transformation by Executive Management) were intervention factors initiated by Executive Management to strengthen research transformation towards research excellence in this study at MUT.

## **7.10 CONCLUSION**

This chapter discussed the outcomes arising from the data analysis which proved invaluable to give credibility, trustworthiness and legitimacy to the empirical findings of the study. Moreover, the findings revealed the analysis of the participants' interviews and institutional data in accordance with the four research questions. The overall findings in this case study revealed that thus far, research transformation at MUT is an individual activity, amongst a few academics, which has not yet evolved to become fully institutionalised. This implies that faculties and departments with their respective managers at MUT are yet to forcefully incorporate research transformation practices as an imperative of HEI. Furthermore, the bulk of an academic's workload is devoted towards teaching and learning activities compounded by high staff/student ratios, impacting adversely on research transformation. Academics need to be cognisant that



despite MUT being primarily an undergraduate HEI, focusing on teaching, research initiatives are being made in most departments to offer post-graduate qualifications. Hence, a fundamental reason for academics to upgrade into vertical qualifications and acknowledge that research productivity should be underpinned by a research culture as an imperative of MUT as an HEI.

Academics need to be familiar with all the capacity building initiatives and enablers that exist within MUT to promote research transformation. Whilst funding and incentives are available, these need to be transparent and communicated institutionally for the purposes that they are intended, for example, improving vertical qualifications, post-Doctoral appointments, research productivity, conference presentations, research training workshops, research productivity and replacement of academics, amongst others, despite being impeded by institutional bureaucracy and approval processes. Finally, since this was an in-house investigation at MUT as a sole UoT, caution is expressed that the analysis of data and concomitant findings cannot be generalised to other UoTs or HE Institutions as situational factors differ in each case. The final chapter provides the conclusions and recommendations emanating from the empirical analysis of the data. The limitations of this case study and suggestions for future research are also highlighted.

## **CHAPTER EIGHT**

### **CONCLUSION AND RECOMMENDATIONS**

#### **8.1 INTRODUCTION**

The previous chapter discussed the findings from the data analysis related to the focal issue of research transformation at MUT. This chapter provides the conclusion, contribution of the study, pertinent recommendations as well as the limitations to the case study. The chapter ends with directions for future research by other scholars.

As a prelude to highlighting the conclusion and recommendations, it is necessary to give a brief overview at this juncture for the reader to grasp the fundamental pedagogical overview of this case study. This was an in-house study conducted at MUT. The aim of this case study was to explore and develop a composite qualitative System Dynamics (SD) Casual Loop Model as an iterative process with related Casual Loop Diagrams (CLDs) comprising of fragmented adaptations aligned to research transformation amongst academic staff at MUT. The background of the study foregrounded the mergers of former Technikons and traditional Universities into one coherent HE sector as per the mandate of the Higher Education Act (DHET 1997) as an imperative to transform the Higher Education landscape in South Africa post 1994. The merged Institutions were called Universities of Technology (UoT). However, given situational factors, Mangosuthu University of Technology (MUT), remained unmerged as a single stand-alone HE Institution in South Africa with its own mission focus which in terms of its own core vision was a teaching and learning Institution (Chapter 2).

As a precursor, this accentuated the deficiencies of the problem statement which then exposed the deleterious challenges that faced MUT as a single entity in the HE sector, when compared to other merged UoTs. In particular, the problem statement in this case study, identified research transformation at MUT as a major impediment in terms of the mandates of the DHET (2013). As a consequence, the problem identified with its concomitant challenges at MUT was exacerbated in relation to, *inter alia*, research transformation, staff who lacked higher vertical qualifications up to Masters and PhD

profiles, lack of financial incentives, low research productivity, lack of a clearly defined research culture and low research outputs (Chapter 1).

The Research Questions are highlighted *seriatim* under the main overarching headings and themes in this chapter to show sequential linkages and flow of the discussion that ensued. This was followed in conjunction by the recommendations and suggestions emanating from the interview responses of the individual and focus group participants in this chapter in relation to the various main headings and sub themes, which were consolidated into a comprehensive analysis of data (Chapter 5).

A qualitative System Dynamics (SD) research methodology was utilised for this case study and supported by the Causal Loop Diagram (CLD). The perceptions of both academic participants' reflections and institutional factors were espoused when leveraging research transformation at MUT using the system thinking paradigm as well fifteen participants and a focus group of six participants were purposefully selected from the three Faculties. An inductive qualitative approach to this case study was adopted to determine the causal effect between variables from a human lens perspective. An Interviewing Schedule (Annexure D) with a list of open-ended questions was compiled by the Researcher to interview both the individual participants and the identified focus group (Chapter 4).

With regards to the brief theoretical constructs, this case study examined the relevant literature in terms of research output at public HEIs, the individual and institutional factors contributing towards the low research output at MUT, capacity-building initiatives and enablers to improving research transformation. Additionally, critical factors to support a research culture at MUT were further explored and expanded upon.

## **8.2 CONCLUSION**

The aim of this case study was to explore and develop a composite qualitative System Dynamics (SD) Causal Loop Diagram (CLD) associated with research transformation at MUT in South Africa. With regards to the brief theoretical constructs, this case study examined the relevant literature in terms of research output at public HEIs, the individual and institutional factors contributing towards the low research output at MUT,

capacity-building initiatives and enablers to improving research transformation. Additionally, critical factors to support a research culture at MUT were further explored and expanded upon. Moreover, the literature analysed statutory documents and related policy frameworks that regulated the HE sectors to implement relevant practices which impacted on the aim of the case study.

