THE IMPLICATION OF THE HEQSF ACT FOR HUMAN AND FINANCIAL RESOURCES

by

Karel Kapp

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The Implication of the HEQSF Act for Human and Financial Resources

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Submitted in partial fulfilment of the requirements for the degree

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Supervisor: Dr André du Plessis

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DECLARATION

I, Karel Kapp, student number 24449823 hereby declare that this M. Ed. dissertation titled *The implication of the HEQSF Act for Human and Financial Resources* is submitted in accordance with the requirements for the Magister Educationis degree at the University of Pretoria, is my own original work and has not previously been submitted to any other institution of higher learning. All sources cited or quoted in this research paper have been indicated and acknowledged in a comprehensive list of references.

Karel Kapp

November 2019

ETHICAL CLEARANCE CERTIFICATE

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RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE	CLEARANCE NUMBER: **EC 18/05/01**
DEGREE AND PROJECT	MEd The implications of the HEQSF Act on human and financial resources
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DEPARTMENT	Early Childhood Education
APPROVAL TO COMMENCE STUDY	31 May 2018
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This Ethics Clearance Certificate should be read in conjunction with the Integrated Declaration Form (D08) which specifies details regarding:

- Compliance with approved research protocol,
- No significant changes,
- Informed consent/assent,
- Adverse experience or undue risk,
- Registered title, and
- Data storage requirements.

DEDICATION

I dedicate this research to my grandmother and grandfather, Joey and Wynand Richter. Even though they are not with us anymore, it is because of them that I kept going. My sincerest thanks go to my mom, Elize de Beer who always encouraged me and gave me the opportunity to follow my dreams, and to my dad, Josef de Beer, for being there in difficult times.

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To have achieved this milestone in my life, I would like to express my sincere gratitude to the following people:

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- Dr Hein van der Watt, for his hours of sound boarding ideas and methods.
- Prof. Tinus Kühn for editing the dissertation.
- Last, but not the least to my new wife, we started dating at the start of the study, and through her motivation and leading by example, I was encouraged to complete the study, and for that I am truly grateful for.

ABSTRACT

Phasing out of existing qualifications and phasing in new ones on a large scale is a costly exercise. This research sought to determine how the implementation of the Higher Education Qualification Sub-Framework (HEQSF) would affect human and financial resources at Universities of Technology and to develop a tool to manage the phasing in and phasing out of qualifications on a large scale in a sustainable way. The Faculty of Engineering and the Built Environment (FEBE) at a University of Technology (UoT) was used as a case study. The study utilised existing Higher Education Management Information System (HEMIS) data to develop a model to conduct a needs analysis and to predict future requirements. The model takes into consideration the programme qualification mix, the number of students enrolled in each programme, the estimated throughput and graduation figures based on historical data of similar qualifications.

The primary contribution of this study is the development of a model that predicts how the phasing in/phasing out of programmes of a faculty affects the workload of academic staff and the subsequent financial implications for the institution. The purpose of the developed model is to enable the faculty to predict accurately the quantity of additional human resources needed during this process of phasing in and phasing out new and old programmes. This will enable the faculty to determine human resource requirements and student enrolments to align them with the university's targeted budget allocation.

Key Concepts

HEQSF Act; human resource management; Department of Higher Education; Higher Education South Africa; salary expenditure; Universities of Technology; Higher Education Management Information System.

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TO WHOM IT MAY CONCERN

I, the undersigned, hereby declare that the master's dissertation titled **The Implications of the HEQSF Act for Human and Financial Resources** by **Karel Kapp** has been edited for grammar errors.
It remains the responsibility of the candidate to effect the recommended changes.

Prof. Tinus Kühn

LIST OF ABBREVIATIONS

CESM	Classification of Educational Subject Matter
CHE	Council of Higher Education
DHET	Department of Higher Education and Training
DoE	DoE
DVC	Deputy Vice-Chancellor
FTE	Full Time Equivalent
FTEN	First Time Entering Number
HEQSF	Higher Education Qualification Sub-Framework
NATED 151	National Accredited Technical Education Diploma
NQF	National Qualifications Framework
ROU	Research Output Unit
SAQA	South African Qualifications Authority
TIU	Teaching Input Unit
TOU	Teaching Output Unit
UoT	University of Technology
FEBE	Faculty of Engineering and the Built Environment

Table of Contents

LIST OF FIGURES

LIST OF TABLES

ADDENDA

CHAPTER 1
GENERAL ORIENTATION

1.1 INTRODUCTION

In order to understand the impact the new Higher Education Qualification Sub-Framework (HEQSF) may have on the management of the human resources of a university, the allocation of funding and the generation of income needs explanation. This will help to clarify how the amount each qualification generates towards the university for an x number of students is calculated. Expenses and the cost of delivering a qualification can then be determined. The cost includes the ratio of academic administration staff to academic teaching staff, and the upkeep of laboratories and other facilities.

The flow of funding to South African public universities is illustrated in Figure 1.1. The average funding proportion for each funding source is also indicated. It is important to note that the proportions listed can fluctuate among institutions.

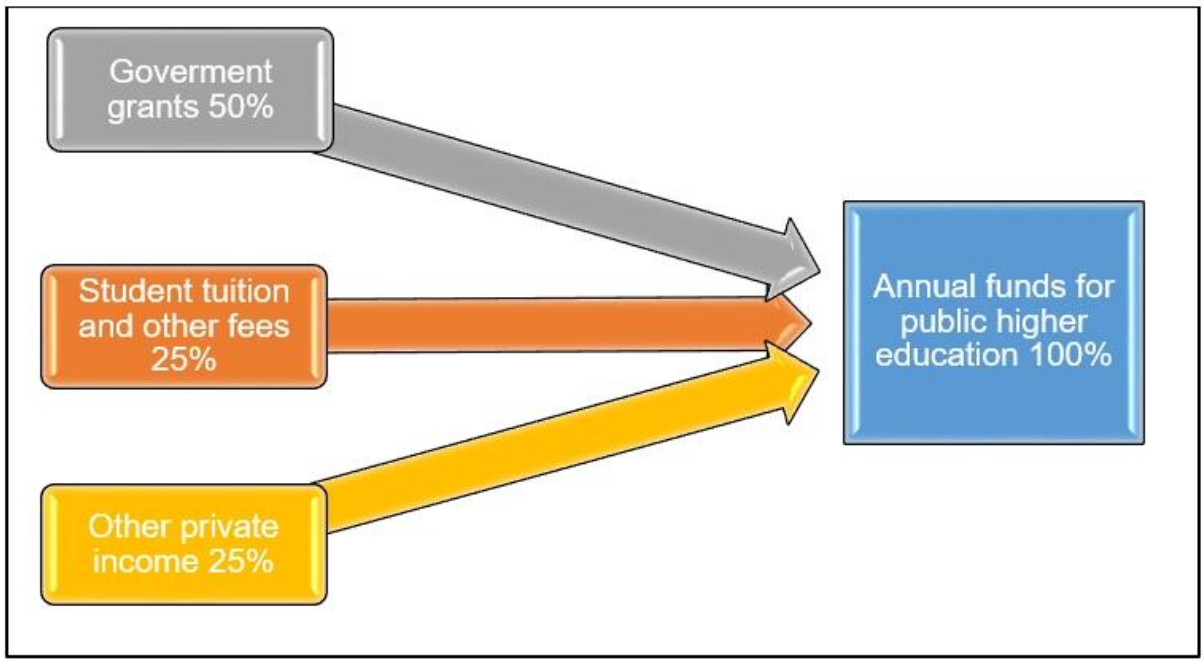

Figure 1. 1: Flow of funding to public universities in South Africa (CHE, 2015)

To illustrate, a universities proportional income from government grants can be as low as 35%. This will require a university to source substantial amounts through third stream income initiatives such as research projects, donations and investments.

Universities who have limited third-stream income resources could however have as much as 65% of their income originating from government grants. According to the Ministerial Statement on University Funding (2015/16 and 2016/17), the following phases are involved in the calculation of the teaching input grants of universities:

- Full time equivalent (FTE) student can be calculated by (a) assigning to each course a fraction representing the weight it has in the curriculum of a qualification, and (b) by multiplying the headcount enrolment of that course by this fraction (CHE, 2015). These figures generate financial resources for a university. If a student takes only half of the load of the qualification for a specific year, his FTE will be equal to 0.5 FTE, which translates to 50% of the income such a student may generate for the university.

  The adjusted FTE total proceeds through a grid, which is approved on a rolling three-year basis by the Minister of Education. This grid places FTE enrolments into categories, which are weighted according to course material, course level and instruction-delivery mode. The funding grid approved by the Minister of Education for 2015/16 to 2016/17 has thirty-two (32) cells indicated in the two tables below.

Table 1. 1: Funding groups by Classification of Educational Subject Matter (CESM) categories: 2015/2016 to 2016/2017 (CHE, 2015)

Funding groups by CESM categories: 2015/16 to 2016/2017	
Funding group	**CESM categories included in the funding group**
1	07 education, 12 law, 14 librarianship, 20 psychology, 21 social services/public administration
2	04 business/commerce, 05 communications, 06 computer sciences, 12 languages, 18 philosophy/religion, 16 military sciences
3	02 architecture/planning, 08 engineering, 10 home economics, 11 industrial arts, 15 mathematical sciences, 19 physical education
4	01 agriculture, 03 fine and performing arts, 09 health sciences, 13 life, 14 physical sciences

Table 1. 2: Weighting factors for teaching input funding group and course levels: 2015/2016 to 2016/2017 (CHE, 2015)

Weighting factors for teaching inputs by funding group and course level: 2015/16 to 2016/2017								
Funding group	**Undergraduate and equivalent**		**Honours and equivalent**		**Master's and equivalent**		**Doctoral and equivalent**	
	Contact	Distance	Contact	Distance	Contact	Distance	Contact	Distance
1	1.0	0.5	2.0	1.0	3.0	3.0	4.0	4.0
2	1.5	0.75	3.0	1.5	4.5	4.5	6.0	6.0
3	2.5	1.25	5.0	2.5	7.5	7.5	10.0	10.0
4	3.5	1.75	7.0	3.5	10.5	10.5	14.0	14.0

Table 1.1 indicates which Classification of Educational Subject Matter (CESM) categories were included in each funding group for the period 2015/16 to 2016/2017. Table 2.1 gives the allocated weightings by instruction-delivery mode, by funding group and by course level. These weightings determine the teaching input units (TIU) according to which the Department of Higher Education calculates funds allocated to a university. CESM (CESM) categories are a set of classifications aiming to provide a single coherent system for categorisation of subject matter, regardless of the type of institution or level of instruction (CHE, 2018). Each CESM (CESM) category is defined by the Department of Higher Education 2008 report.

Another income leg is the teaching output grant or teaching output unit (TOU) per student completing his/her undergraduate qualification. For the period 2015/16 to 2016/17 this equated to a value of R24 457 per undergraduate student finishing a qualification.

A research output grant or unit is awarded to a university as income for the successful delivery of a master's and doctorate degree. In 2017, the monetary value of a master's degree was R107 222 and R321 666 for a doctorate. A more detailed discussion is provided in Chapter 2.

1.2 PROBLEM STATEMENT

The Council of Higher Education (CHE) and the Department of Higher Education and Training (DHET) have requested all Higher Education Institutions to implement the new HEQSF by 2020. The Higher Education Qualifications Sub-Framework Act No. 67 of 2007 (HEQSF Act), which was promulgated in October 2007 (DoE, 05 October 2007), provided for a single qualification framework for higher education institutions as envisaged in the Department of Education's 1997 plan (DoE, 1997). This programme sought to expedite the establishment of one national co-ordinated system for higher education. The key objective of this policy was to support the articulation of programmes and the transfer of students between programmes and higher education institutions. Structures were then separated, producing parallel qualifications, meaning that similar qualifications would be delivered by traditional universities, while Technikons (now known as Universities of Technology) were to be precluded (DoE, 1997).

Since January 2009, all new programmes are required to meet the demands of the HEQSF. Notwithstanding the robust nature of the HEQSF, the Minister of Higher Education was advised by the CHE that a number of concerns still needed to be resolved. These concerns were related to the purpose, number and nature of the types of qualifications allowed for in the HEQSF (CHE, 2013). In addition, the certification process exposed several discrepancies in the HEQSF that later had a negative impact on the meeting of national policy goals and objectives (CHE, 2013).

The HEQSF changeover will affect the level of instruction of the National Accredited Technical Education Diploma (NATED) 151 programmes as well as the revision of funding opportunities to deliver new programmes. Current funding structures and student fees are based on the NATED 151 courses.

In addition, funding structures and student fees are based on subject cost and not credit cost, resulting in service-orientated subject departments that generally offer courses with lower credit accreditations, receiving a greater income as the guardian departmental subject with higher credit accreditations.

A service subject is a subject allocated to a department that does not offer the subject. A departmental subject is a subject that lies in the ownership of the department where the programme is liaised.

For an academic staff member to teach a qualification at a specific level, he/she would need only that specific qualification as well as an additional year in a follow-up qualification (CHE, 15 July 2011). This would greatly influence the Human Resources department of a university with regard to the number of academic staff needed to teach a programme. It is essential to look at the structure of a faculty of a University of Technology (UoT) and its current circumstances to ascertain how it can be streamlined to meet the needs of the new qualifications that are to be introduced. Therefore, the purpose of this study is to develop a model to predict the effect of the HEQSF Act on Human Resources in the Faculty of Engineering and the Built Environment (FEBE) at a UoT.

According to findings made available by the Department of Higher Education, the average salary expenditure in South African universities is 55% to 62.5% of the total income of universities (HESA, Nov 2014). The council of a specific UoT stated that the amount of money currently spent on salaries was 78% of the total university budget. This needs to be reduced to align their expenditure with the national average, namely 55% to 62.5% of the total income to manage the financial resources in a sustainable manner. In addition, 60% of the salary budget should be allocated to academic staff while the remaining 40% to the support staff (TUT, 2017).

A study on the impact of the HEQSF on Human Resources (HR) in a University of Technology (UoT) is required to enable the effective management of the implementation process. The impact on human resources is linked to the qualification needed to teach a specific programme.
It is thus necessary to look at the structure of the Faculty of Engineering and the Built Environment (FEBE) and the current stance to see how it can be streamlined to deal with the needs of the new qualifications. The impact of the HEQSF appears to be most significant on Universities of Technology (UoTs).

The reason for this is that the Bachelor of Technology qualification is to be phased out and replaced with two new qualifications, namely an Advanced Diploma in Technology and a Post Graduate Diploma in Technology.

1.3 RESEARCH AIM

The aim of this study is to provide recommendations based on the findings that will aid in the re-alignment of human resources expenditure in the FEBE in a UoT. These recommendations will aid the implementation of the HEQSF requirements. This not only has implications for the university, but also for the students who have completed a Bachelor of Technology degree and who want to further their studies. These students will need to adhere to the new qualification framework.

This research therefore sought to determine how the implementation of the HEQSF would affect the human resources in the FEBE at a UoT. In addition, it aimed to develop a model to assist faculty management in determining the impact the HEQSF will have on human resource provisioning.

1.4. PURPOSE OF THE RESEARCH

The purpose of this research is to do the following:

- **Determine** the criteria for funding specific programmes at a university;
- **investigate** the Higher Education Information Management System (HEMIS) data received from the registrar's office;
- **determine** the important difference between first time entering students (FTEN) and FTE students;
- **determine** the correlation between headcount, graduation ratio and the retention rate of students;
- **develop** a tool to determine the impact on human resources if all variables are taken into account.

1.5 RESEARCH QUESTIONS

1.5.1 Primary Research Question

How to determine the implications of the HEQSF act for financial and human resources required in the FEBE at a UoT?

1.5.2 Secondary Research Questions

- How does the implementation of the Higher Education Qualification Sub-Framework affect human resources in the at a UoT?
- What additional human resources will be needed in a UoT during the period when NATED 151 is being phased out and HEQSF phased in?
- What are the financial implications of the phasing out of NATED 151 and the phasing in of the HEQSF?
- How should the student enrolment plan be linked to staff profiles to achieve financial viability in a faculty of a UoT?
- How does funding influence the income generated by a specific programme in a UoT?
- What impact does FTE versus FTEN have on funding in a UoT?
- How does headcount, graduation, and retention of students influence the funding of a UoT?

1.6 VALUE OF THE RESEACH

This study was undertaken because of a request by the Deputy Vice-Chancellor (DVC) to the Dean of the FEBE of a UoT to launch a project called “Project 2020” to investigate the impact of the new HEQSF on the faculty in terms of Human Resources. This request was justified by the potential financial implications the new policy may have on staff allocations and the need for pro-active planning with regard to the management of financial and human resources.

As the Faculty Quality Officer, it is my responsibility to oversee all quality issues related to teaching. It is also my responsibility to ensure accreditation by external bodies as well as to liaise with the Directorate of Quality Promotions of the university in respect of quality-specific interventions, reports, improvement plans, model development and related issues.

Together with these duties, I liaise with high-level external and internal stakeholders, such as representatives from professional bodies, Deputy Vice-Chancellors, etc. Therefore, as the Faculty Quality Officer, I am committed to uplifting the quality of qualifications at the university and to ensure that the requirements of the HEQSF are

met to ensure quality in instruction and learning. Conducting this study placed me in an improved position to meet demands of my job description.

In my experience as the Faculty Quality Officer at a UoT, I noticed that the throughput rates of undergraduate and postgraduate programmes are poor, averaging out at 17% for the university as a whole. This is problematic as 78% of the income derived from these programmes is distributed to salaries. This phenomenon inspired this study as I endeavoured to determine how the throughput ratios and lecturer-to-student ratios affect human resources as the university makes changes to its degrees to meet the new HEQSF standards, especially in the long-term. This study can therefore contribute to an improved understanding of the Human Resource requirements of such a university. This would include the number of staff required and the level of competency necessary to ensure a smooth transition into the HEQSF (CHE, 2013).

1.7 CONCEPT CLARIFICATION

The following concepts act as supporting structures for the framework of the study. These concepts correlate thoughts and facts to provide greater meaning to the study. The concepts are explained below:

1.7.1 National Qualifications Framework (NQF)

This is a single integrated system for the "classification, registration, publication and articulation of quality-assured national qualifications" (CHE, 2010).

1.7.2 South African Qualifications Authority

This body was established in terms of the NQF Act No. 67 of 2008. The Minister of Higher Education appoints twenty-nine members to this body. This is done in consultation with the Minister of Labour.

SAQA's function is to administer the development and implementation of the National Qualifications Framework (CHE, 2010).

1.7.3 Higher Education Qualification Sub-Framework

This is a sub-framework of the NQF. To outline the different qualification types and there connection to each other.

The Recognition of Prior Learning Processes (RPL) guides the “movement of individuals within and between non-completed qualifications” (DoE, 1997).

1.7.4 Recognition of Prior Learning

Recognition of Prior Learning (RPL) recognises formal, non-formal, and informal learning across different contexts.

This allows students to gain access and credits to higher education qualifications. It therefore promotes inclusion and advancement in higher education and the workplace. (SAQA, 2013)

1.7.5 Full Time Equivalent (FTE)

FTE student enrolments “are calculated by assigning to each course a fraction representing the weight it has in the curriculum of a qualification and by multiplying the headcount enrolment of that course by this fraction” (CHE, 2015).

1.7.6 Research Output Unit (ROU)

According to the CHE (2015), the ROU is “a proxy for research produced” and “calculated for subsidy purposes”. The number of annual accredited publications and graduate outputs determine the ROUs accrued by a public university (CHE, 2015). These units form part of the income generated by a university.

1.7.7 Throughput Rate

The throughput rate refers to “the number of first time entry undergraduate students of a specific cohort of a specific year that either graduated within the minimum time, or up to two years beyond the minimum time compared to the number of students in the baseline enrolments of that specific cohort” (CHE, 2015).

1.7.8 Traditional Universities

These are higher education institutions “that offer a broad range of general formative and professional programmes at both undergraduate and postgraduate levels” (DoE, 1997).

1.7.9 Universities of Technology

Previously “referred to as Technikons” (DoE, 1997), these universities primarily offer vocational and/or professional undergraduate programmes. However, these universities are increasingly offering postgraduate qualifications and embarking on research endeavours.