The empirical analysis steered by the research questions examined all the variables under each research question which underpinned rigour into the qualitative aspect of this case study in developing the composite qualitative SD CLD. This original contribution paved the way for numerous empirical findings that evolved from the analysis of the data which were specific to this case study. More importantly, these findings were corroborated by previous researchers and authors who had undertaken similar studies and had either supported or expressed other divergent views on the results of the current case study at hand.

### **8.3 CONTRIBUTION OF THE STUDY**

The application of the System Dynamics CLD provided a scientific contribution to the body of knowledge in this field of research endeavour. The distinctive application of the qualitative SD methodology with CLDs in this case study via inductive inquiry unearthed the importance and benefits of research transformation at MUT. The advantages of the CLDs in fragments demonstrated the feedbacks between variables as being dominant and persuasive regarding a particular variable or issue. Subsequently, the combination of the fragments of CLDs into a composite Model, culminated in how each of the constructs related and influenced one another. However, the more intricate the Model became, the more difficult it was to ascertain the overall behaviour of the system over a particular time. Thus, it is at this stage, the utilisation of computer modelling would have provided a better understanding of the SD model. However, this case study did not pursue this latter option because the researcher was a novice at SD modelling and more time would have been required to progress to the computer simulation stage. To this end, this was not a major shortcoming as by extension, this exercise would have proved to be too longitudinal in nature and a fruitless endeavour at best. More importantly, the comprehensive data analyses already showcased the significant correlated qualitative responses from the

research participants for each of the Research Questions and the main headings pertaining thereto (Chapter 5).

Thus, Table 8.1 illustrates the five steps in the SD modelling as an iterative process that was deployed to understand the real problem (Sterman 2000), as it pertained to the research transformation and research productivity at MUT. Furthermore, SD modelling process could be utilised cautiously as a valuable intervention to stimulate further discourse on research transformation by reviewing policies, processes and structures clearly articulated with the imperatives of other research transformation initiatives for effective administration and implementation within MUT (Table 8.1).

**TABLE 8.1 FIVE STEPS OF THE MODELLING PROCESS**

<b>STEPS</b>	<b>PROCESS</b>
<b>1. PROBLEM ARTICULATION (Selecting the boundary)</b>	Engaging with the various sources of the literature identified the need for research transformation at MUT integrating the rich picture as per Figure 2.1
<b>2. DYNAMIC HYPOTHESIS</b>	The empirical analysis and mental models of the participants led to the construction of the CLDs through an iterative process influencing dynamic behaviour between the variables.
<b>3. FORMULATION OF THE MODEL</b>	The fragments of the CLDs enabled the construction of the composite qualitative SD model.
<b>4. TESTING AND EVALUATION OF THE MODEL</b>	The qualitative SD model was tested and validated as an iterative process by gauging the correctness of the loop polarities by linking them with the relevance of actual institutional data.
<b>5. IMPLEMENTATION OF THE FINDINGS</b>	The findings revealed an important dynamic problem of research transformation at MUT. The qualitative SD model with CLDs provided a deep understanding and knowledge about the structure and behaviour of the system. The implementation of the findings is provided by way of recommendations and suggestions hereunder to target leverage points.

**SOURCE:** Sterman (2000: 87). Adapted.

The research transformation agenda at MUT is multidimensional and further compounded by several additional factors as illustrated and discussed in chapters 5, 6 and 7. This case study applied a holistic systems thinking approach to address the individual, institutional, cultural and policy transformational variations to proactively

implement the research transformation agenda at MUT. Hence, the application of a holistic systems thinking approach was to ultimately improve MUT's research output ranking in the HE sector. Furthermore, MUT required resilience in positive attitudes from all academic staff towards research transformation to yield research productivity and research outputs. As a consequence, however, research transformation will not materialise if the same mind-set and approach have been applied over the years. Conversely, it is envisaged that this case study will provide a constructive stimulus towards the imperatives of research transformation at MUT.

## **8.4 RECOMMENDATIONS FROM THIS CASE STUDY**

The core recommendations and suggestions were extracted from the detailed analysis of the empirical findings at the time of this case study and are proposed hereunder based on the four research questions.

### **8.4.1 Recommendations relating to Research Question 1**

*1. What are the contributing factors to the low research output at MUT?*

#### **8.4.1.1 Academic staff qualifications**

It is suggested that Executive Management at MUT should encourage and support academics to complete their respective qualifications within the stipulated timeframe. Furthermore, Heads of Department together with Faculty Deans should monitor the academic staff qualifications especially those requiring assistance to complete their Master's or PhD qualifications. Thus, obtaining vertical qualifications has a leveraging effect on knowledge creation, related benefits for students and research transformation whilst contributing towards research outputs at MUT.

#### **8.4.1.2 Funding approval processes**

It is recommended that the Research Office should regularly inform staff regarding research funding opportunities in advance to assist staff with timeous submissions of applications and relevant documents to meet the prescribed deadlines. Furthermore, sharing of information from senior researchers may also lead to positive insights

amongst staff to ease the funding approval processes or bottlenecks and inspire research transformation at MUT.

#### **8.4.1.3 Career prospects of academic staff**

It is suggested that the respective HODs and Faculty Deans should guide their staff who intend to remain in academia regarding their career trajectory, promotion opportunities and research proficiencies.

#### **8.4.1.4 Focus on Teaching and Learning**

Whilst most of the participants were delivering on their primary academic duties and responsibilities inherited from the Technikon era, they neglected the research component when MUT converted to a UoT. Therefore, it is suggested that Executive Management at MUT should host several intensive research-related programmes for academic staff to emphasise the significance of research transformation, research productivity and research outputs in various Faculties at MUT.

#### **8.4.1.5 Large student numbers**

The access and demand for post-school education in SA has led to massification of education followed by resultant increases in student to staff ratios which do not augur well in assisting students who are at-risk as well as impacting negatively on research transformation. Thus, it is recommended that Executive Management should re-examine student enrolments to ensure manageable class sizes are allocated to academics to further promote research transformation at MUT. Conversely, Executive Management should appoint additional talented staff to ameliorate the current situation with regard to large class sizes.

#### **8.4.1.6 Poaching of academic staff**

Poaching of academics within the HE sector has become a free market economy linked with substantial costs for the current employer when academics resign from an institution. Additionally, HEIs are attempting to identify and entice academics with outstanding research productivity portfolios whose performances are especially acknowledged in the scientific community and in the public domain including names

on registered patents. Considering MUT's low national research output ranking in the HE sector, it is suggested that Executive Management should consider offering prospective academics worthwhile financial packages to raise the stature and eminence of MUT by retaining talented staff.

#### **8.4.2 Recommendations relating to Research Question 2**

*What capacity-building initiatives are in place towards the advancement of research transformation for MUT?*

##### **8.4.2.1 Research workshops and boot camps**

Since research transformation needs to be high on the agenda of MUT, it is recommended that Executive Management together with the research office should offer specific formalised courses with assessment and certification in research methodology, statistical software, for example, SPSS usage, coding for software packages, for example, Atlas TI and NVivo. This could include guidance on a poster presentation, publication workshops, grant writing proposal for external funding. Furthermore, extended research training programmes should be offered for PhD students that enhances self-efficacy and mastery towards research productivity and research output which is the main driver of HEIs. It is suggested to the Research Executive Management together with the Research Office that targeted training in the form of research boot camps over extended periods or block relief are essential factors that should be regularised to target junior, Black females and young academics as well as novice researchers for the growth of established productive researchers at MUT.

##### **8.4.2.2 Funded international conferencing**

It is suggested that Executive Management should create and improve formal and informal broad inter-institutional research collaborative initiatives amongst the four public HEIs regionally (MUT, DUT, UKZN and UZ), nationally and internationally on an ongoing basis to promote research transformation. Moreover, in developing the capacity of the academics, funding events that facilitate networking with colleagues elsewhere, such as attending and presenting papers at symposia, seminars, conferences and inductions should be encouraged by Executive Management. These benefit academics to keep abreast of ongoing and emerging issues in their area of



discipline. Additionally, scholars should also note that through social media networks, they could join professional groups which constantly engage in social dialogues or chat groups on contemporary issues in the different fields of research transformation.

Recently, due to the COVID-19 pandemic crisis, many networking opportunities and conference presentations were conducted online via an online Zoom platform which was a saving of institutional costs in terms of funding for registration fees, travel, accommodation and subsistence amongst others. Thus, Executive Management should encourage academics to attend or participate in these online local and international conferences.

A further recommendation to Executive Management should be the establishment of an international office at MUT to improve research transformation by exploring new endeavours for interdisciplinary collaborative research within the institution as well as other HEIs locally, nationally and globally with the developed and developing countries in the emerging areas of research. Furthermore, collaborating with industry research laboratories or units will leverage staff to a platform of vital exposure towards the work culture and state of the art facilities that are available and accessible.

#### **8.4.2.3 nGAP appointments**

These are early career staff in academic pursuit who should be afforded a solid research foundation to enable them to contribute passionately towards research productivity. Thus, it is suggested that Executive Management together with the research office at MUT should source additional funding opportunities for nGAP appointees to enable them to participate in research productivity as well as in pursuit of higher vertical qualifications and research outputs to sustain their own academic growth trajectory at MUT.

It is further suggested that a test for a potential trade-off between research and teaching and nGAP academic staff pursuing a PhD qualification should be governed by investigating three interwoven influences for self-career gratification and research transformation. Firstly, confidence that the PhD training programme has prepared them to become a researcher. Secondly, self-assurance in their ability to translate and

communicate their research findings. Thirdly, the number of peer-reviewed publications that can be produced from their PhD studies. Subsequently, these three influences have positive outcomes for retention in research careers for the nGAP staff. Thus, it is crucial to building confidence for nGAP staff in their research productivity as a critical component of a successful research career. Other potential environments where resident research can be fostered could include the junior resident boot camps for nGAP staff.

### **8.4.3 Recommendations relating to Research Question 3**

*What are the institutional enablers for academic research transformation at MUT?*

#### **8.4.3.1 Buy-into upskilling by academics**

It is recommended that the MUT Executive Management should increase the incentives for vertical qualifications as a means of upskilling academic staff. This would materialise into being a driving force towards improving research transformation at the University. The incentive could take the form of an incremental monetary benefit, ad hominem promotion to a higher level or additional incentives.

Moreover, there should be targeted and tactical approaches designed to induce the buy-into upskilling of qualifications by academics to promote research transformation and the buy-into upskilling to fit into the emerging 4IR as well as the emerging 5IR and 6IR.