1.7.10 Human Resources

Human resources (HRs) is a term used to describe the individuals who make up the workforce of an organisation. HRs are the human labour, the physical abilities, and mental abilities that produce the goods and services of businesses. (Eslami, Nooshin; Nakhaie, Hamid;, 2011)

1.7.11 Financial Resources

The money available to a business for spending in the form of cash, liquid securities and credit lines (Finance, 2020)

1.8 THEORETICAL ORIENTATION

The National Implementation Research Network Framework (NIRNF) frames this research. This framework was suitable for my study in that it provided "a sound foundation for the exploration, purposeful selection, clarification, improvement and systematic implementation" of a programme's practice model (Fixen, Naoom, Blase, Friedman & Wallace, 2005). The intervention component framework includes the following:

- Model definition (Who should be engaged?): In applying this element of the National Implementation Research Network Framework, the policy of the Council on Higher Education to implement the new Higher Education Qualifications Sub Framework is analysed.
- Theory bases(s) supporting those elements and activities: To support this element of the theory, a UoT, specifically the FEBE is used as my focus.
- Target population characteristics (behavioural, cultural, socioeconomic and other factors that suggest a good match with the practice model): For the purpose of this study, the target population is existing data gathered from official documents and Higher Education Information Management System (HEMIS) data. The Higher Education Management Information System (HEMIS) office fulfils the university's statutory requirements in terms of the provision of information on students to the DHET for subsidy purposes. HEMIS management information is provided to various internal and external stakeholders for strategic planning, the development of enrolment plans, financial planning and for the implementation of policy procedures.

- Theory of change (How those elements and activities create improved outcomes for the target population):

  By utilising a complexity table, all the data can be consolidated into relevant fields of calculations according to the policies of the UoT.

  An outcome can be derived from the data to predict what the human resource needs would be for the implementation of the new HEQSF at a UoT.
- Alternative models (A rationale for why the service organisation rejects using other practice models): Due to the phasing out of the NATED 151 programmes, a few proposals were developed for implementation of the new HEQSF for the FEBE.

These proposals were tested to determine which would best be implemented with the least amount of disruption to the faculty.

1.9 RESEARCH DESIGN AND APPROACH

1.9.1 Epistemological Paradigm

I conducted this study from the paradigm of pragmatism. Pragmatism is the idea that knowledge results from actions, situations and consequences being socially assembled by the processes from within institutions. Legitimisation and socialisation "places managerial characteristics and perceptions at the core of any inquiry that seeks to understand organisational life" (Pansiri, 2006). In pragmatism, the emphasis is on the link between theory and practice, between thought and action, on the practical consequences of beliefs and concepts and acting on them in a human experience (Trohler D; Schlag T; Osterwalder F., 2010). In other words, pragmatism places an emphasis on the practical application of ideas by acting on them to test them in human experiences. This approach assesses principles or opinions in terms of the success of their practical application.

1.9.2 Research Design

A predictive analytical design was utilised within the predominantly quantitative research approach. Such a design, as described by Waller and Fawcett (2013), is unique from all other quantitative research designs in that it is both quantitative and qualitative. By looking at Policy documents in a qualitative way, and bringing in the link from quantitative data that HEMIS supplies.

This feature of a predictive analytical design makes it perfect for this study. This design forecasts possible outcomes while looking at the past and analysing those outcomes for an outcome other than what has already occurred.

Predictive analytics seeks to identify relationships between variables by using mathematical methods (Waller & Fawcett, 2013). Conclusions are drawn both efficiently and cost-effectively. Logistics and supply chain predictive analytics are present in a predictive analysis design.

Supply chain predictive analytics is most applicable to this study as it is defined as using both quantitative and qualitative methods to improve attractiveness through the estimation of past and future levels of integration of business processes among tasks or establishments. An estimated cost and service level is calculated within this design (Waller & Fawcett, 2013).

I utilised this data as a point of departure in developing a new model to make predictions. With the new designed model, FTE, First Time Entering Number (FTENs), graduation numbers and headcount numbers were used to calculate averages and ratios based on historical data.

By using funding categories, the number of credits, level of instruction as external variables, calculations and predictions were made to determine future programme needs depending on the number of students enrolling. Those predications included total income, cost, staff needs, staff-to-student ratios, etc. Detailed discussions are provided in Chapters 3 and 4.

1.9.3 Research Approach

This study followed a mixed methods research approach with the dominant approach being quantitative in nature. Quantitative research can be described as the process in which a phenomenon is explained through the collection of numerical data while analysis is mathematically based (Muijs, 2013). This research made use of numerical data obtained from the FEBE at a UoT. The data was processed in a systematic and objective manner to find generalisability within the phenomenon under investigation (Maree & Pietersen, 2014). The qualitative element of this study relates to the interpretation of the data collected as the data was analysed by myself, the researcher.

As the main objective of research is to gain valuable information from data gathered, an element of qualitative research is applicable to this study as data was used to gain insight into the impact of the HEQSF (Nieuwenhuis, 2016).

The documents that were analysed included data supplied by the registrar of the university. This dataset was specific to the FEBE.

These datasets are simply presented as a set of numbers, which addresses the student-to-lecturer ratio, student graduation ratio, first time entering students, fulltime equivalent numbers, and headcounts of students in specific programmes.

With these data inputs, I developed a model by which these numbers can be meaningfully interpreted, thus further justifying the use of the mixed methods research approach as quantifiable numbers were analysed for meaning by myself, the researcher.

1.10 SAMPLING

Data specifically applicable to the FEBE was collected from the Registrar's Office of a UoT. A blend of convenience and purposive sampling was used for the collection of the data in this study. Convenience sampling was chosen as the Deputy Vice-Chancellor suggested the topic to the researcher.

This project was named *Project 2020*. The Deputy Vice-Chancellor realised that for the university to succeed, it needed to look at areas where resources are being wasted to better allocate these resources. Purposive sampling allows the researcher to select the data based on a specific criterion (Nieuwenhuis, 2016).

While stratified purposive sampling has the potential of not presenting saturated data, it does have the advantage of being the most successful method when data review and analysis are completed in unison (Nieuwenhuis, 2016). I believe that this data was saturated due to the sheer volume of data that was analysed.

1.11 DATA COLLECTION

The data was selected from the 2014 to 2017 Higher Education Information Management System (HEMIS) cohort data, which included graduation rates per faculty, the first time entering students and FTE numbers. The mentioned data was used to calculate numerous outputs for the faculty, such as the following:

- Income grants allocated by the government
- Teaching Input units
- Teaching Output units
- The number of human resources needed to run a specific programme or qualification
- The amount of finances generated by a specific programme or qualification
- Complexity of the faculty in terms of staff allocation.

1.12 DATA ANALYSIS

A predictive model was used to complete the data analysis. Prediction research has become increasingly popular. In predictive research, statistical methods and/or data mining techniques are applied to predict future outcomes, without preconceived ideas (Toll D. B; Jannen K J.M; Vergouwe Y; Moons K. G.M., 2008).

Accurate predictive models can apprise stakeholders and management regarding the future of a programme or the risk of developing a shortage of resources and thereby help decision-makers navigate for the success of the establishment. By using traditional regression analysis, and selecting relevant candidate predictor variables for possible inclusion in the model, conclusions could be drawn. For a prediction model to be valuable, it must not only have predictive ability in the derivation cohort but must also perform well in a validation cohort (Hemingway, Riley & Altman, 2009). This is explained in detail in Chapter 3.

1.13 METHODS USED TO ENSURE VALIDITY AND RELIABILITY

To ensure the trustworthiness of this research, data from multiple sources was used to verify findings. For example, document analysis verified the information gathered from each department in the FEBE.

Qualitative reliability − trustworthiness − refers to the fact that the researcher checks the accuracy of the findings by employing certain procedures, such as using a computerised program and asking other researchers to review the work completed (Nieuwenhuis, 2016).

Within the positivist tradition, validity resided among and was the result and culmination of other empirical conceptions such as universal laws, evidence, objectivity, truth, actuality, deduction, reason, fact and mathematical data (Winter, 2000).

According to Joppe (1998), validity determines whether the research accurately measures that it intended to measure or how truthful the research results are. Objectivity of the data gathered was ensured through peer debriefing and countless rechecks of the data fields. The validity of the data was constantly questioned for its impact on the research questions posed at the start of the study.

1.14 ETHICAL CONSIDERATIONS

The University of Pretoria received and approved the ethical clearance application after successfully defending the proposal to conduct this research. I then sought clearance from the UoT at which the research was conducted as the data was generated from this university's Engineering and Built Environment Faculty. Commencement of the study began after these formalities had been concluded.

During the research process, I adhered to the Research and Ethics Statement provided by the Faculty of Education, University of Pretoria.

1.15 STRUCTURE OF THE RESEARCH REPORT

The structure of this dissertation is as follows:

- **CHAPTER 1: INTRODUCTION AND ORIENTATION TO THE STUDY**
  The first chapter of this study indicates the orientation and background to the research, the problem statement, the rationale, as well as the method and plan of the study. Key concepts are defined and discussed.
- **CHAPTER 2: LITERATURE REVIEW**
  This chapter provides an in-depth account of the literature that is relevant to the study. In addition, it provides a detailed discussion of the National Implementation Research Network theory.
- **CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY**
  This chapter contains the research design and methodology of the study. The research methodology encompasses the mode of inquiry, the research site, data collection and data analysis. Validity and reliability of the data and the findings is also addressed in this chapter. This is followed by a reflection on the trustworthiness of the research, my role as researcher and the limitations of the research approach I employed. The model that was created to analyse data is discussed in detail.
- **CHAPTER 4: ANALYSIS AND FINDINGS**
  This chapter focuses on the presentation and discussion of the acquired data and information obtained from the designed prediction model.
- **CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS**
  This report is concluded with an overview of all the chapters as well as answers to the research questions and contains the conclusion(s) reached.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

In order to provide an understanding of the topics under investigation, this chapter focuses on the breakdown of concepts found in the posed research questions, juxtaposed against local and international developments. Topics selected for discussion include the new HEQSF, the funding model of universities, the phasing out of the old programmes and the implementation of the new ones. The National Implementation Research Network Framework (NIRNF), which was used a framework to conduct this study, is also discussed.

2.2 INTERNATIONAL TRENDS REGARDING NATIONAL QUALIFICATIONS FRAMEWORKS

Since the 1970s, governments around the world have been driven by social and economic objectives that called for higher levels of participation and stronger patterns of outcomes of education and training. This emphasised the relevance of education provision (OECD, 2007).

Although the French system of classification became operational during the 1960s, Coles, Keevy, Bateman and Keating (2014) contend that the first phase of the development of National Qualification Frameworks (NQFs) took place in the 1990s, by a group of so-called “first generation Anglophone” countries, namely South Africa, New Zealand, Scotland, the United Kingdom, Ireland and Australia. Nearly 30 years later more than fifty countries are on course to implement a qualification framework (Keevy & Blom, 2007).

The rationale for this was to move towards outcome-based vocational education and training systems in these countries. Interest by the Anglophone countries in outcomes-based education was linked to economic reformist policies launched by the United Kingdom, New Zealand and Australia in the 1980s.

These countries associated outcomes-based education with the breaking down of provider control and restrictions on the delivery of programmes and courses, thereby transferring the control of training programmes and qualifications to their users (Coles, Keevy, Bateman & Keating, 2014). Social reform in these countries drove policies aimed at educational expansion, and the promotion of enhanced workforce skill levels and lifelong learning. Policies and development of qualification levels would be defined only by outcomes given by industry together with government (Coles et al., 2014).

With the level of the employability of graduates increasing, the policy objectives of higher education institutions pertaining to the modularisation of programmes that have greater flexibility started to manifest (Knight & Yorke, 2004). This increase in flexibility resulted in greater diversification of programmes and it became necessary to formulate an implicit hierarchy of qualifications. This shift in the qualification provision landscape began to take the shape of a qualifications framework. The process has continued as illustrated by the Bologna Process and the Qualifications Framework for the European Higher Education (Adam, 2013). Preceded by the 1998 Sorbonne Conference and Declaration, the Bologna Process and the Qualifications Framework responsible for higher education in 29 European countries endorsed the European Higher Education in 1999. Subsequently it has affected 48 countries in terms of developments in the following areas (Adam, 2013):

- Mobility of students and staff
- A common degree system
- The social dimension
- Lifelong learning
- Quality assurance
- Instruction and learning.

A typical NQF aims to achieve a sum of the objectives as summarised in Table 2.1 (Raffe, 2013). The summary is by no means discrete nor exhaustive, and there are several overlapping areas.

Table 2. 1: Possible objectives of a NQF (Raffe, 2013)

• To promote transparency and to make the education and training system easier to understand. • To make the system more "unified". • To articulate and promote coherence within and between programmes. • To stimulate the recognition of prior learning and skills, whether formal or informal. • To provide an instrument of accountability and control. • To develop a more demanding and focused education and training system. • To improve the quality of instruction and learning. • To promote international links and mobility. • To promote lifelong learning. • To transform the economy and society.

However, to achieve these objectives, policies written on national qualification frameworks point to at least seven processes that require consideration (Raffe, 2013). These are discussed below.

- **A common language**: The introduction of a common language of levels, outcomes, credits, qualification types, is required. This allows for the visualisation of a national qualification framework and makes it more transparent. It provides tools to plan, coordinate and promote access with regard to progression and transfers (Raffe, 2013).
- **Stakeholder engagement and coordination**: It is claimed that in context where different providers, users and other stakeholders come together, the development and implementation of a NQF can become more coherent and demand-driven. This is particularly the case when mutual interests of stakeholders are considered (Raffe, 2013).
- **Regulations**: Regarded as an instrument for regulating qualifications, a NQF may have a mandate to reform education and training (Raffe, 2013).
- **Quality assurance**: National qualification frameworks are allied with quality assurance systems, whether they are being prescribed or not (Raffe, 2013).
- **Unitisation or modularisation:** In most national qualifications, frameworks, qualifications or programmes are unit-based.

They allow for qualifications or programmes to be combined or accumulated in various ways to promote articulation or transfer between programmes or qualifications (Raffe, 2013).

- **Transparency of qualifications:** NQFs claim transparency for individual qualifications, thereby making it easier to improve standards that can be linked to labour-market needs (Raffe, 2013).
- **Cultural and pedagogical change:** It is expected of a NQF to encourage changes in learning culture, thereby encouraging improvements in pedagogy (Raffe, 2013).

According to Raffe (2013), six key areas need to be addressed by policy makers to introduce a NQF successfully. Firstly, the design and implementation of a NQF needs to incorporate the national needs, resources and circumstances. Secondly, a NQF needs to form part of a larger policy programme and implementation should thus be completed.

Thirdly, to have an effective NQF, appropriate objectives in the national context need to be set through proper processes and modes of government. Fourthly, the success of a new framework is determined by the foundation provided by an existing framework and by securing stakeholder relationships and trust. Fifthly, a successful framework tends to have multi-level frameworks, including sub-frameworks with their own specific objectives, with common objectives across these sub-frameworks. Lastly, a NQF is not required to achieve national policy objectives. It may provide realistic ways to reference national qualifications, but national objectives of NQFs should be realized through alternative means (Raffe, 2013).

2.2.1 Qualifications Frameworks in the United Kingdom

By 2013, five large-scale qualification frameworks were in operation in the United Kingdom. Eight national qualification framework level structures cover all qualifications being delivered in England, Wales and Northern Ireland.

The history of these frameworks can be traced back to the 1980s when levels for vocational training were introduced, based on occupational standards (Manpower Service Commission, 1986). Since then the qualification framework has evolved into an open form of classification and communication with strong market regulatory roles.

These frameworks have become a trustworthy tool across providers and stakeholders that use the qualifications to achieve transparency across the board and to facilitate lifelong learning.

According to Coles et al. (2014), the United Kingdom will probably adapt the demands of the home country rather than the needs of the United Kingdom as a whole. As policies change, the diversity of the framework also changes to reflect the diversity of needs of a home country. Coles et al. (2014) argue that the United Kingdom's qualifications system could be used by other countries using one qualification framework that needs to have mobility of learners across borders.

2.2.2 The Australian Qualifications Framework

In 1995, the Federal Education and Training Minister and the Australian states created the Australian Qualifications Framework (AQF). It evolved from two sets of developments (Keating, 2003). The first was the expansion of the higher education system in the 1980s through an amplified focus on the recognition of prior learning and greater articulation between programmes. The second development was the formation of a competency-based vocational education and training system. Based on these two developments, a proposal was put forward for a NQF (Keating, 2003).

The AQF had been stable up to 2010, except for inclusions of additional qualifications between diplomas and bachelor degrees and for removing the notion of qualification "levels" from the framework. During 2009 to 2010, the AQF was subjected to a major review that included broad consultation across sectors to allow for the allocation of credit-bearing facilities that involved measurement of learning for each qualification type at each level (Astralian Qualifications Framework Council, 2009).

It was envisaged that the proposal would face resistance from industry and relevant stakeholders, as they did not want qualifications to be classified by the level or volume of learning. At the end, it resulted in ten (10) levels of descriptors and fourteen (14) highly detailed qualification types focusing on learning outcomes. After empirical testing had taken place, the proposal strengthened the Australian Qualifications Framework (AQF) (Gillis, Wu, Calvitto & Bateman, 2010).

2.2.3 The South African Situation

The initial design of the South African NQF was influenced by political transformation in South Africa (CHE, 2007). In 1998, the South African NQF was formally established following the promulgation of the SAQA Act in 1995 by the first democratically elected post-apartheid government (Coles et al., 2014). The South African rationale for the NQF was more extensive than those of Australia and the United Kingdom were and included goals of overcoming discrimination, which was part of the apartheid dispensation (DoE, 2008). The transformational purpose has remained an integral part of the South African NQF, but it has come at a price. Implementation has been plagued by continued criticism, which resulted in an extended review that started soon after the NQF was first implemented in 1995, and lasted up to 2008 when new legislation for the NQF was promulgated (DoE, 2008).

The agenda for the design of the NQF was to promote lifelong learning for all race groups (SAQA, 2000). Before the creation of the NQF, a broad and extensive consultation process took place; this consultation process took cognisance of a wide range of factors, from labour movements looking for trade skills of black workers to be acknowledged, to the influences of globalisation on the nature of the workplace. A number of education and training systems of Commonwealth countries were scrutinised, but a national standards and flexible pathway was evidently a system-wide need (Coles et al., 2014). By scrutinising the Australians' strong trade union influence framework and New Zealand's labour constituency framework, it was found that these were the more attractive frameworks, with the United Kingdom's framework seen as less attractive as it focused on privatising education and training (French, 2009).

Weaknesses of the NQF were being addressed as is evident in the promulgation of the new NQF Act in 2008 (DoE, 2008). Since then a shift has occurred in that attempts were made to integrate and accommodate three distinct sub-frameworks into the NQF, with clear articulation routes between each − illustrated in Table 2.2 (South African Qualifications Authority, 2007). These are indicated below.

- **Track 1 Higher Education (HE):** This route includes all universities and private higher education providers delivering levels 5 to 8 on the NQF.
- **Track 2 General and Further Education and Training (FE):** This track consist of Adult Basic Education and Training (ABET) centres, schooling systems, and Further Education and Training (FET) colleges delivering levels 1 to 4 on the NQF.
- **Track 3 Trades and Occupations (GE):** This track includes trade-testing centres, workplace-based providers, labour centres delivering on a level of 1 to 4 on the NQF, where higher levels are not excluded.

Table 2. 2: Articulation and credit transfer routes from occupationally based qualifications to general/academic qualifications (CHE, 2007)

<table>
<tr><th>NQF Band</th><th>General/academic Track 1</th><th>Articulation</th><th>General/vocational Track 2</th><th>Articulation</th><th>Trade/occupational Track 3</th></tr>
<tr><td>HE</td><td>Discipline-based</td><td>Credits</td><td>Career-focused</td><td>Credits</td><td rowspan="2">Occupational recognition or context-based workplace qualifications</td></tr>
<tr><td>FE</td><td>Discipline-based</td><td>Credits</td><td>Vocational qualification</td><td>Credits</td></tr>
<tr><td>GE</td><td colspan="5">General educational qualifications</td></tr>
</table>

Key: *Solid arrows: Normal progression routes*

Dashed arrows: Progression routes from occupational qualifications to disciplinary-based qualifications, back to occupational levels

The focus of this study, however, is on Track 1, Higher Education and its sub-framework, as this is where the problem investigated resides.

2.3 SOUTH AFRICAN HIGHER EDUCATION QUALIFICATION SUB-FRAMEWORK

The goal of the HEQSF was to establish “a single qualification framework for a diverse system” (CHE, 2007). In October 2007, a single qualification framework was promoted for higher education in South Africa (RSA, 2007). The main objective was to facilitate the articulation of programmes and to handover students between programmes and higher education institutions.