#### **8.4.3.2 Structured guidance on mentoring and supervision**

This case study exemplifies mentoring and supervision as an operational tool to improve research productivity by assigning suitable mentors to protégés (mentees) to facilitate research transformation efficiently since mismatch can be costly in time and money for both parties. Currently, there exists at MUT a few active retired research professors. It is suggested to Executive Management that there is a need to hire additional productive retired researchers to accelerate research productivity and research outputs. Furthermore, it is recommended that Executive Management should identify seasoned academic researchers to provide dedicated time (not on an ad hoc

basis) to share their research expertise with juniors and upcoming academic researchers who are unfamiliar with research productivity. Mentoring provision should be taken seriously to encourage lifelong learning incorporated into a performance agreement, with accountability and output. Furthermore, online resources for connecting with mentors across national and international institutions should be explored further in view of the current COVID-19 pandemic. Moreover, it is crucial that Executive Management should renew contracts of retired research professors whose mentoring, supervision and research productivity levels exceed their targets and timelines as per their existing contracts.

#### **8.4.3.3 Reposition research**

The key responsibilities of an academic are to encompass a more holistic vision of scholarship which includes excellence in teaching, research and community engagement. Focusing only on teaching exclusively will undermine the other two components and thus under-prepare academics for the future when realising the multifaceted roles that academics need to assume in the HE context. Therefore, it is proposed that Executive Management should introduce in-house journal publication as a form of encouragement to reposition research, since publications in DHET accredited journals are stringent and time-consuming before the actual publication is peer reviewed and approved. In this regard, senior or high-ranking researchers at MUT should take novice researchers under their wing to reinforce research transformation.

#### **8.4.3.4 Publications and citations**

Since teaching and learning, was the primary focus of MUT, there is an opportunity now to re-assess the situation so that research transformation deserves its urgent attention at this HE Institution. Allocation of more dedicated time for academic writing and research productivity is a win-win situation for all stakeholders. Hence, this would result in the success of publications in accredited journals and raise the research output ranking of MUT. Furthermore, academic staff will receive more respect and recognition in the scientific community from publications and citations in high impact journals. It is also significant to note that published articles should be cited with a high impact factor which strengthens academic success and career sustainability.

To become skilful in academic writing, it is suggested that Executive Management should endeavour to provide several publication writing workshops wherein, articles published in targeted journals are internally reviewed by senior researchers including adherence and compliance to the protocols of the selected journal guidelines. Hence, publication assistance needs to be accelerated to promote research transformation. Furthermore, it is imperative that the Research Office at MUT annually furnish a list of DHET accredited journals to avoid predatory journals that do not attract subsidy funding nor improve the research output ranking of MUT.

#### **8.4.3.5 Buy-into research transformation by Executive Management**

It is suggested that the MUT Executive Management should lay the foundations for accelerated research transformation to reconfigure the institutions' vision, missions, core values, governance and balancing the roles of academics in the three pillars of higher education, namely, teaching and learning, research, innovation and engagement, and community service. Establishing a research master plan supported by an effective research policy needs to be communicated to all staff, particularly at Faculty and departmental levels.

It is suggested that Executive Management should reinforce research transformation by providing transformational leadership training programmes for Deans of Faculties and Heads of the Departments to become effective leaders at MUT in its quest towards institutionalising research transformation with concrete deliverables. Moreover, it is further proposed that Executive Management should appoint research administrative support at the Faculty level, to increase academics' interest in conducting basic empirical research leading to post graduate qualifications.

Furthermore, it is recommended that the MUT Executive Management should delegate these substantial shifts to Faculty Deans and Heads of Departments with effective monitoring and evaluation mechanisms to acknowledge the University's new identity and transformational role in the HE context. This realignment will enable academics to utilise their intellectual capacity, commercialise knowledge production and transform their new identity. It is envisaged that this should improve the research productivity of

individual academics and the overall improved research output ranking of MUT by the DHET.

Changing MUT to a research-informed University towards research transformation will demand total buy-in from academics. More importantly, support from the MUT Executive Management as transformational leaders to address the institutional and individual factors regarding low research output will enhance the image of MUT. The success of an HEI stems from the effectiveness of transformational Executive Management as well as academics who also provide a critical role towards research transformation. The spin-off from buy-in from Executive Management to strongly support research transformation should also be seen in the formation of good working relationships. These links are between MUT and many provincial and national institutions; establishing and increasing the number of international meetings, seminars and conferences being held on-site. Moreover, there should be robust and open communication between MUT and the government, namely, NRF, DST and DHET on a continuous basis.

#### **8.4.4 Recommendations relating to Research Question 4**

*What are the critical factors to support a research culture at MUT?*

##### **8.4.4.1 Employ support staff and tutors**

Reducing academic administrative burdens of academic staff would enable them to devote more time to the core business, namely, teaching and learning, research and community engagement. Thus, it is recommended that Executive Management should consider the appointment of additional permanent support staff and temporary appointment of competent post-graduate students as tutors for ongoing academic administrative assistance to staff, taking cognisance of the holistic demands of teaching responsibilities. However, it is imperative that tutors undergo an intensive training programme to ensure their functions and responsibilities are clearly identified and clarified with their duties and expectations per their contractual appointment upfront to avoid any role ambiguity between students and academics.

Furthermore, Executive Management via Faculty Deans and Heads of Departments should provide student feedback of tutors that will improve the academic's teaching pedagogy for the courses as well as improve students' learning. Thus, employing support staff and tutors to assist with academic administration, "at-risk" students, and tutoring in small class sizes should facilitate the retention of academic staff at MUT. More importantly, it will accord academics time to engage in research productivity, improving their vertical qualifications and publications in accredited journals.

#### **8.4.4.2 Review of the workload model**

The current workload model at MUT as enunciated by the participants' responses, does not augur well in practice. Therefore, it is recommended that Executive Management at MUT should revisit and reassess the current workload model of academic staff and reduce the burden of excessive workload by recruiting additional talented academic staff in departments with large student numbers. Furthermore, the revised workload model should attract additional recruitment of talented academic staff to increase research productivity and research output at MUT.

There may be a moderate acceptance for an equitable and transparent workload for all academics at MUT. However, a workload model cannot be one size fits all. Each workload of staff is dependent on several factors, namely, class sizes, related academic administrative responsibilities, laboratory constraints, academic staff's profile in terms of higher studies, research productivity, research collaboration, supervision of postgraduate students and producing research outputs.

Therefore, tactical applications of the workload model with accountability for performance should be communicated to each academic staff, HOD and Dean of the Faculty for flexibility with a reasonable distribution of hours allocated towards research per week which will contribute significantly towards research transformation at MUT. Chipman-Johnson (2008) and Gregory and Lodge (2015) support flexible approaches in workload allocations that would help universities to promote the research interests and strengths of Faculty staff members.

#### **8.4.4.3 Career prospects**

There are young academic staff who intend to remain in academia as a career. Therefore, it is fundamental that the young academic staff show a keen interest in pursuing vertical qualifications and entrench research productivity throughout their professional academic career. Thus, it is proposed that Executive Management supported by Deans and Heads of the Departments should make a concerted effort to provide clarity and candidness about the academics' career trajectory well in advance to ensure that they get promoted timeously per policy guidelines and in accordance with the set criteria when the opportunity arises. This commitment should also provide a strategy towards upward mobility of staff, future senior leadership pipeline and succession planning at MUT.

#### **8.4.4.4 Research culture**

The quintessence of an ideal research culture is tantamount to changing institutional systemic support structures and paradigms for research training endorsed by the Executive Management of MUT. A research culture attempts to reposition MUT in a social background and amongst its peers, by redefining its mandate as an HEI by promoting research transformation activities.

It is suggested that to embed an institutional research culture strengthened with buy-in support and commitment from the Executive Management should be filtered down to each Faculty, Department and academics in order to instil and sustain research transformation. To be proactive, proficient academic researchers intending to retire, especially baby boomers should be afforded extended contracts by MUT to expedite transfer of knowledge to novice researchers and other academic staff to strengthen a research culture (Beehr and Bennett 2015).

It is further suggested that Faculty Deans identify a champion researcher in each department that would bolster a research culture across MUT. This initiative can translate to the introduction of a research institutional culture and ethos amongst staff at the undergraduate level who can become prolific future researchers at the postgraduate level. Moreover, it is suggested that the MUT Executive Management

should develop a monitoring and evaluation tool to embed a research culture. Subsequently, a dynamic research culture should foster high research output and promote job satisfaction amongst the research active academics at MUT coupled with the inclusion of gratifying incentive schemes to retain talented staff.

The apex of an improved research culture is an indication that the effect of institutional learning on research productivity is likely to benefit both academics as well as MUT. Subsequently, the creation of an innovative research culture should allow MUT to achieve a healthier competitive DHET research output ranking as well as an above-average performance in the public HE sector in the foreseeable future.

#### **8.4.4.5 Awareness of incentives**

It is suggested that the Executive Management and the Research Office at MUT should formulate a concrete revised integrated system of incentives commensurate with the overall purposes of embedding research transformation and quality research outputs in accredited journals, to achieve a competitive ranking in the SA HE sector. Research incentives are manifold in addition to a normal source of personal income. Thus, financial incentives matter due to the efforts and causal relationships between sacrifices and time expended by academics on research productivity.

Besides informing academics regularly on incentives from publications in accredited journals, books and approved published conference proceedings, additional income can be boosted by communicating to academics regarding information and solutions to industry research problems, collaborating with industry networks, royalty sharing from inventions, including scholarly collaborative research. This initiative should also be rewarded by income sharing from DHET. Furthermore, designs of intellectual property rights by way of registered patents can also culminate in spinoffs for MUT as well as on local and global economic growth. However, these research incentives can be realised by way of operationalising new institutional policies, procedures and structures thereby encouraging staff to also engage with collaborative interdisciplinary research across faculties without any structural barriers. Thus, increased research incentives should enable MUT to be recognised as a knowledge hub and a contributor towards developing the economy.



Additionally, to promote knowledge production, a recommendation to Executive Management should be to incentivise Master's and PhD supervision to strengthen the core activities of an HEI. These revised incremental incentives would ensure that established researchers will then remain committed to MUT and will not be poached by other HEIs that are well-resourced and research-led.

#### **8.4.4.6 Improve remuneration packages**

The higher education sector is very competitive. Academic staff with impressive research profiles are knowledge producers for the workforce and the economy. Hence, they are easily poached by other HEIs including the private sector which is becoming an increasing challenge. Thus, it is recommended that Executive Management together with Human Resources and Development Department at MUT should review the remuneration packages of talented academic staff whilst a few of them could also be NRF rated researchers. This can be attained by benchmarking within the HE sector to ensure that MUT's remuneration packages are competitive and above average amongst peer institutions considering that MUT's research output profile is low and which may deter talented academics, especially if the remuneration packages are not lucrative as well. Additionally, a proactive strategy should be applied consistently and in a transparent manner to highly recognised and acclaimed researchers to ensure that counter-offers are afforded timeously in order to entice them to remain at MUT.