Since its implementation in January 2009, the following concerns and inconsistencies have arisen and had a negative impact on meeting national policy goals and objectives (DoE, 2008):

- Due to the lack of variants in a degree at Universities of Technology, the appropriateness of qualification types to meet the needs of labour and to fulfil market expectations was questioned.
- The lack of 240-credit diplomas that may be necessary on a range of supplementary health careers.
- Articulation pathway from undergraduate to postgraduate programmes with reference to time needed for the completion of a qualification (DoE, 2007).

The South African higher education sector has awaited the publication of the implementation plans for the Higher Education Qualification Framework (DoE, 2008). From August 2008 to August 2010, the Council on Higher Education (CHE), DHET, and the SAQA published a number of communiqués to provide institutions with clarification and guidance regarding the implementation of the HEQSF (CHE, 2013). All existing institutions, public and private, who are offering existing and previously accredited higher education programmes have been affected by the implementation of the new requirements of the HEQSF. The impact is visible through minor name changes and/or a complete re-circulation of the programme content.

Traditional academic universities made minor changes in aligning their old qualifications with the new proposed structures, while Universities of Technology were required to make dramatic changes to their curriculum (CHE, 2010). Traditional universities already offered Bachelor, Honours, Master's and Doctorate degrees where Universities of Technology, according to the NATED 151 framework offered Diplomas, comprised of 18 months' theoretical studies and 18 months' relevant practical application in work places (CHE, 2010).

To align these qualifications to meet the requirements of the HEQSF, the changes that were required to the content of Diploma, Baccalaureus Technologiae, Magister Technologiae and Doctor Technologiae qualifications at Universities of Technology, were substantial (CHE, 2010). This was because the structure of the old framework required students to complete 18 months' theoretical studies and 18 months' relevant practical application in work places for many of these qualifications.

Table 2. 3: NATED 151 Qualifications vs. HEQSF Qualifications (SATN, 2013)

Non -HEQSF-Aligned Qualifications NATED 151		HEQSF-Aligned Qualifications	
QUALIFICATION TYPE AND CREDIT	NQF LEVEL	QUALIFICATION TYPE AND CREDIT	NQF LEVEL
Doctor Technologiae (D Tech) Doctoral Degree (PhD) (240 credits)	NQF level 8	Doctoral Degree (360 credit)	NQF level 10
Magister Technologiae (M Tech) Master's Degree in Business Administration (MBA) Master's Degree (120 credits)	NQF level 8	Master's Degree (180 credits)	NQF level 9
No equivalent Non-HEQSF aligned qualification exists		Postgraduate Diploma (120 credits)	NQF level 8
Professional Bachelor Degree (480 credits)	NQF level 7	Professional Bachelor Degree (480 credits)	NQF level 8
Bachelor Honours Degree (120 credits)	NQF level 7	Bachelor Honours Degree (120 credits)	NQF level 8
No equivalent Non-HEQSF aligned qualification exists		Advanced Diploma (120 credits)	NQF level 7
Baccalaureus Technologiae (B Tech) (120 credits)	NQF level 7	No equivalent Non-HEQSF aligned qualification exists	
Bachelor Degree (360 credits)	NQF level 6	Bachelor Degree (360 credits)	NQF level 7
		Bachelor of Education (480 credits)	NQF level 7
National Diploma (360 credits)	NQF level 6	Diploma (360 credits)	NQF level 6
		Diploma (360 credits)	NQF level 6
No equivalent Non-HEQSF aligned qualification exists		Advanced Certificate (120 credits)	NQF level 6
National Higher Certificate (120 credits)	NQF level 5	Higher Certificate (120 credits)	NQF level 5

The gap between qualifications on the existing NATED 151 framework and the new HEQSF needed to be closed in the high-level range of qualifications (CHE, 2010).

Table 2.3 provides an indication of how the NATED 151 (qualifications not aligned with the HEQSF, and the HEQSF qualification types with the associated National Qualification Framework (NQF) levels are aligned (CHE, 2010). The NQF is a framework that sets the boundaries, principles and guidelines that provide a vision, a philosophical base and an organisational structure for the construction of a qualifications system (CHE, 2010).

Concerning Section 27 of the National Qualification Framework Act 67 of 2008, the CHE initiated a review of the HEQSF in October 2010. The expanded mandate included the following:

- The development and management of the sub-framework.
- The development and implementation of policy and criteria for the development, registration and publication of qualifications.
- Ensuring that the development of qualifications by each university is required for the higher education system (CHE, 2010).

Submissions were received from numerous higher education stakeholders, both public and private. Professional bodies sought greater movement in the pathways for vocational and professional qualifications (CHE, 2004). After a revision of the HEQSF, requirements for integrating all higher education qualifications into the NQF was achieved.

A mechanism was developed to improve the coherence of the higher education systems. This mechanism indicated the routes, which can be followed between qualifications. These routes thereby enhanced the flexibility within the education system. This subsequently enabled students to move more efficiently from one programme to another as they pursue their academic or professional careers in the higher education system (CHE, 2010).

2.3.1 Institutions

In 2013, the South African Higher Education System had the following 26 public higher education institutions (CHE, 2015):

- Eleven Traditional Universities: University of Cape Town, University of Fort Hare, University of the Free State, University of Kwazulu-Natal, North-West University, University of Pretoria, Rhodes University, Stellenbosch University, University of the Western Cape, University of the Witwatersrand, and Sefako Makgatho Health Science University (CHE, 2015).
- Six Comprehensive Universities defined as an institution offering a range of degree programmes that include the liberal arts, as well as professional fields such as business and education: University of Johannesburg, Nelson Mandela University, Walter Sisulu University, University of South Africa, University of Venda, and the University of Zululand (CHE, 2015).
- Eight Universities of Technology: Cape Peninsula UoT, Central UoT, Durban UoT, Mangosuthu UoT, Sol Plaatjie University, University of Mpumalanga, Tshwane UoT, and Vaal UoT (CHE, 2015).

2.3.2 Characteristics of Universities of Technology

A common question is, “What makes a UoT different from any other university, as compared to the classical concept of a university?” The use of technology in a university is not the classification criteria of a UoT. It is rather the interlinking focus between the nature of the university and technology that constitutes a technological university (Du Preez, 2010).

Therefore, the study focus at a UoT is on technology while students maintain the viewpoint from various study fields, rather than one particular study field. *Technology* in this sense refers to the arrangement of nature by humans with the help of tools for human purposes.

It refers to the operative and proficient application of the amassed expertise, knowledge and skills that, when applied, will result in the production of value-added products, processes and services. In essence, it is the expertise to construct, which includes forming and emerging new technologies (Du Preez, 2010).

Technology is found in the Greek origin *techne*, which means *skill* or *proficiency* (Du Preez, 2010). Furthermore, it is related to the word *episteme*, which refers to *understanding and skill*. Therefore, the word 'technology' refers to two separate issues: first, the skill to fabricate products, followed by the skill to manage the fabricated products (du Preez, 2010).

From the above we can extrapolate an understanding of technology similar to the definition provided by USESCO:

> "... the know-how and creative processes that may assist people to utilise tools, resources and systems to solve problems and enhance control over the natural and made environment in an endeavour to improve the human condition" (Du Preez, 2010 p10).

The main goal of technology is to improve lives. All instruction/learning curriculum and projects are therefore focused on Technology. Technology is evidently integral to all academic activities of a UoT (DoE, 2008).

While all academic specializations should be studied at a university, specific fields of study would benefit more from a University of Technologies approach to education. The fields of science, engineering and management would have high priority at universities of technology (DoE, 2008).

Thus providing the evidence that a UoT differs from a Traditional University, Brook (CHE, 2010) described the helpful characteristics of a UoT:

- Universities of Technology are research-informed.
- Curriculums at Universities of Technology are established according to the defined graduate profiles as determined by the industry and profession.
- Universities of Technology focus on strategic and applied research, which supports professional practice.
- Universities of Technology make provision for multi-level entry and exit points for students.
- Universities of Technology are primarily concerned with the development of vocational/ professional education.

- At Universities of Technology, technological capabilities are as important as cognitive skills.

The aim of technical universities in various countries is to further economic progress. The goal within these universities is to equip students with the skills to construct products that are needed by society. Generally, science and engineering students who graduate from Traditional Universities have little understanding for the world of work (CHE, 2010). They are skilled in the science of things, but have to learn to manage project budgets, drafting strategic plans, writing reports, managing people, developing technology and applying skills. This is the critical point where Universities of Technology are different from Traditional Universities. Clearly, the economy needs both types of institutions, each having its own niche in the spectrum of the country's educational requirements (CHE, 2010) .

2.4 FUNDING OF HIGHER EDUCATION INSTITUTIONS: INTERNATIONAL TRENDS

For decades, policymakers have been concerned about increasing the efficiency and effectiveness of higher education institutions. In recent years, funding has been directly connected to government funding based on an institution's performance with regard to student graduation numbers, retention numbers, transfer of students between qualifications and universities and job placements (Dougherty, Jones, Lahr, Natow, Pheatt & Reddy, 2016).

2.4.1 Norway

In 2003, Norway adopted a finance system for higher education that was centred on the general number of students in different subjects.

The purpose of this was to deliver the society with the appropriate allocation of students with certain skills. With this in mind, an overall budget could be allocated across institutions (Frolich & Strom, 2008).

A lack of incentives was used as a reason for the high dropout rate and the longer average for students to complete their studies.

It was recommended that the government introduce a result-based funding system two years later, where the institutions' budget depended on the number of students in addition to a base component and a separate component for research funding (Frolich & Strom, 2008).

The activity-based student component on average represents approximately 25% of a university's budget, while the research and base components represent 15% and 60% respectively. Because the set credits taken by a student could now be predetermined, this funding system has been in place since 2003/2004 as a model for predicting the income budget (Frolich & Strom, 2008). Apart from these changes to the system, another change was made to the institutional funding scheme in public higher education. This change was in the financial aid system, which resulted in tuition fees no longer paid by the student but rather through subsidised loans from the government. This was done to motivate the student to pass his/her subjects, as the relationship between the grant was directly proportional to the passing of a subject (Frolich & Strom, 2008).

2.4.2 Jamaica

Since 1993, the Jamaican government has accepted the policy of a cost-sharing funding model for all higher education systems (Nkrumah-Young, Huisman & Powell, 2008). It was regarded as a collective responsibility between the Jamaican government, corporate sectors, individual institutions and students. The Jamaican government would still provide an important portion of resources and the World Bank would assist in aiding student financially (Nkrumah-Young et al., 2008). Positive effects, such as improved financial performance of higher education institutions due to an increase in student enrolments were noticeable with the introduction of this funding model.

There are, however, disadvantages to this cost-sharing funding model. Firstly, the fees are set by the government and is based on price control, which means institutions cannot set prices above a certain level.

This can result in an oversupply or shortage on the funding that an institution receives. Secondly, transparency is lacking due to the rationale for price setting and calculations of cost.

The cost was determined by either the operational budget of an institution and what the governments deemed appropriate, or the actual cost of a qualification in an institution.

The third negative aspect relates to the issue of student fee merits, which either could be set by the government or be left to the institutions to change, according to labour markets. Lastly, it was recommended that a process had to be followed for allocating resources to higher education institutions to ensure equal treatment of regional and nationally owned institutions due to historical roots of higher education in the Caribbean (Nkrumah-Young et al., 2008).

2.4.3 United States

Revenue generated in public universities in the United Sates varies from commercial to non-commercial activities (Bok, 2003). However, tuition fees, state appropriations, endowment income and federal funding are the largest sources of revenue of public universities. Of these sources of income, tuition fees and state appropriations constitute the bulk of income that an institution has discretion to allocate (Wellman, Desrochers, Lenihan, Kirshstein, Hurlburt & Honegger, 2009). Due to public higher education's being non-profit organisations, surplus revenue cannot be extracted from the institution but must rather be used to subsidise other aspects that need the funding in institutions that cannot generate sufficient funding themselves. Looking at this model, in general the established trend indicates that most public institutions have experienced an increase on net tuition fee income (tuition minus the university's financial aid) as a primary source. Figure 2.1 below is a representation of the United States published tuition and mandatory fees over the same period for 4-year public institutions. A 4-year institution is a postsecondary institution that offers programmes of at least 4 years duration or one that offers programmes at or above the baccalaureate level (Wellman et al., 2009).

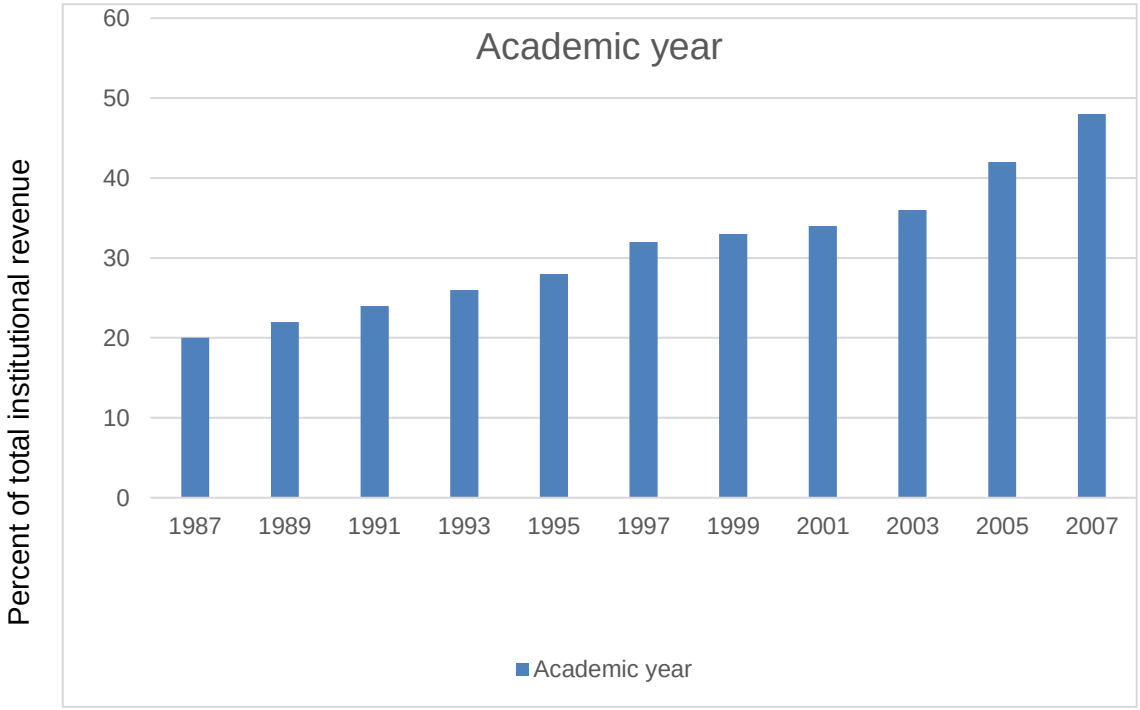

Figure 2. 1: Revenue trends at public four-year universities in the United States 1987 – 2008 (Wellman, J; Desrochers, D; Lenihan, C; Kirshstein, R; Hurlburt, S; Honegger, S, 2009)

2.4.4 United Kingdom

In 1992, the Higher Education Funding Councils (HEFCs) was established. The public financing of the United Kingdom's universities has changed significantly, with allocations from the United Kingdom Government progressively reliant on institutions fulfilling research and teaching criteria as it was determined. However, separate HEFCs for England, Scotland and Wales determine funding on the British mainland, while the DoE for Northern Ireland (DENI) is responsible for Northern Ireland's universities, advised by the Northern Ireland Higher Education Council (NIHEC). This distribution of responsibilities allows more independence for the regions, but makes it challenging to distinguish underlying trends in higher education spending. This is the reason that most studies focus on a single HEFC − most often that of England (Stiles, 2000).

The increase in student numbers during the 1990s was in keeping with the aim of broadening access to higher education coupled with a simultaneous drive for superior efficiency and the maintenance of a globally competitive research base (Command, 1991).

The implementation of the HEFCs has faced difficulties in reconciling expansion with spending restrictions and the emphasis on efficiency gains. Consequently, HEFCs were hard-pressed to allocate increasingly scarce resources to universities.

According to the Higher Education Statistics Agency (Higher Education Statistics Agency, 1997/98) the HEFCs "emphasised teaching, research and a total block grant, which combined, constituted the largest proportion of an institutions' total income during the 1990s. Indeed, despite the growth of non-government income during the past decade, it is estimated that 38.8% of the total income of UK higher education establishments was composed of HEFC funding". In 1999/2000, the UK HEFC teaching grant (TTG) income was £3 569 million, approximately three-and-a-half times that generated by research grants (TRG), which stood at just over £1 035 million. Along with other components, the total adjusted UK HEFC grant (TAG) in 1999/2000 was £4 608 million. Since 1994/95, research grant income has risen by 31.2%, teaching grants by 24.7% and the total adjusted grant by 26.8%.

2.4.5 South Africa

To understand what the impact of the new HEQSF may have on human resources in South Africa, the allocation of funding and how income is generated by a university needs to be explained. This will help in calculating the amount each qualification generates towards the university for an x number of students.

The number of staff-to-students ratio determines the impact of funding on human resources; this ratio needs to be known by universities. In 2013, the public Higher Education institutions employed 52 571 academic staff and 137 571 support staff; higher education institutions enrolled 983 698 students of which 800 955 were undergraduate students and 159 548 were postgraduate students (CHE, 2015).

Qualifications awarded by public higher education institutions in South Africa can be categorised as follows (CHE, 2015):

- 180 698 qualifications at all levels
- 49 051 qualifications in business and commerce
- 52 540 qualifications in science and technology
- 79 233 qualifications in the human and social sciences

The public higher education institutions produced 10 809 master's degrees and 2 051 doctoral degrees.

The following percentage of first time entering students in 2008 (excluding UNISA) graduated after six years (CHE, 2015):

- Diplomas of 360 credits, 50% of the graduates completed their studies, improving on the 47% of the 2006 first time entering students who graduated.
- Degrees that should be completed in 3-years, 59% graduated (no improvement).
- Degrees that should be completed in 4-years, 63% graduated, improving on the 56% of the 2006 first time entering students who graduated successfully.

To make sense of all these numbers, the funding categories and funding groups discussed in Chapter 1 need to be taken into consideration.
For each level of qualification, a different grant is allocated. For example, a Humanities qualification at level 1 has a much lower input and output grant than a level 4 qualification (CHE, 2015).

Each value above represents a student completing a degree and is converted into a monetary value, which the Department of Higher Education pays to a university. In the 2018/2019 cycle, the successful completion of an undergraduate degree by a student would, for example, earn a university an amount of R 24 678, a master's degree R108 300 and a doctoral degree R 324 900 (CHE, 2016). This, however, forms part of only one of the three income streams to a university. One other stream is a TIU as discussed in Chapter 1. The last leg is the tuition and class fees, and the National Student Financial Aid Scheme of South Africa (NSFAS) (CHE, 2016). This scheme was established in 1991 due to the fact of previously failed student loan schemes (Jackson, 2002).

The mission statement of NSFAS (CHE, 2016) is the following:

> *"The National Student Financial Aid Scheme of South Africa (NSFAS) seeks to impact on South Africa's racially skewed student, diplomate and graduate populations by providing a sustainable financial aid system that enables academically deserving and financially needy students to meet their own and South Africa's development needs"* (CHE, 2016 p283).

In the 2017 academic year, a proportion of more than 45 percent of South Africa's higher education student population enrolled at contact institutions, while 230 469 students were supported by NSFAS (CHE, 2016). In the light of the movement towards fee free education, and despite a steadily increasing budget, the scheme cannot fund all students who apply and qualify for financial aid. Due to the increased burden of funding and the increase in First Time Entering Students (FTEN), it was necessary to incorporate fundraising strategies into its mandate. The implication of this is that additional funds needs to be raised through the private sector, SETAs, other government departments, and international donors. In order to qualify for funding and to ensure that NSFAS funds reach the right students who have the greatest need for funding, students need to provide proof that the income threshold of parents or guardians is less than R350 000 per annum (CHE, 2016).

NSFAS funds are paid directly to the tertiary institutions, such as universities and Technikons that in turn allocate these funds to individual students in the form of loans, part of which can be renewed into a bursary if the student achieves good marks in his or her tertiary education course. NSFAS has clearly been one of the key players in bringing significant change. However, its goals are ongoing and dynamic. Student profiles are still racially skewed; academically able but financially needy students will always be with us and the bulk of the loans still needs to be recovered. Therefore, NSFAS still has work to do.