#### **8.4.4.7 Recruitment and retention of talented academics**

There is a need to scale up new entry requirements for a lecturer position. Thus, it is recommended to Executive Management and Human Resources and Development (HR&D) that all future recruitment of academic staff should possess a relevant PhD qualification commensurate with an excellent track record of quality research productivity related to MUT's niche areas. Clearly, when academics are recruited with extensive research skills, then MUT should have a pool of mentors to guide others to fruitful research engagement. Consequently, highly talented academics will be able to share their expertise with existing academics to strive towards achieving MUT's research transformation and thereby accelerating improved research output.

To attract and retain the targeted personnel to intensify research transformation, it is suggested that Executive Management together with HR&D should develop and implement policies to safeguard and support their retention. These researchers should be accorded recognition for their efforts by providing the requisite support base, namely, an intellectual and vibrant research environment, excellent students in postgraduate programmes to impart their supervisory expertise, provision of resources, upgrading their professional goals and the focus on research productivity.

The benefit of this case study to extant literature is that scholars agree that staff turnover remains high in public universities (Samuel and Chipunza 2009; Maina and Waiganjo 2014) including challenges of inconsistent executive leadership at HEIs. This case study identified some of the reasons for high employee turnover and suggested ways to address the challenge. Thus, an over-riding positive outcome is that if the identified strategies are implemented, then MUT will be transformed into an enterprising research-informed, research-productive and sustainable University in the near future.

MUT needs to pursue reforms aggressively and selectively in recruitment to generate research output growth by responding to the challenges of research transformation by attracting the most talented academic staff. Appointing academic staff with appropriate qualifications should be profiled on MUT's website to encourage branding, publicity and provide a platform for networking prospects with other scholars locally and globally.

#### **8.4.4.8 Formalised sabbatical leave policy**

All the participants interviewed had vague interpretations of sabbatical leave at MUT. Therefore, it is recommended that Executive Management together with the HR&D unit should formalise a sabbatical leave policy and communicate it at all institutional levels to make it transparent with effective implementation and monitoring. Furthermore, HODs and Deans of Faculties should advise their staff on the benefits of taking sabbatical leave when they have accumulated ring-fenced leave to ensure that it is not forfeited. Accumulated ring-fenced leave should be utilised, namely, to improve on their vertical qualification, to encourage publications, or to engage in collaborative

research initiatives. Thereafter, the consequential success, accountability and feedback from post-sabbatical reporting becomes an imperative to measure return on investment on the effectiveness of sabbaticals as a form of academic development trajectory and research productivity.

## **8.5 LIMITATIONS OF THIS CASE STUDY**

The empirical findings of this study are limited to MUT as an investigative case study with its own unique perspective. Caution should be expressed that these findings cannot be generalised to other UoTs or other public HEIs in South Africa as situational factors may differ quite divergently. Moreover, with respect to the empirical findings, the perceptions expressed may have limited generalisability. The primary limitation of this case study relates to the small sample size and the inherent need by the volunteer sample of academics who were willing to participate in the individual interviews and a focus group.

Additionally, individual academics with a specific profile were purposively selected as sample size but excluded other academics who may have been vital for the study based on their experience related to research transformation at MUT. This was not a negating factor or obstacle as the selected participants all had a Master's Degree or pursuing PhD studies and were *au fait* with the functioning of the Institution and attendant problems of low research outputs and research transformation. The selected participants were seasoned academics with long-standing academic careers, namely, they had served the institution for more than 10 years with a predominant focus on teaching and learning.

Another constraining aspect was the limited use of the SD methodology. Due to time limitations and being recently introduced to systems thinking the researcher focused mainly on the qualitative features of SD which is the causal loop diagramming. This was done primarily as the case study also adopted a qualitative paradigm, hence the need to focus attempts on qualitative aspects of SD aligned to CLD. Therefore, the study did not progress to the computer simulations stage of SD which would have become too complex for this case study, time consuming and would have also proved to be longitudinal in nature. However, numerous computer simulations may have

provided a better understanding of this case study together with its host of variables which may generate a more holistic behaviour of the system over a particular time. Additionally, the whole spectrum of systems thinking, namely, SSM, SODA, CSH, and VSM, was not applied.

## **8.6 DIRECTIONS FOR FUTURE RESEARCH**

- Future studies with a qualitative paradigm should include a larger representative sample of academics that might contribute to obtain a better understanding of the influence of factors impacting on research transformation at MUT or studies conducted at other under-resourced UoTs in South Africa.
- Future researchers should consider adopting systems thinking approach holistically to investigate the academic's new emerging perceptions, their individual progression, the barriers or support structures to promote research transformation within MUT, the SA UoT sector as well the traditional research-led comprehensive Universities.
- HEIs operate under various interacting adaptive parts with stakeholders in a volatile, uncertain, complex and ambiguous (VUCA) world becomes challenging to analyse using traditional thinking mind-sets. Hence, further research should be undertaken by applying systems thinking through the practice of integrating multiple perspectives into a Causal Loop Diagram leading to computer simulation as a tool to assist policymakers to bring about positive research transformation.
- Additionally, other system approaches, namely, soft systems methodology (SSM), the viable system model (VSM), strategic options development and analysis (SODA) and critical systems heuristics (CSH) could be adopted in the future to study complex institutional problems related to research transformation, research productivity and research output. However, the findings of this case study should be viewed as a steppingstone for gaining a

deeper appreciation for the needs of academics in the developmental stages of research transformation interventions.