2.5 HUMAN RESOURCE MANAGEMENT

Universities increasingly need to be globally competitive and as a result need to compete internationally to appoint highly qualified and competent staff. In contradiction to the past, where conditions of employment and linear career structures offered stability and predictability, universities are now part of a very complex knowledge producing structure (Gibbons, Limoges, Nowotny, Schwartzman, Scott & Trow, 2002), which forces them to look for new and different skills in a harsh competitive environment (Wood, 2005). Hence, a shift took place from a stable, secure, and low maintenance environment to a high risk, high maintenance environment that is influenced by the connection between the higher education institutions, governments and developmental agencies.

2.5.1 United Kingdom

In systems such as those in use in Australia, New Zealand and the United Kingdom public-funding bodies have been looking for methods on how to reduce the effects of uncertainty and enhance the performance of staff. In the United Kingdom, initiatives by the Higher Education Funding Council for England (HEFCE) had developed a good practice of Rewarding and Developing Staff (HEFCE, 2005) and for Leadership, Governance and Management (HEFCE, 2003). In conjunction with this, the Higher Education Role Analysis Scheme (HERA) was implemented to help the incorporation of all staff on a single national pay scale. This was done in conjunction with the European Community and aimed to promote equal opportunities, and to meet government and funding council policies (Prudence & Deer, 2005).

This changing environment is influencing higher education institutions around the world. While some individuals may see this as a threat, others may see as being liberating or the legitimation of developments (Harman, 2003). The literature reports growing concerns about workloads, stress and issues of work-life balance (Gordon & Whitchurch, 2007).

Human resource strategies are outlined to equip institutions to compete and retain a high quality of creative people in an environment. This is outlined by the following six elements by Dunkin (2005).

- Determining how many people are needed, what they need to do, how they need to do it, and how to configure and manage them.
- Analysing skills needed and addressing any shortfalls.
- Attracting and retaining high quality staff.
- Managing performance.
- Rewarding and acknowledging performance.
- Developing staff.

2.5.2 South Africa

Chigada and Ngulube (2015) explain that due to South Africa's economy being largely knowledge-driven, the human resources environment has experienced unprecedented change in the last decade. In 2009, the South African government emphasised the need for higher education institutions (HEIs) to appoint and sustain highly qualified and skilled academic and support staff (Nzimande, 2009). Due to a national skills deficiency, a need to pursue human resource management (HRM), strategies were identified to overcome these deficiencies. It was necessary for institutions to take notice of the critical level of knowledge gaps and develop appropriate human resource strategies, and to find instruments to generate, capture, retain and harness knowledge to achieve the organisation's human resource objectives. According to Hunter (2010) economists, researchers and industrialists believe the shortage of skills is the largest challenge faced by the economy in the 21st century. These challenges contribute to emigration, early retirement, deteriorating work conditions and poor salaries. It is proposed that South Africa is in denial about the shortage of skills in higher education (Hunter, 2010). Hunter (2010) claims that due to the shortage of skills, institutions are appointing under-qualified staff, which then results in standards being lowered, thereby compromising the quality of service delivery and productivity. According to Momberg (2008), an acute shortage of skills is prevalent in the higher education sector. If an urgent solution cannot be found, future operations of HEIs can be negatively affected (Momberg, 2008).

Higher education institutions therefore need to come up with strategies to respond positively to the problem of the continuous withdrawal of skilled employees (Smith & Schurink, 2005).

2.6 THEORETICAL FRAMEWORK: NATIONAL IMPLEMENTATION RESEARCH NETWORK FRAMEWORK

The National Implementation Research Network Framework frames this study. This framework is suitable for my study as it provides a comprehensive foundation for investigation, focussed selection, explanation, development and methodical implementation of a programme's practice model (Fixen et al., 2005). Consideration of these components should occur during the exploration and adoption stage of programme implementation. To implement a purposefully selected practice model effectively with fidelity, a service organisation must adjust its infrastructure at the initial stage of programme implementation. This will obviously have implications for the management of its human resources. Then, using model-pertinent data, the service organisation should make practice-informed adjustments during the stage of initial programme implementation until it achieves targeted fidelity and population outcome benchmarks that characterise the stage of full programme implementation (Bertram, Blasé &Fixsen, 2013).

The prospective relationships among primary implementation components, organisational features and influence factors are illustrated in Figure 2.2.

Figure 2. 2: Multilevel Influences on successful implementation (Bertram et al., 2013)

A number of authors (Bernfeld, Farrington & Leschied, 2001; Edwards, Schoenwald, Henggeler & Strother, 2001) have described an approach to understand the transactional effects shared by these domains.

As shown in Figure 4, core implementation components must be present for implementation to occur with dependable outcomes. The organisational components must be present to enable those core components to thrive in the long-term. In addition, all of this must be accomplished over the years in the context of capricious but influential changes in governments, leadership, funding priorities, economic boom-bust cycles, shifting of social priorities, and so on. Further explanation is provided in Chapter 3.

The core implementation elements appear to be critical for changing the workload of practitioners who are key providers of evidence-based practices within an organisation. The core elements need to be sustained by an organisation that establishes facilitative administrative structures and processes to select and assess the workload of practitioners; consistent programme evaluation functions which provide guidance for decision-making and intervention in external systems to assure ongoing resources and support for the evidence-based practices in the organisation.

2.7 CONCLUDING REMARKS

In this chapter, I indicated the different trends in NQFs, the HEQSF of South Africa and the changes made by the DHET. The characteristics of Universities of Technology and the implications of the HEQSF for universities of technology in comparison to traditional universities were addressed. The Higher Education Institutions Statistics and Funding trends were discussed, followed by human resource management in higher education systems. As they have led the study in the implementation process of a newly designed fee structure model, the National Implementation Research Framework and its five intervention components were described, starting with the multilevel influences on successful implementation.

In the next chapter, I present the methodology and research design used to conduct this study. A detailed explanation of the model to predict the implications of the HEQSF on human resources is provided.

CHAPTER 3
RESEARCH METHODOLOGY

3. 1 INTRODUCTION

This chapter focuses on important aspects that dictated how the research was conducted. In addition, the paradigm from which this study was conducted is presented and discussed. Aspects such as the research approach, research design, research site and data collection methods are presented.

3.2 EPISTEMOLOGICAL PARADIGM

Epistemology originated from the Greek word *episteme*, meaning *knowledge*. According to Trochim (2000), epistemology is the philosophy of knowledge or how we come to know it. Trochim (2000) explains that epistemology thus poses the following questions:

- What is the relationship between the knower and what is known?
- How do we know what we know?
- What counts as knowledge?

Based on the above, this study was conducted from the paradigm of pragmatism. Pragmatism is the idea that knowledge results from actions, situations and consequences being socially assembled by the processes from within institutions. According to Pansiri (2006), legitimisation and socialisation place “managerial characteristics and perceptions at the core of any inquiry that seeks to understand organisational life”. In pragmatism, the emphasis is on the link between theory and practice, between thought and action, on the practical consequences of beliefs and concepts and acting on them in a human experience (De Waal, 2005). In other words, pragmatism places emphasis on the practical application of ideas by acting on them to test them in human experiences. As articulated by de Waal (2005) a pragmatic approach evaluates theories or beliefs in terms of the success of their practical application.

3.3 RESEARCH METHODOLOGY

Applying a pragmatic view to the research problem, the researcher utilised a predictive analytics design. This design, as described by Waller and Fawcett (2013), is unique from all other quantitative research designs as it is both quantitative and qualitative.

The design forecasts possible outcomes while looking at the past and analysing those outcomes for an outcome other than what has already occurred. Predictive analytics seeks to identify relationships between variables by using mathematical methods (Waller & Fawcett, 2013). The research approach employed in this study was thus both quantitative and qualitative, with the quantitative approach being dominant. In other words, both quantitative and qualitative methods were applied. The combination of quantitative and qualitative methods has the potential to provide a more rounded understanding of the phenomenon being studied (Creswell, 2012). While mixed methods research can be thought of as two separate designs, the challenge lies in merging, integrating, linking and embedding these two research designs to present quality research (Creswell, 2012). This is a time-consuming process. However, the results of this mixture of designs have the potential to provide an in-depth view of the phenomenon (Creswell, 2012).

A mixed methods research design combines the strengths of both quantitative and qualitative designs. This aids in developing an in-depth understanding of the phenomenon under investigation. Mixed methods research has the ability to provide a more intricate design to the problem under investigation, as well as to provide a well-rounded understanding of the topic (Ivankova, Creswell & Clark, 2014). Based on the above, the methodologies and corresponding research design employed in this study are indicated in Table 3.1 below.

Table 3. 1: Research strategy

Research Methodology	Qualitative (QUAL)	Quantitative (QUAN)
Research Design	Policy Analysis	Development and application of prediction model

3.3.1 Quantitative Research

Quantitative research can be described as identifying and explaining why a problem occurs in a field that the researcher selected. This problem can be answered through the researchers' study as he attempts to identify the tendency of responses brought forward by the data under investigation (Creswell, 2012).

Variables are very much a part of quantitative research, as the researcher is often required to explain how one variable affects another. Variables refer to an attribute or characteristic that the researcher seeks to explain (Creswell, 2012).

A literature review plays a vital role in the initial stages of a quantitative research study (Creswell, 2012) and is used both to justify the need for the research as well as to advocate for the purpose of the research and identify research questions. In other words, literature is used to justify the importance of the issue selected for the study (Creswell, 2012).

Research questions are formed to be clear and precise for the researcher to attain data that is measurable and observable. Aspects such as the purpose statement and research questions are formed in such a way that only a few variables may be identified for the investigation (Creswell, 2012).

While a quantitative design uses the research problem to direct questions during data collection, a qualitative design uses the research problem to confirm the importance of the study. In addition, there is a difference in the analysis strategies utilised; the quantitative design analyses numerical data in statistical analysis while the qualitative design analyses words from the actors or participants (Creswell, 2012). As the bulk of this research involved quantitative data (numbers and formulas) to develop a model for predicting the effect of the HEQSF Act on the human resources at a faculty of a UoT, this study is predominantly quantitative in nature. The qualitative aspect of the study took the form of policy analysis, more specifically an analysis of the HEQSF (Ivankova et al., 2014).

3.3.2 Qualitative Research

Qualitative research seeks to gain a much deeper understanding of the phenomenon being studied (Nieuwenhuis, 2016). Nieuwenhuis (2016) describes qualitative research as being naturalistic as its focus remains on the environment where interactions occur naturally.

Qualitative research methods were developed to meet the need to explore problems to develop an understanding of the use of literature for the justification of the problem studied. To interpret the larger meaning of the information gathered themes were identified in the data.

The researcher made use of flexible and evaluative criteria that led to the optimal conditions for report writing.

In qualitative research, the literature review does not play a major role in the initial stages of the research; it is rather used to justify why the research is needed. This is because qualitative research relies on the information discovered to direct the course of the literature gathered and therefore later refines the research questions (Nieuwenhuis, 2016). The collection of data is performed to learn from the data and thus form protocols for recording data. Protocols may change in the course of the study to cater for emerging trends in the data to deliver a well-written report (Nieuwenhuis, 2016).

3.3.3 Strengths and Weaknesses of Mixed Methods Research

Hibberts and Johnson (2012) point out the following advantages of using mixed methods in research:

- The use of words can add meaning to numerical data.
- The researcher does not need to remain within one research design.
- Mixed methods research can generate practical theory by linking theory and practice.
- The strengths of one design may be used to negate the weaknesses of the other design.

- Qualitative data has the potential to identify possible issues in the quantitative analysis.
- Qualitative descriptions of the information may provide a feedback loop.
- The combination of quantitative and qualitative research designs creates integrated information (Hibberts & Johnson, 2012).

As with every design, there are inherent weaknesses. These include a greater difficulty in developing an understanding of both designs utilised (Hibberts & Johnson, 2012). To combine the designs, I needed to understand both designs separately to make informed decisions because the act of balancing the designs can be difficult and time-consuming (Hibberts & Johnson, 2012).

The use of a mixed methods research design was necessary as I planned to examine numerical data to develop a model, which may shape policies within a university. While arguments can be made for this research to be purely quantitative, I decided to combine the strengths of both quantitative and qualitative research to develop a well-rounded and valuable model for the university. The qualitative data would ensure greater effectiveness of the quantitative data collected because it provided the context in which the quantitative data was to be analysed and interpreted.

In mixed methods research, there are various designs that may be utilised for their ability to complement the research. The research design that was chosen for this research is now discussed in detail.

3.4 RESEARCH DESIGN

The research was conducted in four phases as indicated in Table 3.2 below.

Table 3. 2: Phases of the research project

Phase	Actions taken
1	Policy analysis
2	Collection of existing quantitative data
3	Development of the prediction model
4	Interpretation of the results

3.4.1 Phase 1: Policy Analysis

Policy analysis can be described as normative, which makes reference to judgements about what ought to be, rather than descriptions of what is. Judgements about what the university's fee structure ought to be clashed with what the data conveyed it actually should be.

As such, the university was operating on misguided judgements based on old statistics and data. Therefore, I began an inquisition into what the fee structure should be based on to update the current policies. According to Dunn (2016), information that is relevant to policy analysis research should contain one of these five questions:

1) What is the problem for which a potential solution is sought?

2) What are the expected outcomes of policies designed?

3) Which policies should be chosen?

4) What policy outcomes are observed?

5) To what extent do observed policy outcomes contribute to the investigation?

These questions describe five types of information that can be referred to as policy-informational components. By using these questions, I was able to draw upon information that would contribute to meaning-making throughout the study.

Policy problems can be seen as opportunities for improvement through action (Dunn, 2016). While the above questions were used to identify data that would add value to the research, issues found in the original fee structure documents were in need of a re-model. These issues were turned into an opportunity, as the importance of this model became ever more pertinent to the university's survival. These questions were used in sequential order to gather meaningful data. Firstly, the problem was identified as an invalid fee structure, which would ultimately cause the university to close its doors due to financial constraints. Thus, the potential solution, which involved the redesign of the fee structure, became a pertinent part of this study.

Secondly, the expected outcome was the design of a policy that sought to change the manner in which the university managed its lecturer-to-student ratio. Thirdly, policies chosen were those affected by the HEQSF and NATED qualification guidelines. These required an update as certain qualifications were changing.

Fourthly, a potential outcome from the model designed in this research study sought to redesign the university's fee structure to provide a valuable instruction and learning environment.

This policy analysis phase started with the new *Funding Framework: How Government Grants are allocated to Public Higher Education 2015* (CHE, 2015). This policy was used to determine how a public university generates income from public and private sectors and to determine the monetary value of grants received from government when students start a course/degree and when they successfully complete a course/degree (CHE, 2015). This policy would form the base of the prediction model on income received from government.

To further strengthen the study, *The Ministerial Statement on University Funding: 2017/2018 and 2018/2019* document was analysed to retrieve specific funding groups and CESM categories of a qualification (CHE, 2016). As each qualification might fall into different CESM groups, it was essential for the prediction model to build this into it, and not to use a once-off approach, but rather to make allowances for a multi-level approach.

Closely linked to the above-mentioned policy, the policy on *The HEQSF* was also analysed to determine the structure of the newly aligned HEQSF qualifications that would be introduced into Universities of Technology (CHE, 2013). The policy would become a significant element of the prediction model, as it would show the current qualifications on the NATED 151 framework in relation to the HEQSF aligned qualifications, as discussed in Chapter 2. Furthermore, it provided the period for the phasing in of the HEQSF qualifications and the phasing out of the NATED 151 qualifications.

The documents indicated in Figure 3.1 were collectively used to strengthen the prediction model and to give clarity on how the funding models affect different universities, programmes, level of programmes and the effects of these factors on how income is generated. The sequence of the analysis was determine by gaining base information for the prediction model, and then bringing it closer inline to the university structures and needs.

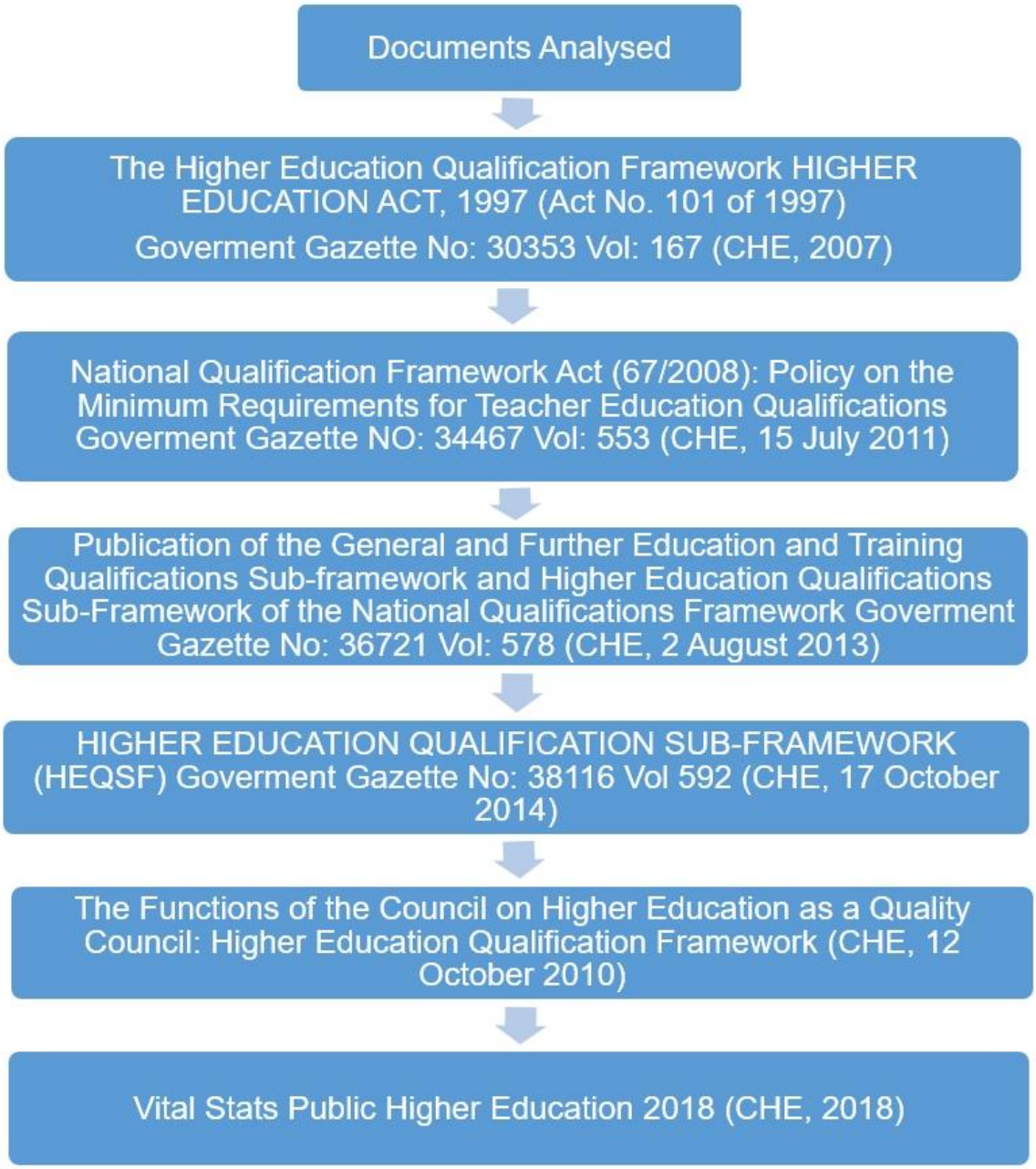

Figure 3. 1: Documents used in the document analysis phase

3.4.2 Phase 2: Collection of Existing Quantitative Data

The characteristics that shape the quantitative research include a description of trends as they relate to one another, the collection of numerical data from a larger number of people through pre-set guidelines, the analysis of trends, comparison of groups and relating variables using statistical analysis methods, and the use of standard structures for which the research may be conducted without bias (Creswell, 2012).

Quantitative data applicable to this study was obtained from the Higher Education Management Information System (HEMIS).

This is management information that is provided to various internal and external stakeholders for strategic planning purposes, the development of enrolment plans, financial planning and for the implementation of policy procedures. To gain access to the data set, I had to submit a formal application to the registrar of the university. After approval had been gained, the relevant data set was opened for viewing in my internet browser, from where I could export relevant data in various formats. The data included the following:

- FTE (FTE) students that generate income for a university.
- First Time Entering Student data.
- Throughput rate of the faculty.
- Graduation rate.
- Headcount.

3.4.3 Phase 3: Development of the Prediction Model

The Kapp and Van Wyk model of prediction is a visual representation of the tool developed to calculate and make predictions and was developed with the collaboration of Professor Barend van Wyk. A detailed explanation of this prediction model is provided in Chapter 4. Prediction is necessary in this case, as the objective of this research was to gain insight into the funding aspects of a university, more specifically, at faculty level. This model is futuristic in the manner that it uses past and present ratios to predict future needs in the university.

Such a prediction model enables the organisation to make necessary preparations to serve its employees and students best.

3.4.4 Phase 4: Interpretation of the Results

In Phase 4, the results of eleven key estimates were interpreted. The interpretation of the results led to the final estimation of senior lecturer equivalent estimates. With this estimate known, the faculty can manage each department as it shows the number of staff needed to deliver a specific qualification.

Three keys estimates namely headcount, full-time equivalent (FTE) and graduation estimates ran parallel for interpretation. With each of these estimates linked to a different stream of income for the faculty, these links can be seen in Figure 3.2.

The headcount estimates link to FTE estimates that link to the class fee of what a student will generate for the faculty; the FTE estimates also link to TIUs and teaching input income, which is funded by the government for a student that enters a university and takes a full load (120 credits) per year. Graduation estimates link to TOUs or ROUs, depending on undergraduate and postgraduate studies, which are funded by the government for a student completing a qualification.

With the tree main streams of income generated (class fee, teaching input income and teaching output income) distributable income can be estimated for the faculty, with only 65% of distributable income to be used for academic salaries. With the estimate of income for academic salaries, the senior lecture equivalent could be calculated and compared with the staff-to-student ratio that was predetermined by the DHET.

3.5 ADRESSING TRUSTWORTHINESS

I addressed trustworthiness by pointing out its perceived limitations and expanded this list to include limitations that occur during the data collection process. I completed data verification by analysing collected data to identify a common trend that either proved or disproved the objective of the research (Maree & Pietersen, 2014).

Once data themes had been identified during the data analysis process, I engaged with peers in my field to confirm perceived themes. I also confirmed my understanding with them as I shared the information gathered from the documents.

By including these techniques, I ensured that this research is credible, with trustworthy accuracy. The trustworthiness of this study was further ensured by addressing credibility, dependability and authenticity.

Authenticity refers to the documents as being genuine, reliable and dependable in nature. It falls upon the researcher to ensure that the document is authentic. This is similar to how a researcher must ensure that an observation occurs in a natural, non-staged manner. If the document is erroneous, or if there are inconsistencies in the data presented, the researcher must hold the document under intense scrutiny. The researcher must authenticate the authorship of the data and verify its contents to the best of his ability. Credibility refers to the document as being without error. The presentation of the data must also be clear for the researcher to refer to the document as being credible.

Documents must be representative of the data selected. Thus, the data must demonstrate typical information that one would expect under the documents objective. Finally, the meaning of the document must be clear and easily comprehendible to the reader (Mogalakwe, 2006).

3. 6 STRENGTHS AND WEAKNESSES OF THE RESEARCH APPROACH

Strengths of the model are that it can be used in any department, big or small, and even be up-scaled to university or institutional level as it uses true HEMIS data received from the registrar's office and that has been audited by the DHET. In addition, a further strength of the research approach can be found in the weakness of the fee structure in a university and more specifically, the FEBE. This weakness in the fee structure is what forms the crux of the entire research project and in turn Project 2020.

An added weakness of model is that it is still a prediction model. Although many factors have been taken into consideration when developing it as discussed in Chapter 4, fluctuation in student numbers and staff can have an impact on it.

I have pointed out perceived limitations of each strategy and method employed for the completion of this study (Creswell, 2014).

All quantitative data pertinent to this research was found in the departmental offices at a UoT. The handling of documentary sources met specific criteria, such as authenticity, credibility, representativeness and meaning (Mogalakwe, 2006). Due to the predictive nature of this study, gaps may result in the data, which other researchers may wish to fill-in as the years progress. As this is a live predictive model that requires a yearly update to attain accurate data for the following year, this model is restricted by past attainable data. This predictive model cannot accurately predict key estimates twenty years from now, as it is reliant on recent past data to formulate such an estimate.

3.7 ETHICAL CONSIDERATIONS

As this research project first began as a project at the Tshwane UoT as part of my work-related duties, ethical clearance was first obtained from the UoT. I then obtained ethical clearance from the University of Pretoria to continue the study, which had been put on hold until I had gained such clearance. After ethical clearance had been granted, I applied to the office of the Registrar of the UoT for the data required to complete the study. All headings that might show the name of the university have been hidden to ensure the anonymity of the research site.

3.8 CONCLUDING REMARKS

In this chapter, the epistemological and methodological paradigm from which this study was conducted was explained. The mixed methods research approach employed in the study, as well as its strengths and weaknesses was presented. It was explained that the HEMIS data applicable to a specific faculty of a UoT was used, based on specific criteria. The chapter is concluded with a discussion of issues related to the reliability and validity of the prediction model employed in the study, the strengths and weaknesses of the prediction model and ethical considerations relevant to the study. A full explanation of the prediction model and a discussion of the results are presented in Chapter 4.

CHAPTER 4
THE PREDICTION MODEL AND THE FINDINGS

4.1 INTRODUCTION

In this chapter, the prediction model is presented and explained and all definitions and formulas for the calculations are provided. This is followed by a discussion of the findings as derived from the key estimates provided by the prediction model.

4.2 BREAKDOWN OF THE MODEL OF PREDICTION

The development tool to calculate the predictions is illustrated in Figure 4.1. The aim was to develop a tool that can make predictions on future values as shown in red in the prediction model (SLE ratios, FTE, TIU, TOU, Graduation, Class fees, Distributable Income and Income for Academic Salaries Estimates) based on historical data of the FEBE to plan and prepare shifts in human resource needs in each department. Quantitative data pertaining to a cohort of three years (2015 to 2017) was extracted from the Higher Education Management Information System (HEMIS).

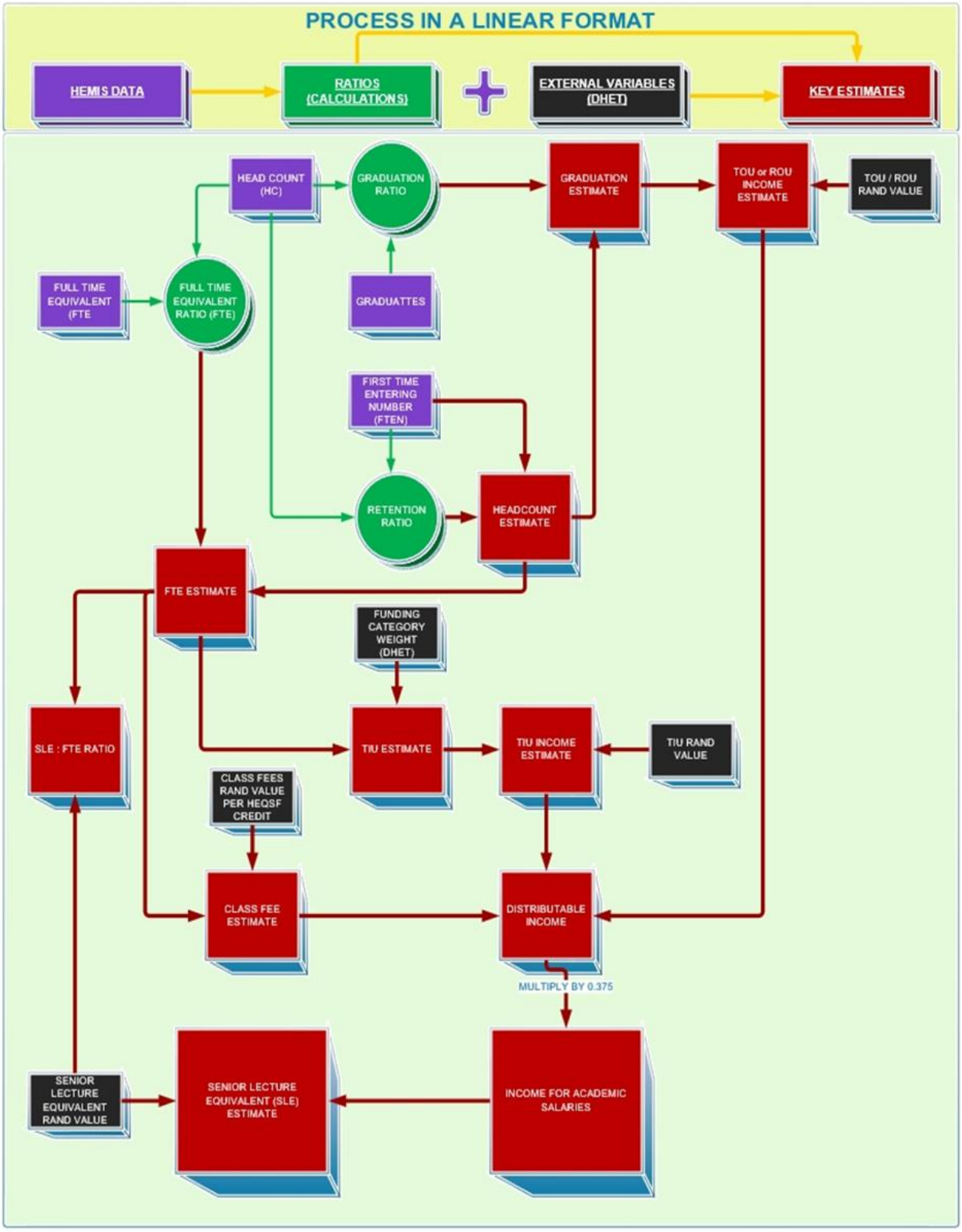

Figure 4. 1: Kapp and van Wyk developmental tool to calculate predictions

Each data heading used in the analysis is explained in detail following the following format: definition, purpose, calculation method and formula.

4.2.1 Qualifications

All qualifications in the FEBE were extracted from the HEMIS data, including the subjects for the different qualifications. The qualifications and subjects were divided into two parts on a spreadsheet, namely the phasing out qualifications NATED 151 and the HEQSF aligned qualifications, which are being phased into the structure. This is shown in Table 4.1.

Table 4. 1: NATED 151 being phased out and HEQSF qualifications being phased in

NATED 151 Qualifications (Phasing out)	HEQSF (Phasing in)
Department of Architecture	
Baccalaureus Technologiae in Architectural Technology	Master Of Architecture (Structured)
Baccalaureus Technologiae in Architecture: Professional	Bachelor Of Architecture/Bachelor Of Architecture (Ext)
Baccalaureus Technologiae in Architecture: Professional (Ext)	Master Of Architecture In Architectural Technology. Replaces Magister Technologiae in Architectural Technology
Magister Technologiae in Architectural Technology (Structured)/Professional (Structured)	Doctor Of Architecture

Department of Building Science	
Baccalaureus Technologiae in Construction Management	Master Of Building Science (Research)
Baccalaureus Technologiae in Quantity Surveying	Master Of Building Science (Structured)
Magister Technologiae in Construction Management/Quantity Surveying	Bachelor Of Building Science
National Diploma in Building/Diploma In Building	Bachelor Of Building Science: Honours In Quantity Surveying
	Bachelor Of Building Science: Honours In Construction Management
	Doctor Of Building Science
Department of Chemical Engineering, Metallurgical and Materials	
Baccalaureus Technologiae in Engineering: Chemical	Master Of Engineering In Chemical Engineering
Baccalaureus Technologiae in Engineering: Metallurgy	Master Of Engineering In Metallurgical Engineering
Baccalaureus Technologiae in Polymer Technology	Master Of Engineering In Polymer Technology
Magister Technologiae in Engineering: Chemical/Master Of Engineering In Chemical Engine	Bachelor Of Engineering Technology Honours In Chemical Engineering
Magister Technologiae in Engineering: Metallurgy/Master Of Engineering In Metallurgical Engineering	Bachelor Of Engineering Technology Honours In Metallurgical Engineering
Magister Technologiae in Polymer Technology/Master Of Engineering In Polymer Technology	Bachelor Of Engineering Technology Honours In Polymer Technology
National Diploma in Engineering: Chemical	Bachelor Of Engineering Technology In Chemical Engineering
National Diploma in Engineering: Metallurgy	Bachelor Of Engineering Technology In Metallurgical Engineering
	BACHELOR OF ENGINEERING TECHNOLOGY IN MATERIALS IN POLYMER TECHNOLOGY
Department of Civil Engineering	
Baccalaureus Technologiae in Engineering: Civil: Water	Master Of Engineering In Civil Engineering
Baccalaureus Technologiae in Engineering: Civil: Geotechnical	Bachelor Of Engineering Technology: Honours In Civil Engineering
Baccalaureus Technologiae in Engineering.: Civil: Construction Man	Bachelor Of Engineering Technology In Civil Engineering
Baccalaureus Technologiae in Engineering: Civil: Environ Engineering	Higher Certificate In Construction Engineering
Baccalaureus Technologiae in Engineering: Civil: Structural	

Department of Civil Engineering	
Baccalaureus Technologiae in Engineering: Civil: Transport	
Baccalaureus Technologiae in Engineering: Civil: Urban Engineering	
Magister Technologiae in Engineering: Civil/Master Of Engineering In Civil Engineering	
National Diploma in Engineering: Civil	
National Diploma in Engineering: Civil (Extended)	
Department of Electrical Engineering	
Baccalaureus Technologiae in Engineering: Electrical	Bachelor Of Engineering Technology: Honours In Electrical Engineering
Magister Technologiae in Engineering: Electrical /Electrical/M.Eng (Electrical Engineering)	Bachelor Of Engineering Technology In Electrical Engineering
National Diploma in Engineering: Electrical	Diploma In Electrical Engineering
National Diploma in Engineering: Electrical (Extended)	Higher Certificate In Electrical Engineering
Department of Geomatics	
Baccalaureus Technologiae in Surveying	Bachelor Of Geomatics: Honours
National Diploma in Surveying	Bachelor Of Geomatics
	DIPLOMA IN GEOMATICS
Department of Industrial Engineering	
Baccalaureus Technologiae in Engineering: Industrial	Master Of Engineering In Engineering Management (Structured)
Magister Technologiae in Engineering: Industrial/Industrial Tech/Industrial Tech	Master Of Engineering In Industrial Engineering
National Diploma in Engineering: Industrial	Bachelor Of Engineering Technology Honours In Industrial Engineering
National Diploma in Engineering: Industrial (Extended)	Bachelor Of Engineering Technology In Industrial Engineering
	Higher Certificate In Industrial Engineering

Department of Mechanical Engineering, Mechatronics and Industrial Design	
Baccalaureus Technologiae in Engineering: Mechanical	Master Of Engineering In Mechanical Engineering
Baccalaureus Technologiae in Engineering: Mechatronics (Mechatronics)	Bachelor Of Engineering Technology: Honours In Mechanical Engineering
Magister Technologiae in Engineering: Mechanical/Master Of Engineering In Mechanical Engineering	Bachelor Of Engineering Technology: Honours In Mechatronics Engineering
National Diploma in Three-Dimensional Design	Bachelor Of Engineering Technology In Mechanical Engineering
National Diploma in Engineering: Mechanical	Bachelor Of Engineering Technology In Mechatronic Engineering
National Diploma in Engineering: Mechanical (Extended)	Higher Certificate In Mechanical Engineering
National Diploma in Engineering: Mechatronics	Advanced Diploma In Industrial Design
National Diploma in Engineering: Mechatronics (Extend)	Diploma In Industrial Design

An extract of the prediction model showing the above information has been included below for the reader' convenience. This is shown in Table 4.2.

Table 4. 2: Qualifications as shown on the developed tool (example)

Faculty	Department	Qualification Code	Qualification
Eng & The Built Env	ARCHITECTURE	BTAQ95	B TECH ARCHITECTURAL TECH (TECHNOLOGY)
Eng & The Built Env	ARCHITECTURE	BTPS09 / BPAR17	B TECH ARCHITECTURE: PROFESSIONAL / BACHELOR OF ARCHITECTURE
Eng & The Built Env	ARCHITECTURE	BTPSF0	B TECH ARCHITECTURE: PROFESSIONAL (EXT) / BACHELOR OF ARCHITECTURE (EXT)
Eng & The Built Env	ARCHITECTURE	MTAD96/MTPSS0/MPAR18	M TECH ARCHITECTURAL TECH (TECH) (STRUC)/PROFESSIUONAL (STRUC)
Eng & The Built Env	BUILDING SCIENCES	BTCU02	B TECH CONSTRUCTION MANAGEMENT
Eng & The Built Env	BUILDING SCIENCES	BTQS02	B TECH QUANTITY SURVEYING

As some qualifications had a name change only, historical data will be valuable in predicting the shape and success of the "new HEQSF aligned" qualification. In terms of Category C qualifications, in other words brand new qualifications, similar NATED151 qualification data was used to predict the impact of such new qualifications on human resources.

4.2.2 Headcount (HC)

Definition: The headcount reflects the physical bodies (students) in front of a lecturer in class.

Purpose: To determine a rolling average headcount for a three-year qualification.

Calculation method: An average was calculated by adding the headcounts of 2015, 2016 and 2017 and dividing the total by three. The results are indicated in Table 4.3.

Formula: Average Headcount = (2015 HC + 2016 HC + 2017 HC)/3.

4.2.3 First Time Entering Number (FTEN)

Definition: FTEN (FTEN) refers to students entering a university for the first time and can usually be regarded as the new semester or yearly intake.

Purpose: To measure precisely access to a specific qualification of those entering a higher education institution (UoT) for the first time.

Calculation method: The average over three years (2015 to 2017) was calculated by adding the cohort data and dividing it by three. The results are indicated in Table 4.2.

Formula: FTEN average = (2015 FTEN + 2016 FTEN + 2017 FTEN)/3.

4.2.4 Full Time Equivalent (FTE)

Definition: Full-time equivalent can be calculated by (a) assigning to each course a fraction representing the weight it has in the curriculum of a qualification, and (b) by multiplying the headcount enrolment of that course by this fraction (CHE, 2015). These numbers are used to allocate financial and human resources to a university. If a student enrols for only half of the load of the qualification for a specific year, his FTE will be equal to 0.5 FTE, which translates into 50% of the income to the university.

Purpose: To show the average overall FTE that a specific qualification generates for a UoT.

Calculation Method: For the data analysis, three years (2015 to 2017) were added and divided by three to calculate the average FTE. The results are indicated in Table 4.2.

Formula: FTE Average = (2015 FTE + 2016 FTE + 2017 FTE)/3.

4.2.5 Graduates (G)

Definition: The number of students in a cohort that completed a qualification.

Purpose: To assess the success of a qualification's internal efficiency in terms of the number of students that graduated.

Calculation method: Graduates of 2015 to 2017 were added and divided by three to calculate the average graduates for all the qualifications offered by the FEBE. The results are indicated in Table 4.3.

Formula: Graduates Average = (2015 G + 2016 G + 2017 G)/3.

Table 4. 3: Headcount, FTEN, FTE and Graduate Averages

HEAD COUNT				FTEN (First time entering number)				FTE (Full Time Equivalenty)				Graduates			
2015HC	2016HC	2017HC	HCA (Head count Avg)	2015FTEN	2016FTEN	2017FT	FTEN AVG	2015FTE	2016FTE	2017FTE	FTE AVG	2015 Graduates	2016 Graduates	2017 Graduates	Graduation Avg
6	7	7	8	9	7	0	5.33	3	6	4	4.33	7	2	4	4.33

4.2.6 Teaching Input Unit (TIU)

Definition: The teaching input consists of aggregations of educational subject matter categories (CESM categories), which are subject to weightings by funding group and by course level as discussed in Chapter 2.

Purpose: To calculate the average TIU for each qualification to determine the income received from the Department of Higher Education.

Calculation method: TIUs of 2015 to 2017 were added and divided by three to calculate the average TIUs for all the qualifications. This is indicated in Table 4.3.

Formula: Average TIU = (2015 TIU + 2016 TIU + 2017 TIU)/3.

4.2.7 Teaching Output Unit (TOU)

Definition: TOU is a grant that the university receives on completion of a student's qualification. It is based on non-research graduates as explained in Chapter 2.

Purpose: To calculate the average TOU for each qualification to determine the income received from the Department of Higher Education.

Calculation method: As indicated in Table 4.3, TOUs of 2015 to 2017 were added and divided by three to calculate the average TOUs for all the qualifications offered by the FEBE.

Formula: Average TOU = (2015 TOU + 2016 TOU + 2017 TOU)/3.

4.2.8 Research Output Unit (ROU)

Definition: ROU is a grant that the university receives on completion of publications and delivering masters and doctoral graduates. Publication units are equal to one, research masters' graduates are equal to one, and doctoral graduates equal to three ROUs.

Purpose: To calculate the ROU for each qualification that is categorised as a research qualification to determine the income gained from the Department of Higher Education.

Calculation method: The Rand (R) value of a ROU is multiplied by the ROU weighting as specified by the Department of Higher Education. This is indicated in Table 4.4.