- Moreover, other researchers within the UoT sector as well as from other public HEIs in South Africa should undertake further research taking cognisance of an academic workload model incorporating an equitable balance between teaching and learning and all facets of research productivity. More importantly, how this intervention supports research output, innovation and community engagement should be comprehended. This was a major factor identified by most academics who were interviewed as participants in the current study at MUT.
- Similar studies on research transformation, research productivity and research output could also adopt the mixed research design methodologies, such as a combination of both a quantitative and a qualitative design commonly termed mixed methods. This will lend authenticity to a deeper insight and may generate more credible statistical empirical findings.
- The findings of similar studies could stimulate other comparative studies underpinning Causal Loop Diagrams (CLDs), research transformation, the trajectory of research outputs and post graduate supervision success rates amongst UoTs and comprehensive Universities which are research led.

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## ANNEXURES

### ANNEXURE A



**Title of the Research Study:** Investigating the imperatives of research transformation at a University of Technology in South Africa.

**Principal Investigator/s/researcher:** C.D. JINABHAI (MBA and M.Com)

**Co-Investigator/s/Supervisor/:** DR S BODHANYA (PhD)

#### **Brief Introduction and Purpose of the Study:**

I am Chandra Jinabhai. The purpose of this study is to investigate what are the main mitigating factors that hinder academic careered staff at this UoT to undertake research transformation initiatives despite financial benefits and other incentives associated with research transformation inter alia, improving staff qualifications towards Masters and Doctorate qualifications, research publications, innovations, conference presentations, technology transfer, knowledge production, etc. This study focuses mainly on the justification and improvement on the low research transformation agenda at this UoT. Furthermore, it is imperative that this UoT's management acknowledges the current status of research transformation, and provide the requisite support, resources, regular monitoring and evaluation to reverse the situation. The study makes an original contribution to the existing body of knowledge by the formulation of a conceptual framework using System Dynamics to present to this UoT's Executive Management to leverage research transformation that is aligned to the HEI sector.

**Outline of the Procedures:**

All interviews and archival data will be conducted and sourced at this UoT. You have given consent to participate and be interviewed for the purpose of the study.

I intend to conduct semi-structured interviews with academic staff from this UoT and record their views on research transformation of this UoT. All the participants will remain anonymous and labelled as participants P1 to P15 and the focus group participants as F1 to F6. Purposive sampling is appropriate in this case study as I am investigating a phenomenon at this UoT. The interviews will be held at scheduled times during working hours. Individual interviews will last approximately 25 minutes and focus group interview will last approximately 1 hour. The interviews of all participants and focus group will be held in my office where it will be recorded.

**Risks or Discomforts to the Participant/s:**

There are no risks nor discomfort to you as a participant/s. All interviews will be held with strict confidentiality and your participation will remain anonymous.

**Benefits:**

There are no direct benefits to you. However, the information that is obtained from your participation for this study that is unique to this UoT will be used to assist the researcher and Executive Management at this UoT to promote research transformation and create opportunities for further research. The benefit to the researcher will be to promote research output at this UoT.

**Reason/s why the Participant May Be Withdrawn from the Study:**

Your participation in this study is completely voluntary and you are free to withdraw at any time. There will be no adversarial confrontations to you as a participant should you not be willing to participate or continue with the study.

**Remuneration:**

You will not be subjected to any monetary benefits nor remuneration for participating in the study.

**Costs of the Study:**

You will not be expected to cover any cost towards the study. The researcher will fund the study.

**Confidentiality:**

Your interviews and recordings will be conducted anonymously on a recorder with no names mentioned. The researcher will provide assurance to you that interviews will be conducted with strict confidence.

**Research-related Injury:**

The study will not cause any harm to you since it is not injury related. As a result there will be no requests for any compensation by you.

**Persons to Contact in the Event of Any Problems or Queries:**

Researcher: CD Jinabhai (082 200 9592)

My supervisor is: Dr S Bodhanya (084 866 1142)

Problems or complaints can be reported to DUT:

Prof CE Napier. Acting Director: Research and Postgraduate Support Directorate:

Tel. 031 373 2577 or [carinn@dut.ac.za](mailto:carinn@dut.ac.za)



## CONSENT

**Statement of Agreement to Participate in the Research Study:** Investigating the imperatives of research transformation at a University of Technology in South Africa.

- I hereby confirm that I have been informed by the researcher, CD JINABHAI, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: \_\_\_\_\_,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

\_\_\_\_\_  
**Full Name of Participant**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Time**

\_\_\_\_\_  
**Signature**

I, CD Jinabhai, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

C.D. JINABHAI

**Full Name of Researcher**

**Date**

**Signature**



**Faculty of Management Sciences**

**Department of Entrepreneurial Studies and Management**

Telephone:	Mangosuthu University of Technology
Cell:	PO Box 12363
Email:	JACOBS, 4026

Dear Research Participant

#### **INTERVIEW ASSISTANCE**

I am a registered Doctoral student at the Durban University of Technology in the Department of Entrepreneurial Studies and Management, Faculty of Management Sciences.

My topic is titled: **INVESTIGATING THE IMPERATIVES OF RESEARCH TRANSFORMATION AT A UNIVERSITY OF TECHNOLOGY IN SOUTH AFRICA**

In order to successfully complete my research, one of the aspects of my study relates to interviews with focus group with selected staff at a UoT. You have been identified as one of the participants of the interview or part of the focus group that formed the sample for this study.

I hereby humbly request your participation at an interview which will take approximately 25 minutes. Your participation is voluntary and you are at liberty to withdraw from answering questions that you are not comfortable with. Please note that your objective and informed responses will be treated with strict confidentiality and no names will be divulged to any third party. The collated responses will be only used for data analysis. A summary of the main findings will be provided to you on completion of the project.

Your assistance with this important component of my study would be highly appreciated and I look forward to having an interview with you. If there are any queries, kindly do not hesitate to contact me via my email address or my cellphone. I take this opportunity to sincerely thank you for your kind cooperation in availing yourself for the interview.

Kind regards

C.D. JINABHAI (Cell.: 082 200 9592)

(e-mail: chandra@mut.ac.za)



## **Interviewing schedule to participants and focus groups**

### **Instructions to participants and focus groups**

- 1) The interview pertains to attaining higher qualifications and research transformation at this UoT.
- 2) Your candid feedback and contributions will play crucial role in the research being conducted since all responses will be regarded as confidential and anonymous.

### **Question 1**

Why do you think that research is regarded as one of the three pillars/activities as being significant for any higher education institution?

### **Question 2**

Why do you believe that this UoT should have an institutional research culture?

### **Question 3**

In your opinion as an academic staff, what are the challenges, if any, encountered by yourself to attain higher qualifications?

### **Question 4**

Do you think that this UoT should have a retention strategy to retain skilled academic staff who are poached by other higher education institutions after obtaining a Masters or PhD qualification? Please expand on your response.

### **Question 5**

Why is it necessary for an academic staff who joins this UoT as a lecturer to have acquired a minimum Masters qualifications to commence duties as a lecturer?

### **Question 6**

Have you attended any research workshops hosted by this UoT or outside agencies? How did you benefit/not benefit from this workshop?

### **Question 7**

In your opinion as an academic staff what do you think are the major challenges encountered by yourself to promote research transformation for this UoT?

### **Question 8**

What type of assistance do you think you will still require from this UoT to increase its research outputs?

### **Question 9**

In your opinion, do you think that the current incentives offered at this UoT are sufficient or insufficient to undertake research activities? Please elaborate on your response.

### **Question 10**

In your understanding of this UoT's workload model, please explain whether adequate time is allocated for research.

### **Question 11**

What is your understanding of sabbatical leave at this UoT?

### **Question 12**

What kinds of benefits can be achieved from Master's or Doctoral qualification?

### **Question 13**

Do you have anything else to add?

***Thank you for your participation.***



**INTERNAL MEMORANDUM**

TO: Prof. Z Dlamini (DVC: Research Innovations and Engagements)  
FROM: Prof. CD Jinabhai (Acting Dean: Faculty of Management Sciences)

**SUBJECT: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT A  
UNIVERSITY OF TECHNOLOGY**

I, **CD Jinabhai** (staff no. 90595), is a PhD student at the Durban University of Technology (DUT) (student no. 18550163). I hereby request permission to conduct research towards my PhD.

The study relates to the investigation of the main mitigating factors that hinder academic careered staff at this UoT to undertake research initiatives despite financial benefits and other incentives associated with research transformation inter alia, improving staff qualifications towards Masters and Doctorate qualifications, research publications, innovations, conference presentations, technology transfer, knowledge production, etc. This study focuses mainly on the justification and improvement on the low research transformation agenda at this UoT. It will be conducted through interviews.

I hereby seek approval to conduct interviews with at least 15 academic staff from the three faculties and a focus group of 6 academics representing the three faculties at this UoT. The interviews will take approximately 25 minutes per participant and one hour for the focus group. Attached herewith is a copy of my thesis proposal.

Upon successful completion of my study, I hereby undertake to provide this UoT with a bound copy of the full research report to the library. If you require further information, please do not hesitate to contact me.

Your approval in this regard would be greatly appreciated.

Yours faithfully

**CD JINABHAI**

Tel.: 031-9077128

Email: [chandra@mut.ac.za](mailto:chandra@mut.ac.za)

**DR S BODHANYA**

Supervisor

Tel: 084 866 1142

Email: [shamim@leadershipdialogue.co.za](mailto:shamim@leadershipdialogue.co.za)



**Mangosuthu**  
**University of Technology**

**UMLAZI - KWAZULU NATAL**

P.O. Box 12363 Jacobs 4026 Durban Tel: 031 907 7111 Fax: 031 907 2892

10 September 2018

Dear Prof Jinabhai

**Title: Investigating the imperatives of research transformation at a University of Technology in South Africa Ref: ME 10/18/11**

The Interim MUT Ethics Committee considered and noted your application for the proposed study at their meeting held on 10<sup>th</sup> September 2018.

Your acceptance of this approval denotes your commitment to comply with the South African National Research Ethics Guidelines of 2004 as amended, South African Good Clinical Practice Guidelines (2006) as amended, and the MUT Research Ethics Policy, Procedures and Guidelines. The approval is valid for one year, (10 September 2018 to 10 September 2019).

Furthermore, permission to conduct the project is granted on the condition that any changes to the project must be brought to the attention of the MUT Research Ethics Committee as soon as possible.

Good luck with your research.

Yours faithfully,

Dr Z.L. Kwitshana

Interim Chairperson Ethics Committee

Mangosuthu University of Technology

Tel: 031 8199273; Email: [kwitshanazl@mut.ac.za](mailto:kwitshanazl@mut.ac.za); Skype Zilungile.Kwitshana

# TURNITIN REPORT: CD JINABHAI (18550163)

## INVESTIGATING THE IMPERATIVES OF RESEARCH TRANSFORMATION AT A UNIVERSITY OF TECHNOLOGY IN SOUTH AFRICA

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