Formula: ROU = Publications x 1

ROU = Master's degree x 1

ROU = Doctoral degree x 3

Table 4. 4: Teaching Inputs, Teaching Outputs and ROUs

TIU				TOU				ROU
2015 TIU	2016 TIU	2017 TIU	TIU'S AVG	2015 TOU	2016 TOU	2017 TOU	TOU's Avg	ROU AVG
13.85	26.35	16.8	19.00	10.5	3	5	6.17	0.00

Table 4.4 shows TIU, TOU and ROU values for a qualification from 2015 to 2017 where the average has been calculated for each heading.

4.2.9 Service subject credits

Table 4.5 shows all the subjects and credits being offered by other faculties to the FEBE.

Table 4. 5: Service subjects delivered by other faculties

Credits	Subjects (Faculty That Is The Custodian Of The Subject)
20	Applied Building Science I – Diploma (Science Faculty)
10	Computer Application I – Diploma (ICT)
10	Communications I – Diploma (Humanities)
20	Site Surveying – Diploma (Geomatics)
20	Construction Accounting III – Diploma (Economics And Finance)
20	Structure And Concrete III – Diploma (Civil)
10	Inorganic Chemistry – National Diploma (Science)
16	Chemistry IA – National Diploma (Science)
10	Organic Chemistry II – National Diploma (Science)
10	Physical Chemistry II – National Diploma (Science)
32	Mathematics I+II+III – National Diploma (Mathematics)
16	Physic IA – National Diploma (Science)
8	Engineering Physic – National Diploma (Science)
13	Drawings: Chemical Engineering – National Diploma (Mechanical)
6	Communications I – NATIONAL DIPLOMA (ICT)
16	Management Skills – National Diploma (Management Sciences)
1	Information Literacy – Bachelor Of Engineering (Humanities)
6	Communication Skills – Bachelor Of Engineering (Humanities)
5	Computer Literacy – Bachelor Of Engineering (ICT)
2	Life Skills – Bachelor Of Engineering (SDS)
14	Engineering Graphics – Bachelor Of Engineering (Mechanical)
14	Physical Chemistry – Bachelor Of Engineering (Science)
14	Organic Chemistry – Bachelor Of Engineering (Science)
14	General Physics – Bachelor Of Engineering (Science)
42	Engineering Mathematics I + II Bachelor Of Engineering (Mathematics)
14	Scientific Computing – Bachelor Of Engineering (Mathematics)
14	Probabilities And Statistics0 – Bachelor Of Engineering (Mathematics)
14	Engineering Practice – Bachelor Of Engineering (Civil)
10	Metallurgy Chemistry – National Diploma (Science)
10	Entrepreneurial Skills – National Diploma (Management Science)
14	Engineering Practice – Bachelor Of Engineering (Civil)
28	Engineering Surveying – Bachelor Of Engineering (Geomatics)
18	Physics And Chemistry – Bachelor Of Engineering (Science)
21	Physics And Chemistry – Higher Certificate (Science)
8	Communications I Higher Certificate (Humanities)
10	Computer Literacy – Higher Certificate (ICT)
14	Engineering Graphics – Higher Certificate (Mechanical)
14	Engineering Physics – Higher Certificate (Science)
3	Information Literacy + Life Skills – Higher Certificate (SDS)
21	Tech Mathematics I – Higher Certificate (Mathematics)
6	Communications I National Diploma (Humanities)

56	Engineering Mathematics I + II + Statistics – Bachelor Of Technology (Mathematics)
6	Computer Skills – National Diploma (ICT)
12	Engineering Science I – National Diploma (Science)
14	Engineering Graphics I – Bachelor Of Technology (Mechanical)
3	Information Literacy + Life Skills – Bachelor Of Technology (SDS)
10	Mechanics I – Bachelor Of Technology (Mechanical)
20	Science – L Diploma
42	Mathematics And Statistics I + II – Bachelor
9	Fundamental – Bachelor
20	Science L – Bachelor
15	Practice Management – B Tech
10	Electrotechnology I – National Diploma (Electrical)
10	Mechanical Engineering Drawing I – National Diploma (Mechanical)
10	Mechanics I – National Diploma (Mechanical)
10	Manufacturing I – National Diploma (Mechanical)
10	Manufacturing Relations I – National Diploma (Management Sciences)
10	Qualitative Techniques I – National Diploma (Science)
10	Costing II - NATIONAL DIPLOMA (Economics And Finance)
10	Industrial Accounting III – NATIONAL DIPLOMA (Economic And Finance)
10	Industrial Leadership III – National Diploma (Management Sciences)
28	Electric Circuits I – Bachelor Of Technology Mechanical (Electrical)
14	Scientific Computing I – Bachelor Of Technology Mechanical (Electrical)
14	Electrical Power Eng. – Bachelor Of Technology Mechanical (Electrical)
12	Digital Control Systems – Baccalaureus Technologiae (Electrical)
12	Software Design – Baccalaureus Technologiae (Electrical)
12	Power Electronics III – Baccalaureus Technologiae (Electrical)

Table 4.6 shows all the subjects being offered by the FEBE to different departments in the Faculty or different faculties.

Table 4. 6: Service subjects delivered by the Faculty of Engineering and the Built Environment

CREDITS	SUBJECTS (FACULTY OR DEPARTMENT THAT IS THE CUSTODIAN OF THE SUBJECT)
36	Manufacturing II – National Diploma (Mechanical)
36	Engineering Design I – National Diploma (Mechanical)
10	Structures And Concrete III – NATIONAL DIPLOMA (Building Science)
6	Management Civil I – National Diploma (Geomatics)
12	Geomatics Design IV – Baccalaureus Technologiae (Geomatics)
10	Structures Iv – Bachelor in Architectural Design (Architecture)
32	Electrotechnology I +II - National Diploma (Mechanical)
16	Electrical Machines I – National Diploma (Mechanical)
24	Electrotechnology I +II – National Diploma (Mechatronics)
12	Electronic Technology I National Diploma (Mechatronics)
12	Digital Technology I +II – National Diploma (Mechatronics)
12	Electrical Machines I – National Diploma (Mechatronics)
12	Sensors And Process Control – National Diploma (Mechatronics)
12	Computer Studies – National Diploma (Mechatronics)
12	Software Design – Baccalaureus Technologiae (Mechanical)
12	Power Electronics – Baccalaureus Technologiae (Mechanical)
14	Electrical Technology – Higher Certificate (Mechanical)
28	Embedded Systems – Bachelor Of Technology (Mechanical)
28	Electrical Circuits – Bachelor Of Technology (Mechanical)
28	Electronic Circuits – Bachelor Of Technology (Mechanical)
28	Engineering Software Design – Bachelor Of Technology (Mechanical)
16	Electrotechnology – National Diploma (Industrial)
10	Life Cycle Management – Bridging (Building)
10	Supply Chain Management – Bridging (Building)
15	Engineering Data Analysis –Bridging (All Departments)
14	Engineering Graphics – Higher Certificate (Industrial)
14	Engineering Graphics–Higher Certificate (Electrical)
28	Mechanics – Bachelor Of Technology (Industrial)
14	Engineering Graphics – Bachelor Of Technology (Industrial)
10	Mechanics – Bachelor Of Technology (Electrical)
14	Engineering Graphics – Bachelor Of Technology (Electrical)
10	Mechanical Manufacturing – National Diploma (Industrial)
13	Drawing – National Diploma (Chemical)
10	Mechanical Drawing I – National Diploma (Metallurgy)
10	Strengths Of Materials II – NATIONAL DIPLOMA (Metallurgy)

Definition: Service Subjects that are offered for a specific qualification by a faculty that is not the custodian of that specific qualification that is linked to the credits of that subject.

Purpose: The inclusion of Service Subject Credits necessary to calculate the amount of income and expenditure being lost or gained by the faculty due to other faculties delivering a service for a specific qualification.

Calculation method: Subtract the service subjects offered by other faculties from each qualification and add similar service subjects offered by the FEBE to give a total of service credits delivered to the custodian of the qualification. This is indicated in Table 4.7.

Formula: Service subject credits= (Total service credit subjects of the faculty minus the service subjects offered by other faculties) + service credit subjects offered on behalf of other faculties.

Table 4. 7: Service subjects

SERVICE SUBJECTS							
SERVICE #1 ARCHITECTURE			Income From Service Rendering	SERVICE #2 BUILDING			Income From Service Rendering
DEPARTMENT RENDERING SERVICE	CREDITS	FUNDING GROUP	Income = (Class fee estimate + Tiu income) * (Service credit/total credits)	DEPARTMENT RENDERING SERVICE	CREDITS	FUNDING GROUP	Income = (Class fee estimate + Tiu income) * (Service credit/total credits)
	0.00		0.00		23.00		782704.66

Table 4.6 shows the number of credits delivered by a specific department and the income that is generated by rendering the service.

Thus the Building Science Department renders 23 credits of service to another department, and the monetary value is calculated by means of a cost per credit and the number of students in that specific qualification.

4.2.10 Ratios

With the use of the average data above, three critical ratios could be calculated on historical data that might provide good insight into what prediction may look like. The three ratios that are discussed are retention, graduation and full-time equivalent ratio.

4.2.10.1 Retention ratio

Definition: The retention ratio is the proportion of enrolled cohort of students in a qualification who did not progress to study in the next NQF level. The lower the rate, the better the throughput of students and the higher the funding level of a university.

Purpose: To calculate the retention ratio for each qualification in the FEBE to determine the efficiency of the department/faculty that is the custodian of the qualification.

Calculation method: The average first-time entering number for the qualification divides the headcount. This is indicated in Table 4.5. It was done in this manner, as I needed to calculate how long it takes an average student to complete a qualification and how many students are retained. This influences the new intake of students and the funding received from the DHET. The retention ratio is then used to determine the number of students over a period of study to facilitate the student enrolment plan of the faculty.

Formula: Retention ratio = Headcount Average/FTEN average.

4.2.10.2 Graduation ratio

Definition: Graduation ratio is the number of students in a cohort that successfully completed qualifications offered by the faculty divided by the total headcount of students who initially enrolled for each qualification.

Purpose: To indicate the general graduation efficiency level of the qualifications offered by the faculty. The higher the graduation ratio for a qualification, the better the income of TOUs and ROUs for the UoT.

Calculation method: The headcount average of each qualification is divided by the average FTEN for the qualification. This is indicated in Table 4.8.

Formula: Graduation Ratio = Graduation Average/Headcount average.

4.2.10.3 Full Time Equivalent ratio

Definition: A FTE ratio shows the success of the students enrolling for all the subjects in a specific year of a qualification. Because this has a major impact on funding for a university, the closer the derived value is to 1 the higher the income generated.

Purpose: To calculate the level of human resources and income needed for each qualification based on the number of students taking a full load of study.

Calculation method: Divide the FTE average by the headcount average (Table 4.8).

Formula: FTE Ratio = FTE Average/HC average.

Table 4. 8: Ratios

RATIOS		
Retention Ratio (HCA/FTEN AVG ≥ 1)	Graduation Ratio (GA/HCA ≤ 1)	FTE Ratio (FTE avg / HCA ≤ 1)
1.45	0.56	0.56

Table 4.8 shows the Retention, Graduation and FTE ratios calculated for a qualification.

4.2.11 External variables

The fixed standards and values as determined by the CHE and the DHET were incorporated in the development of the prediction model. These are indicated in Table 4.9 and include class fees expressed in Rand value, funding groups, funding category weight, senior lecturer equivalent (SLE) Rand value, teaching input Rand value, teaching output Rand value and research output Rand value.

Table 4. 9: External Variables

External Variables							
Class Fees Expressed in Rand Value per 1 x HEQSF credit per NQF level	Funding Group	Funding category weight from DHET funding framework	SLE Rand value	TIU Rand Value	TOU Rand Value	ROU Rand Value	Targeted SLE:FTE ratio per funding category (targets approved by senex
150	3	2.5	10218	12801.21	24355.32	102518.7	30

Table 4.9 shows the external variables that are used in the calculation of the Key Estimates per qualification.

4.2.11.1 Class fees expressed in rand value (cost per credit)

Definition: The amount a student pays either from his pocket or from a bursary to the university for the use of the facilities and classes.

Purpose: To make accurate predictions on the income generated by a qualification in reference to class fees, a structure had to be developed in calculating a norm for cost per credit rather than a cost per subject.

This gives a clear indication of what income a qualification can generate according to the number of credits allocated to a qualification.

Calculation method: Add the cost per subject to a student in a qualification and divide the total cost of the qualifications to students by the number of credits.

Formula: Cost per credit per student = (Add all subjects cost per student)/credits/

4.2.11.2 Funding group

As discussed in Chapter 2, there are four funding groups pertaining to higher education referred to as “Funding Groups by CESM categories”. For the purpose of this study, Funding Group 3 was used, as this is the group the Engineering qualifications are allocated to.

4.2.11.3 Funding category weight

After the funding group – as indicated in the previous section − had been determined, the *Weight Factors for Teaching Units by Funding Group and Course Level* was used to allocate weights by instruction-delivery mode. An Engineering qualification rests in Funding Group 3; thus, the weight for the different categories of qualifications is as follows:

- Undergraduate and equivalent: 2.5 for contact or 1.25 for distance.
- Honours and equivalent: 5.0 contact and 2.5 for distance.
- Master’s and equivalent: 7.5 contact and 7.5 for distance.
- Doctoral and equivalent: 10 contact and 10 for distance.

4.2.11.4 Senior Lecturer Equivalent (SLE) rand value

A senior lecturer equivalent (SLE) is a currency used by some universities of Technology in the place of using monetary values. The Finance Department at a UoT found it easier to articulate the number of staff needed to deliver a qualification when using SLE values. As each level of staff has a different SLE, values for each staff level are indicated in Table 4.10 below. In 2017, the cost of one SLE equalled R9 549.92.

Table 4. 10: Senior lecturer equivalent per post level

Position	SLE Amount
Junior Lecturer	62.5
Lecturer	82.5
Senior Lecturer	100
Associate Professor	121.5
Full Professor	145

4.2.11.5 Teaching Input Unit rand value

The 2017 the TIU Rand value was R 12 294 (CHE, 2015). The Department of Higher Education determines and adapts this value on an annual basis

4.2.11.6 Teaching Output Unit rand value

The 2017 teaching output Rand value is R24 457 (CHE, 2015). The Department of Higher Education determines and adapts this value on an annual basis.

4.2.11.7 Research Output Unit rand value

The 2017 research output Rand value is R107 222 (CHE, 2015). The Department of Higher Education determines and adapts this value on an annual basis

4.3 INTERPRETATION OF NEW DATA GENERATED BY THE PREDICTION MODEL

The aim of collecting the selected quantitative data was to develop a tool that could simulate historical trends in the FEBE so that I could formulate formulae to make estimate predictions. In this section, I have broken down the steps that I took in calculating the specific predictions that will have an impact on human resources in the FEBE at a UoT.

Making predictions is a strategy using information from historical data and one's personal experiences to anticipate what one is about to predict. Alternatively, making predictions answers the question,

What comes next? Researchers involved in making predictions focus on the data at hand, constantly thinking ahead and also refining, revising, and verifying the predictions (Fries-Gaither, 2011).

To understand what the impact would be on human resources in the FEBE in a UoT, thirteen predictive calculations were developed to give a clear overview of what would happen to a complete qualification.

4.3.1 Key Estimates and Predictions

Each data heading used in the qualitative analysis is explained in detail according to the following format for headcount, graduation, FTE, class fee, teaching input, teaching output and distributable income estimates: definition, purpose, calculation method and formula.

4.3.1.1 Headcount estimate

Definition: The estimated headcount reflects the predicted physical bodies in the whole qualification for the total duration of a specific qualification being phased in in terms of the HEQSF.

Purpose: To predict how many students stay in a qualification for the time allocated to that qualification. This value is useful for the planning of class sizes and venue usages.

Calculation method: Multiply the first-time entering numbers (FTEN) for the qualification with the retention ratio of the same or similar qualification.

Formula: Headcount Estimate = FTEN x retention ratio.

4.3.1.2 Graduation estimate

Definition: An estimated number of students in a cohort who complete a qualification being phased in in terms of the HEQSF.

Purpose: To determine the potential success of a qualification's internal efficiency in terms of the estimated number of students who will graduate in a specific qualification. This is a prediction based on past success rates and the number of lecturers. There has yet to be a tool designed and used like the one that I have developed, thus I cannot assess any previous data. Instead, I can make a prediction based on previous data. This prediction should enable me and the faculty management to calculate the potential number of TIUs required.

This, in turn, can be used to calculate the amount of money that will be received from the DHET for the specific qualification.

Calculation method: Multiply the Headcount Estimate with the Graduation Ratio.

Formula: Graduation Estimate = HC Estimate x Graduation Ratio.

4.3.1.3 Full Time Equivalent estimate

Definition: The full-time equivalent estimate is the estimated/predicted number of students that, in accordance with the HEQSF, will enrol for a full subject load of a qualification in a year.

Purpose: If a prediction can be made on the number of FTEs in a qualification, a percentage of the university's potential income from the DHET for a specific qualification can be calculated.

Calculation method: Multiply the headcount estimate with FTE ratio.

Formula: FTE Estimate = HC Estimate x FTE Ratio.

4.3.1.4 Class fee estimate

Definition: The estimated amount a student will pay the university for the use of the facilities and classes and equipment received.

Purpose: To calculate the estimated total income from class fees generated by a specific qualification. This will form part of the total income to the faculty, which in turn will be a key factor to determine the human resource needs for a specific qualification.

Calculation method: Multiply FTE estimate with Rand value of one HEQSF credit and Total HEQSF credits.

Formula: Class Fee Estimate = FTE Estimate x 1 Credit value x Number of credits.

4.3.1.5 Teaching Input Units estimate

Definition: The estimate teaching input consists of aggregations of educational subject matter categories (CESM categories), which are subjected to weightings by the funding group and by course level as discussed in Chapter 2.

Purpose: To calculate the average estimated TIU for each qualification in order to determine the potential income from the Department of Higher Education.

Calculation method: Multiply FTE Estimate by the funding category weight.

Formula: TIU Estimate = FTE Estimate x Funding category weight.

4.3.1.6 Teaching Input Unit income estimate

Definition: The estimated amount of money generated per qualification to be received from the DHET based on the funding group of a qualification.

Purpose: To calculate the estimated income received from the Department of Higher Education for a qualification based on the funding category and number of FTE, which form part of the total income of a qualification.

Calculation method: Multiply the TIU estimate with the Rand value of a TIU.

Formula: TIU Income Estimate = TIU Estimate x Rand value of TIU.

4.3.1.7 TOU or ROU income estimate

Definition: The TOUs or ROUs Income estimate is a calculation of the grant that the university receives from the DHET on completion of either an undergraduate or postgraduate qualification.

Purpose: To calculate the estimated income received from the DHET for the completion of a qualification, whether it is an undergraduate degree or a postgraduate degree.

Calculation method: Multiply the graduation estimate with the Rand value of a TOU or ROU.

Formula: TOU/ROU Income Estimate = Graduation estimate x Rand value of (TOU/ROU).

4.3.1.8 Distributable income estimate

Definition: The total estimate amount of income a qualification generates for the minimum period of the qualification.

Purpose: To calculate the total estimated income generated by a specific qualification, where that income can be allocated to human resources, upkeep of equipment and venues.

Calculation method: Add class fee estimate (CFER) in Rand value to the estimated Rand income generated by teaching input units (TIUER) and the estimated Rand income derived from ROUs (ROUER).

Formula: Distributable Income Estimate = CFER + TIUER + ROUER.

4.3.1.9 Estimated expenditure to service departments

Definition: The estimated expenditure generated by subjects/modules that are being offered in a specific qualification by another department that is not the custodian of that specific qualification and not in the FEBE. This specific department will firstly calculate the income, and as soon as the income has been calculated, it will be deducted from the FEBE.

Purpose: To make accurate estimated predictions on the expense generated by a qualification in reference to a department that is not part of the FEBE, the need arose to calculate the income lost due to subjects/modules delivered by such departments.

Calculation method: Add all the subject costs in a qualification, and add the total to the department responsible for the service of the subject.

Formula: Subject cost 1 + Subject cost 2 + Subject cost 3 = A specific department's loss in income.

4.3.1.10 Estimated income from rendered services

Definition: The estimated income generated by rendering service subjects that are being offered in a specific qualification by a department in the FEBE that is not the custodian of that specific qualification. This is necessary to develop an understanding that as a Faculty, you lose income from service subjects delivered by other faculties on the one hand, while on the other hand income can be gained from rendering a service to other faculties. Hence, both these scenarios need to be taken into consideration and included in the prediction model.

Purpose: To make accurate estimate predictions of the income generated by a department, the need arose to calculate the income gained due to subjects delivered as a service subject to a different department in the university.

Calculation method: Add all the subject costs in a qualification, and add the total to the department responsible for the service of that subject.

Formula: Subject cost 1 + Subject cost 2 + Subject cost 3 + all other subjects related = Specific Department income.

4.3.1.11 Estimated income for academic environment salaries

Definition: The amount to be distributed to the academic sphere of a university to cover the salary and administration budgets pertaining to a specific qualification.

Purpose: To calculate the estimated amount of income to be allocated to the academic environment staff salaries (EIAES) to deliver a qualification. According to national standards, only 62.5% of the distributable income may be used (CHE, 2015).

Calculation method: Multiply the distributable income by 62.5%.

Formula: EIAES = Distributable income x 62.5%.

4.3.1.12 Senior Lecturer Equivalent (SLE) estimate

Definition: A senior lecturer equivalent estimate is a currency used by some Universities of Technology instead of using actual monetary values. It is easier to calculate the number of staff needed to deliver a qualification. The cost of one SLE equals R9 549.92 (2017) and as the years pass, the increase in salaries will be taken into consideration. As this is a lengthy project, salary increases for the years 2018 and 2019 were not available at the time the tool was developed. Thus, while consideration was given to potential salary increases, all data was based on the 2017 salary structure.

Purpose: To calculate the estimate senior lecturer equivalent number of academic, technical and administration staff needed to deliver the qualification over the minimum amount time allocated.

Calculation method: Divide the estimated income amount for academic environment staff salaries by the senior lecturer equivalent rand value.

By doing this, one gains insight into the actual number of staff needed in the faculty. With this knowledge, an organisational review can be done in the faculty to plan effective utilisation of human resources for the HEQSF qualifications phasing in.

Formula: SLE estimate = EIAES/SLE Rand value.

Table 4.11 shows the Key Estimates that are calculated per qualification.

Table 4. 11: Key estimates and predictions

Headcount Estimate = FTEN * Retention ratio	Graduation Estimate = Headcount Estimate * Graduation Ratio	FTE Estimate = Headcount Estimate * FTE Ratio	Class Fee Estimate = FTE Estimate * Rand value of 1 HEQSF * Total HEQSF credits in qualification	TIU Estimate = FTE Estimate * Funding Category Weight	TIU Income Estimate = TIU estimate * Rand value of TIU	TOU or ROU Income Estimate = Graduation Estimate * Rand value of TOU or ROU	Distributable Income Estimate = TIUR +TOUR +CFE	Income to service departments	Income from rendered service (FTE Est*Rand value of 1 HEQSF*Service credits)	Income for Academic Environment Salaries Estimate = Distributable Income Estimate * 0.375	SLE Estimate = SALE/Current or Predicted SLE Rand Value
6.67	4.33	4.33	78000	10.83	138679.78	105539.72	322219.50	0.00		120832.31	11.83

4.4 EXAMPLE OF AN INCOME AND SLE ESTIMATE

4.4.1 Undergraduate

The example provided pertains to the prediction model for a Diploma in Engineering at NQF 7 with an FTE headcount of 60 students of which 15 graduate per year. Students have on average six subjects per year and the predicted class fees are R4 040 per subject/module per year.

Solution: Engineering = Funding group 3

Diploma = Undergraduate contact 2.5

Headcount = 60

Graduate = 15

Subjects = 6 (R 4 040)

Total Distributable income for the Diploma in Engineering:

= Class fees + TIU + TOU

= (Headcount x years x subjects x cost of subject) + (Funding group, Undergraduate contact x headcount x TIU Rand value x year) + (Graduates x year x TOU Rand value)

= (60 x 6 x 3 x 4 040) + (2.5 x 60 x 12 294 x 3) + (3 x15 x 24 457)

= (4 363 200) + (5 532 300) + (1 100 565)

= R 10 996 065

Income for academic department:

= 62.5% of Total Distributable Income

= 10 996 065 x 62.5%

= R 6 872 540.62

In addition, 60 % of the 62.5% can be used for academic salaries:

= 6 872 540.62 x 60%

= R 4 123 524.38

The cost of one SLE equals R9 549.92

Thus 4 123 524.38/9549.92

= 431 .786 SLE to run the whole qualification.

This means that this Diploma in Engineering at NQF 7 with a FTE headcount of 60 students of which 15 graduate per year can be offered with an equivalent of four senior lecturers.

4.4.2 Postgraduate

The example provided pertains to the prediction model for a Master's Degree (Research) in Engineering at NQF 9 with a FTE headcount of 15 students of which three graduate per year. Students have on average one (1) subject/module per year and the predicted class fees are R 18 000 per year.

Solution: Engineering = Funding group 3

Master = Master's contact 7.5
Headcount = 15
Graduate = 3
Subjects = 1 (R 18 000)

Total Distributable income for the Diploma in Engineering:

= Class fees + TIU + TOU
= (Headcount x years x subjects x cost of subject) +
(Funding group, master's contact x headcount x TIU rand value x year)
+ (Graduates x year x TOU rand value)
= (15 x 2 x 1 x 18 000) + (7.5 x 15 x 12 294 x 2) + (3 x3 x 107 222)
= (540 000) + (2 766 150) + (964 998)
= R 4 271 148

Income for academic department:

= 62.5% of Total Distributable Income
= 4 271 148 x 62.5%
= R 2 669 467.50

In addition, 60 % of the 62.5% can be used for academic salaries

= 2 669 467.50 x 60%
=R 1 601 680.50

The cost of one SLE equals R9 549.92

Thus 1 601 680.50/9549.92

= 167.71 SLE to run the whole qualification.

This means that this Master's Degree (Research) in Engineering at NQF 9 with a FTE headcount of 15 students of which three graduate per year could be offered with an equivalent of two senior lecturers.

4.5. FINDINGS

Since the Minister of Higher Education and Training, Dr BE Nzimande announced that the phasing out date for all non-aligned qualifications with the HEQSF will be 31 December 2019 (Consult Addendum A: Government Gazette No. 41399 pg. 138 (b)) it means that current qualifications that are not HEQSF aligned will have no intake from 2020. The last date of registering new students for the non-aligned qualifications will be January 2019 for year courses and July 2019 for semester courses only (CHE, 2013). It is thus important that accurate predictions be made of the impact of this transition on human resource management processes to facilitate a smooth changeover to the qualifications offered in terms of the HEQSF Act. These predictions are discussed in each of the following sub-sections.

4.5.1 Full Time Equivalent (FTE)

It is predicted that FTEs will have a steady increase from 2018 to 2023 as shown in Figure 4.2. The vertical axis shows the number of students in the FEBE that enrol for a full load of subjects in a qualification for a specific year. From 2018, the number of 4 425 students gradually increased to 4 475 in 2019. This number will then drop slightly again to 4 450 students in 2020. This drop in students may be due to the NATED 151 courses phasing out, and the fact that the HEQSF aligned qualifications not having yet commenced. As the HEQSF aligned qualifications are phased in, an increase can be expected, rising to 4 525 in 2021, 4 675 in 2022 and 4 725 in 2023.

This increase is due to students that are in the higher education system on the NATED151, qualifications that have to be converted the HEQSF qualifications, and the enrolment of new students in HEQSF qualifications from 2018 onwards. The impact of this is an increase in income from the DHET subsidies as a student is taking a fuller load of subjects to complete a qualification.

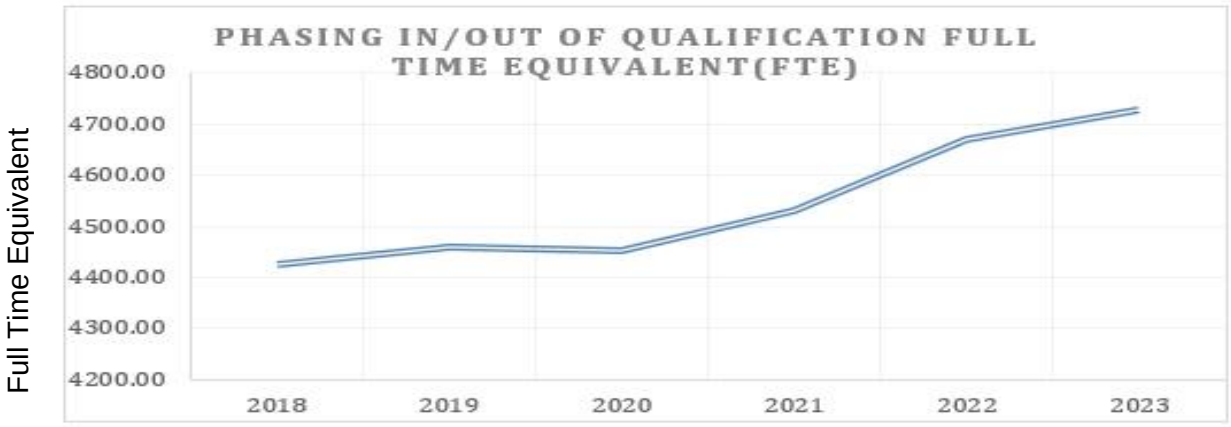

Figure 4. 2: Phasing in/out of qualifications FTE (FTE)

4.5.2 Teaching Input Units (TIUs)

As illustrated in Figure 4.3, the left-hand value represents the number of TIUs the faculty will receive from the DHET, based on the number of students in the faculty from 2019 to 2023. TIUs are predicted to decrease from 10 525 in 2019 to 9 500 in 2020 and 9 480 in 2021, but will start to recover again to 10 250 in 2022 and 11 000 in 2023. The reason for the decrease is that more qualifications falling in lower funding categories will be phased in as compared to the number of NATED 151 qualifications situated in higher funding categories being phased out.

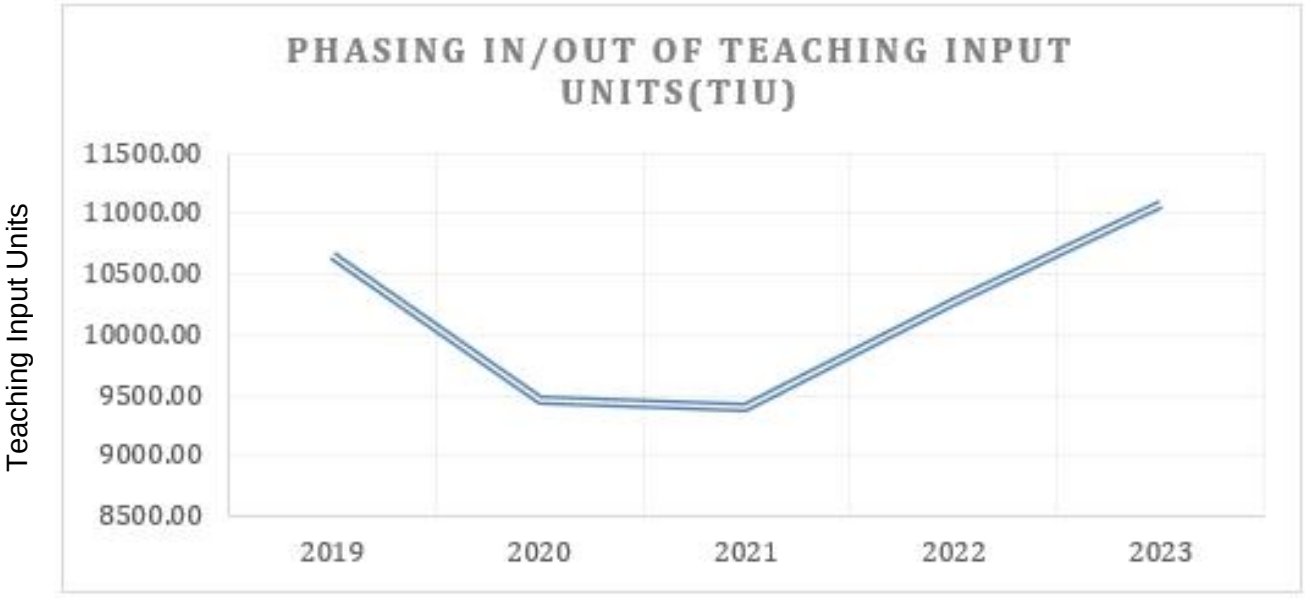

Figure 4. 3: Phasing in/out of Teaching Input Units

4.5.3 Teaching Output Units (TOUs)

TOUs are directly linked to the number of undergraduate students. In Figure 4.4, the left axis represents the number of TOUs for the period 2018 to 2023. A predicted steady increase for the phasing in and phasing out period can be seen in the TOUs from 1 100 in 2019 to 1 150 in 2020, to 1 175 in 2021, increasing to 1 225 in 2022 and reaching 1 275 in 2023. This means that the university can expect a greater income, more specifically, the Faculty of Engineering, and the Built Environment. Fortunately, a steady growth in TOUs is observed, slightly offsetting the stagnation in TIUs shown in Figure 4.3.

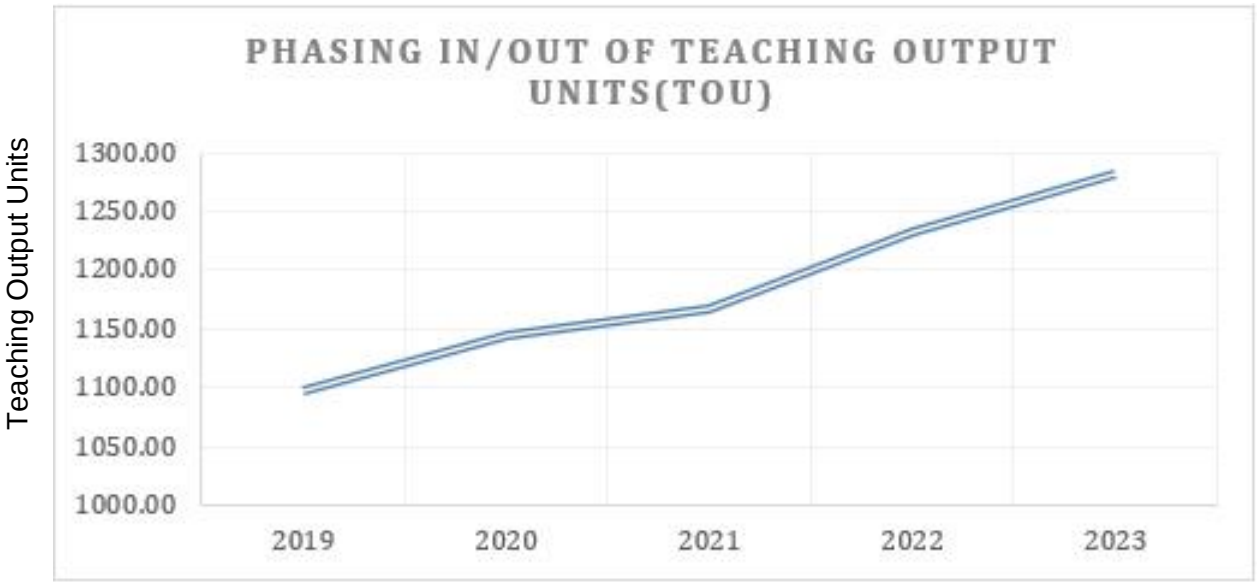

Figure 4. 4: Phasing in/out of TOUs

4.5.4 Research Output Units (ROUs)

As illustrated in Figure 4.5, the phasing in of new HEQSF aligned master's programmes will bring a steady growth in ROUs. The vertical axis indicates the research input unit values over a period of six years, starting in 2019. Between 2019 and 2020, no increase is predicted in the ROUs due to the first intake of HEQSF programmes not yet being able to graduate. As from 2021, an increase can be seen from seven in 2020 to 73 in 2021, and then increasing again to 78 units in 2022, 83,82 in 2023, stabilising at 83,82 in 2024.

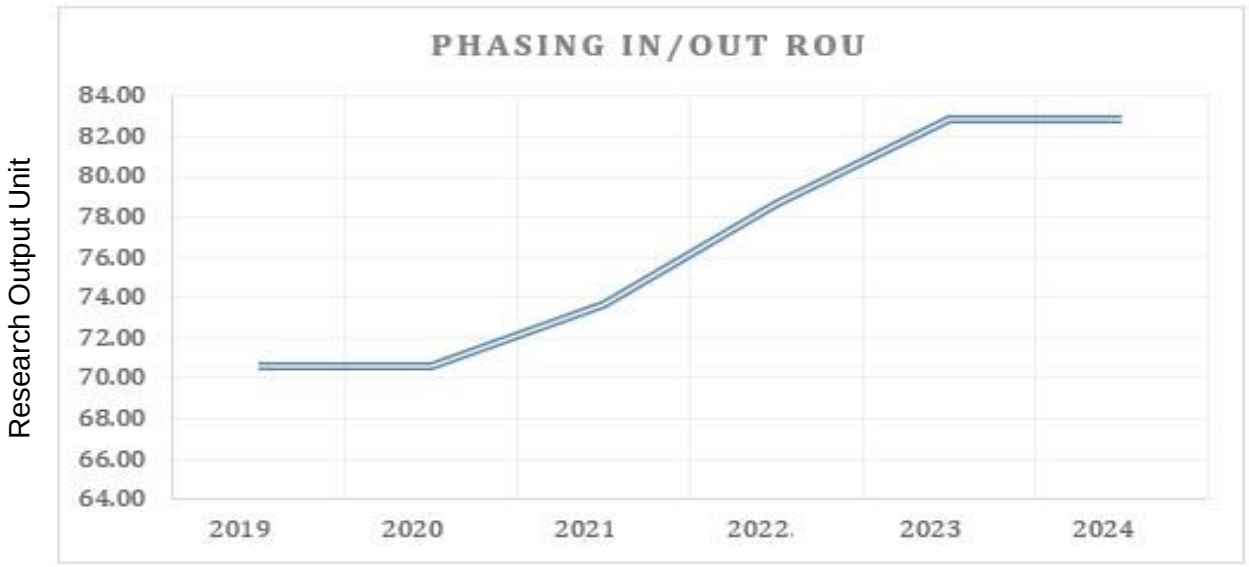

Figure 4. 5: Phasing in/out of Research Output Units

4.5.5 Full Time Equivalent (FTE) per Senior Lecturer Ratio (SLR)

A predicted increase in FTEs per Senior Lecturer Equivalent (SLE) can be seen in Figure 4.6, increasing from 25.7 in 2018 to 28.5 in 2023 if the current staff complement of 165 remains constant. This will have a big influence on funding received from the DHET as the higher the FTE: SLE ratio, the more students are enrolled for a full load of subjects in a qualification.

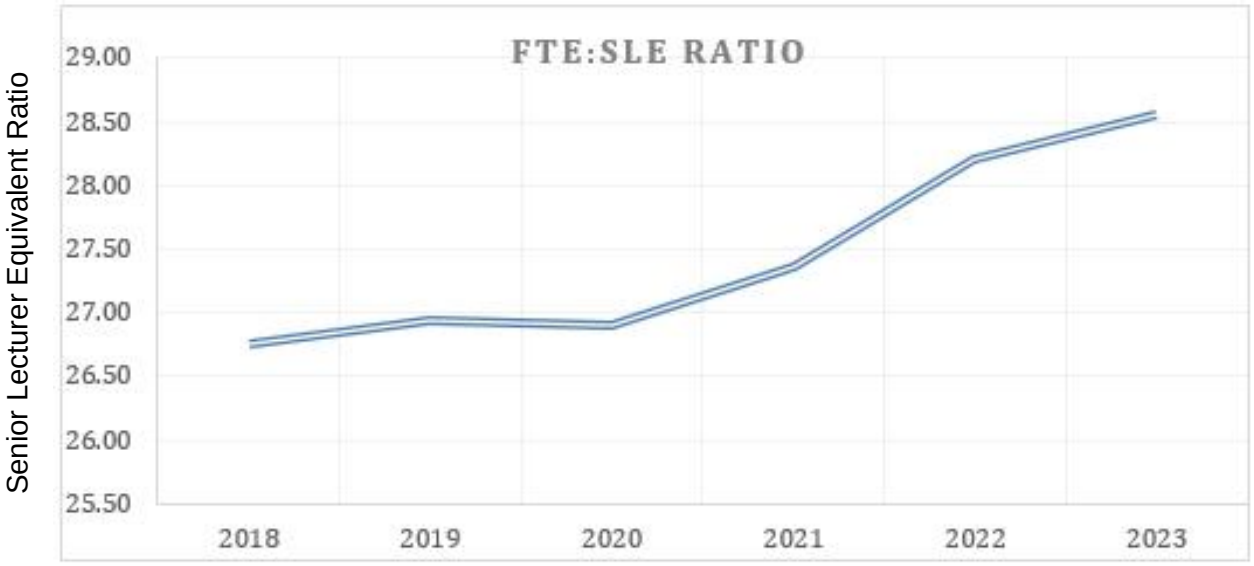

Figure 4. 6: FTE per Senior Lecturer Equivalent ratio

4.5.6 Senior Lecturer Equivalent (SLE)

Figure 4.7 illustrates the predicted SLE linked to income generated by TIUs, TOUs and ROUs required by the Faculty to break even in 2020, given the 62.5% of distributable income that should be used for salaries in the university.

I predict a rise in SLEs starting at 130 SLEs in 2018, increasing to 145 SLEs in 2019, 185 in 2022, followed by a slight decrease to 180 in 2023 and 2024, due to the ending of the phasing out process of the old programmes.

Figure 4. 7: Senior Lecturer Equivalent

4.6 CONCLUDING REMARKS

In this chapter, the results and findings of the study were given in tables and figures. The data relating to each of the sections was presented under the relevant sections, and answers to the main research question, as well as the two sub-research questions, were discussed.

In Chapter 5, the conclusions, strengths, limitations and implications of the study are discussed. Recommendations for future research are made.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter, conclusions are drawn and recommendations for further study are made. The research questions for each department in the FEBE and the Faculty as a whole are answered. Recommendations are made regarding the management of human resources and a revised fee structure for the University, the FEBE. The limitations and value of study are also discussed.

5.2 OVERVIEW OF FINDINGS

The phasing out of existing qualifications and phasing in of new HEQSF aligned qualifications on a large scale is a costly exercise. Due to the overlapping of qualifications, an increase in workload and the need for extra staff in December 2012, The South African Minister of Higher Education and Training approved a revised HEQSF (CHE, 2012). The CHE and the DHET mandated all Higher Education Institutions to implement the new Higher Education Qualifications Sub-Framework (HEQSF) by 2020. The purpose of this research was to determine how the implementation of the HEQSF would affect human resources and funding, of the FEBE at a UoT during the phasing in and phasing out periods.

The impact of the introduction and phasing in of the HEQSF qualifications, and the phasing out of NATED 151 qualifications manifested in an increase in the workload of staff members. The model shows that the distributable income generated by the FEBE is not sufficient to appoint new staff members to assist in the phasing in and phasing out process. For a department to function sufficiently a FTE: SLE-ratio ideally needs to be at least 1:25, meaning that 25 students should enrol for 120 credits in the specific qualification in the field of Engineering and the Built Environment.

If a student does not enrol for 120 credits, the headcount in the class will raise, putting more pressure on staff for a bigger class size.

For example, if a class size is 50 students, and they enrol for only half of the 120 credits, the FTE: SLE ratio is 1:25, whereas a group of 25 students taking a full load (120 credits) will give a SLE: FTE ratio of 1:25 as well. This clearly shows the relationship between class size and funding for full load students.

This is, however, not the case for all departments in the faculty. For example, the Department of Architecture, being in a higher funding category, should have a SLE: FTE ratio of 1:20. In the following sub-sections, the research questions are answered as they pertain to the different departments in the FEBE; each department is discussed according to the research questions.

5.2.1 Department of Architecture

The SLE: FTE ratio of the Department of Architecture for the NATED 151 qualifications that are being phased out for the last three rolling years is 1:34.06, indicating that the department was well sustainable with the amount of income generated by the department. However, with the phasing in of the HEQSF qualification it is predicted to drop to 1:19.15 in 2025. This shows a considerable decrease in staff resources needed to deliver the desired qualifications in the department when the HEQSF aligned qualifications are fully introduced. To keep the current staff profile of the department while the phasing out and phasing in are in progress, the student enrolment plan needs to be revised to raise the SLE: FTE ratio to 1:20.

5.2.2 Department of Building Science

The Department of Building Science NATED 151 qualifications that are being phased out have had an SLE: FTE-ratio of 1:27.41 for the last three years rolling. This indicates that this department was well sustainable with the amount of income it generated. However, with the phasing in of the HEQSF qualifications the SLE: FTE ratio is predicted to drop to 1:22.12 in 2025. This shows a slight decrease in staff resources needed to deliver the desired qualifications in the department when the HEQSF aligned qualifications are fully introduced. To keep the current staff profile of the department while the phasing out and phasing in are in progress, the student enrolment plan needs to be revised to raise the SLE: FTE ratio to 1:25.

5.2.3 Department of Chemical, Metallurgical and Materials Engineering

For the past three rolling years, the Department of Chemical, Metallurgical and Materials Engineering has had an SLE: FTE ratio of 1:37.12 for the NATED 151 qualifications that are being phased out, showing that the department was well sustainable with the amount of income it generated. The SLE: FTE ratio is, however, predicted to drop to 1:22,12 in 2025. This shows a slight decrease in staff resources needed to deliver the desired qualifications in the department when the HEQSF aligned qualifications are fully introduced. To keep the current staff profile of the department while the phasing out and phasing in are in progress, the student enrolment plan needs to be revised to raise the SLE: FTE ratio to 1:25.

5.2.4 Department of Civil Engineering

The Department of Civil Engineering had a SLE: FTE-ratio of 1:30,57 for the NATED 151 qualifications that are being phased out. This department was also well sustainable with the amount of income it generated. Conversely, the new HEQSF qualifications envisage a predicted drop to 1:23.81 in the SLE: FTE ratio by 2025. This shows an insignificant decrease in staff resources needed to deliver the desired qualifications in the department. However, to keep the current staff profile of the department sustainable while the phasing out and phasing in are in progress, the student enrolment plan needs to be revised to raise the SLE: FTE ratio to 1:25.

5.2.5 Department of Electrical Engineering

Likewise, a decline in the SLE: FTE ratio is predicted for the Department of Electrical Engineering. The NATED 151 qualifications that are being phased out had an SLE: FTE ratio of 1:30.27 during the last three years rolling with a predicted drop to 1:22.78 when the new HEQSF qualifications are phased in by 2025. This shows small decrease for staff resources needed to deliver the desired qualifications in the department when the HEQSF aligned qualifications are fully introduced in 2025. To keep the current staff profile of the department sustainable while the phasing out and phasing in are in progress, the student enrolment plan needs to be revised to raise the SLE: FTE ratio to 1:25.

5.2.6 Department of Industrial Engineering

In the Department of Industrial Engineering, the NATED 151 qualifications that are being phased out had an SLE: FTE ratio of 1:34.06, indicating that this department was well sustainable with the amount of income generated by the department. However, with the phasing in of the HEQSF qualification it is predicted to drop to 1:19.15 by 2025.

This shows a considerable decrease in staff resources needed to deliver the desired qualifications in the department when the HEQSF aligned qualifications are fully introduced in 2025. To keep the current staff profile of the department sustainable while the phasing out and phasing in are in progress, the student enrolment plan needs to be revised to raise the SLE: FTE ratio to 1:25.

5.2.7 Department of Mechanical Engineering, Mechatronics and Industrial Design

The SLE: FTE ratio of the Department of Mechanical Engineering, Mechatronics and Industrial Design for the NATED 151 qualifications being phased out for the last three rolling years is 1:31.58, indicating that this department was well sustainable with the amount of income it generated. However, with the phasing in of the HEQSF qualification it is predicted to drop to 1:21.32. This shows a significant decrease in staff resources needed to deliver the desired qualifications in the department when the HEQSF aligned qualifications are fully introduced in 2025. To keep the current staff profile of the department sustainable while the phasing out and phasing in are in progress, the student enrolment plan needs to be revised to raise the SLE: FTE ratio to 1:25.

5.2.8 Implications for The Faculty of Engineering and The Built Environment

It is evident that in each of all the departments in the FEBE the human resources were sufficient to offer the NATED 151 qualifications sustainably. However, the prediction model indicates that the all departments in the faculty are likely to experience a drop in SLE: FTE ratios when the new HEQSF qualifications are phased in. This will have a serious impact on the human resources in the faculty. As extra staff had to be appointed to facilitate the phasing in and phasing out process, no extra staff will be needed once the process has been completed.

To mitigate such a big drop in enrolment numbers for the new HEQSF qualifications, the faculty will have to increase enrolment numbers to balance the SLE: FTE ratio to at least 1.25 during the phasing in and phasing out process. If the capacity to service bigger numbers of students does not exist, the fee structure of the new qualifications in the faculty needs to be re-evaluated.

Assessing the whole of the FEBE in terms of the above breakdown of each department, it is clear that if the individual departments are to be sustainable during and after the phasing in and phasing out of qualifications with the current staff allocation; the student enrolment plan needs to be revised. Due to constraints with regard to on-campus facilities, the feasibility of this might be limited.

5.3 CONCLUSIONS

The results generated by the prediction model indicate that during the phasing out of the NATED 151 qualifications and phasing in of the HEQSF aligned qualifications, a significant overlap in old and new qualifications will occur. This will result in a marked increase in workload. The additional resources needed during this transition phase translate to an increase in workload for the academic staff in the FEBE at a UoT if the current staff compliment remains constant.

Student and staff profiles permitting, the enrolment targets for Bachelor, Honours, and Master's degree qualifications should be increased to offset the potential drop in income. This can only be accomplished if the student enrolment plan is linked to staff capacity, staff qualifications, student profiles and the phasing in of HEQSF qualifications. Implementing the new HEQSF therefore comes with an adverse impact on human resources in terms of increased workload.

Comparing the annual class fees in the different faculties, Table 5.1 indicates that there are marked variations in class fees among the various faculties and that class fees in no way reflect the number of credits, nor the resources needed for each of the DHET funding categories. For example, a Diploma in ICT (Funding category 2) will cost less than a Diploma in Humanities (Funding category 1); a B. Tech in The Arts (Funding category 4) will cost less than a B. Tech in Humanities (Funding category 1).

Table 5. 1: UoT Average Yearly Class Fees per Faculty

FACULTY	UNDERGRADUATE/YEAR	PGDIP/HONS/B.TECH PER YEAR
The Arts	R35500-00	R13553-00
Engineering and the Built Environment	R35948-00	R31173-00
Science	R22030-00	R23691-00
Economics and Finance	R23040-00	R33240-00
ICT	R17885-00	R32520-00
Humanities	R25954-00	R19795-00
Management Sciences	R21366-00	R21163-00

Variances in class fees are also found in one faculty for the same qualification among the different fields. Figure 5.1 indicates the variances, which occur in the class fees for the different fields in which the National Diploma is offered. Similarly, Figure 5.2 indicates the variances in class fees in the different fields in which the Baccalaureus Technologiae is offered. This is because the current fee structure is not related to the credit value of the module/subject, but based on whether a module/subject is a semester or year module/subject. As a result, there are instances of large variability between similar courses in the same funding category within faculties. It is clear that there is significant variability between National Diplomas in the same funding category, with instances where the fee is more than double; for example, fees for the National Diploma Building Sciences amount to R21 215 and for the National Diploma in Electrical Engineering to R45 300. Another example is where the fees for the Baccalaureus Technologiae in Geomatics is R 17 700 compared to the fees for Baccalaureus Technologiae Mechanical Engineering, which amount to R43 800. The same phenomenon is observed in all other faculties.

Changing the fee structure of the phasing out NATED 151 qualifications is a redundant task, as implementation of the revised fee structure will happen when the qualifications have been phased out in total.

In this regard, the University Council must approve a revised fee structure, firstly to align the cost of offering the qualifications with the national average and to promote a credit-based fee structure.

The effect of the revised credit-based fee structure on human resources will reflect the income that a qualification is generating, based on the credit value this will apply to the subjects/modules offered in each the qualification. This has an impact on the service department that will receive a credit-based income for the service delivered. In addition, a fair distribution of income for the department that is the custodian of the qualification will be achieved. With this knowledge of the amount of distributable income, individual departments will be able to manage human resource needs for the qualifications offered.

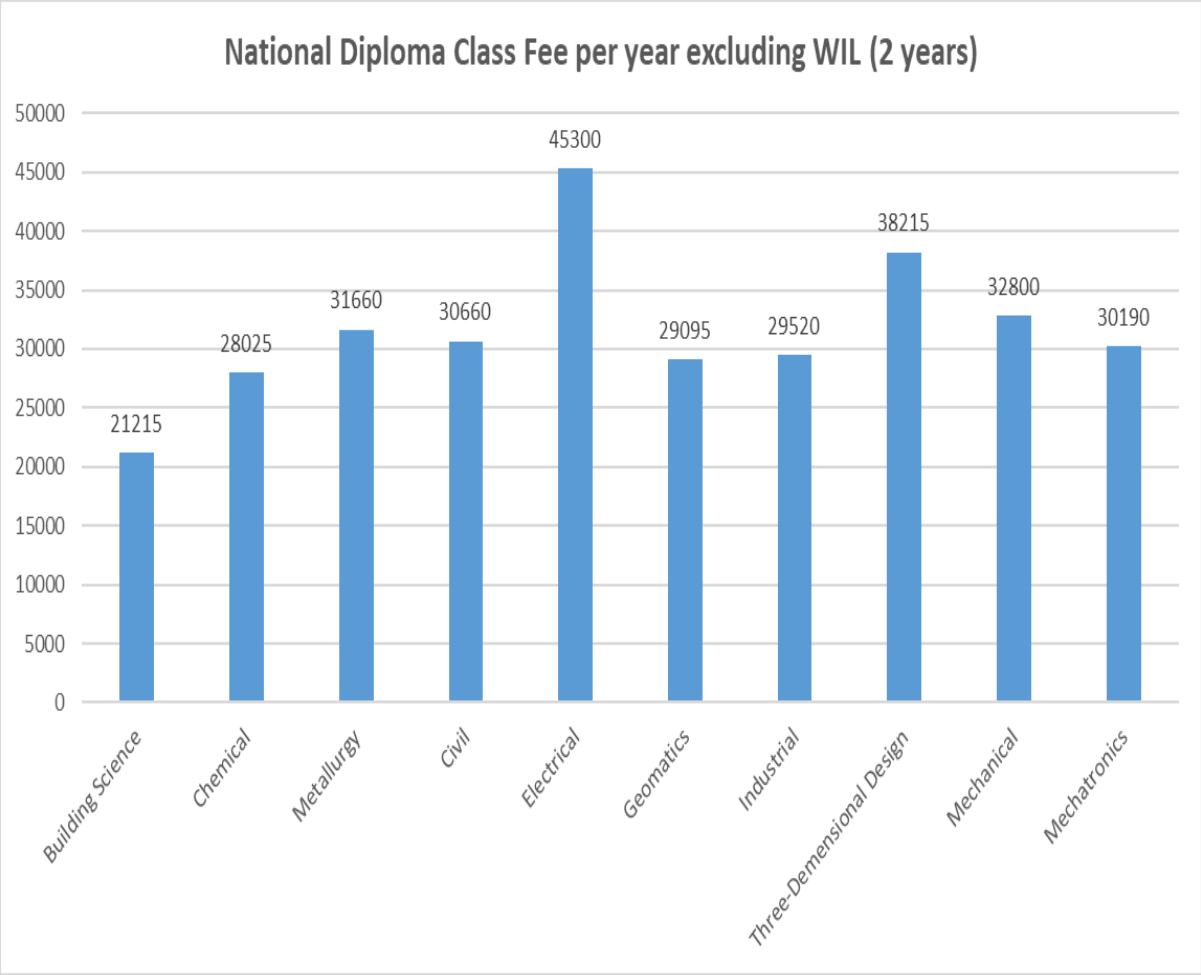

Figure 5. 1: National Diploma class fee per year excluding WIL component

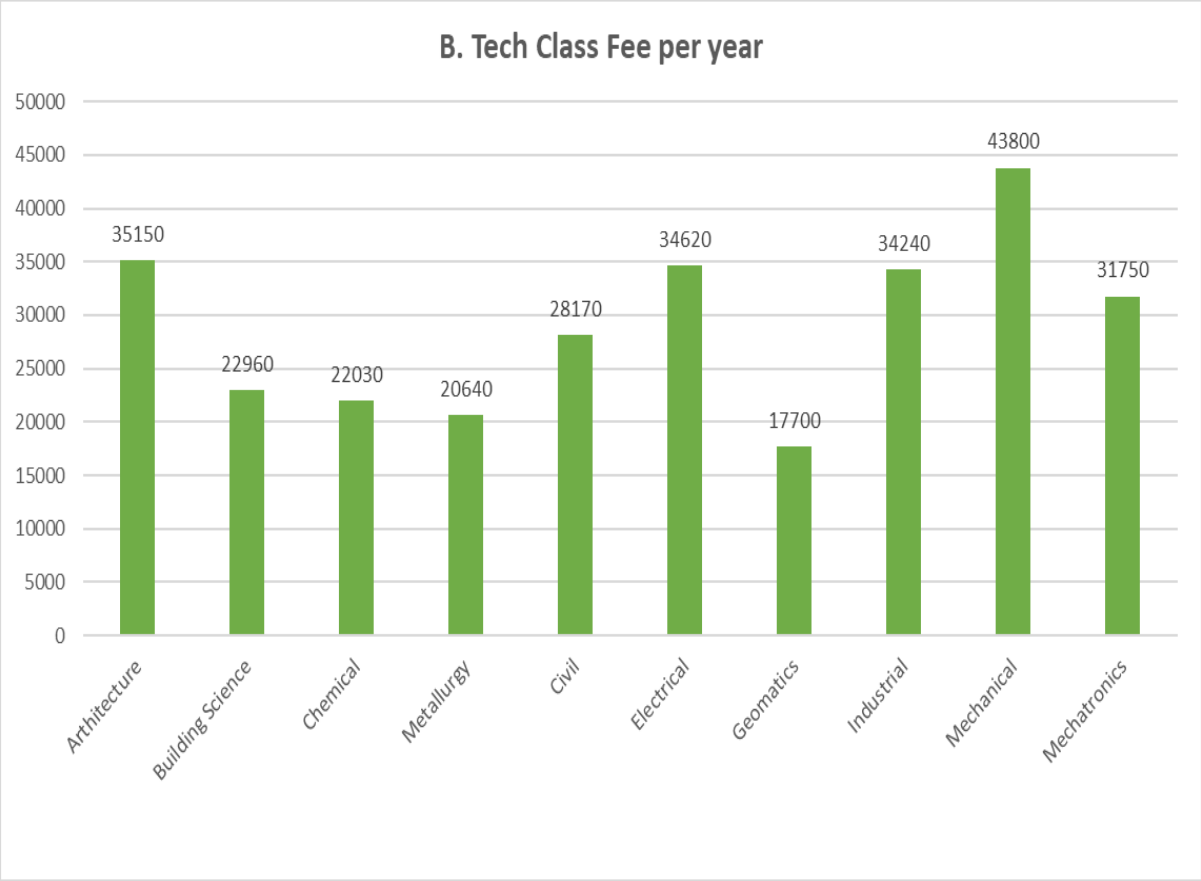

Figure 5. 2: Baccalaureus Technologiae class fee per year

To determine where the UoT stands concerning the cost of its qualifications, benchmarking was done through the office of the registrar at the UoT with the majority of South African universities. These universities included traditional universities that deliver similar qualifications, such as Stellenbosch University, University of Pretoria and North-West University. They also included Universities of Technology, such as Durban UoT, Vaal UoT, Central UoT, Cape Peninsula UoT and Walter Sisulu UoT and Science, based on qualifications of similar duration, funding category and resources required. The results are indicated in Figures 5.3 and 5.4. Again, there are significant discrepancies. For example, the lowest class fees for a diploma in the Faculty of the Arts are R 25 000 per year, and the highest R53 000 per year. Considering all the universities (traditional and UoTs), a national average cost for a diploma in the Faculty of Arts was calculated as R 41 000.

In general, the fees at the UoT for a diploma in the Faculty of Arts is much lower than the country average, which is R35 500. This trend holds true for all the undergraduate qualifications in all the faculties.

The same discrepancies can be observed when benchmarking the Post Graduate Diploma, Honours, and Baccalaureus Technologiae qualifications. For example, in the Faculty of the Arts the lowest class fees is R 10 000 per year and the highest is R44 000 per year. Considering all the universities (traditional and UoTs) a national average for a diploma in the Faculty of Arts was calculated as R 28 000. In general, the fees at the UoT for a diploma in the Faculty of Arts are much lower than the country average of R13 553.

As the current fee structure was not financially viable for the survival of the university and its ability to sustain the current staff profile, and with the benchmarking done, the need arose for the UoT to revise the fee structure. This will be the only opportunity to introduce a credit-based fee structure that coincides with the phasing in of the new HEQSF aligned qualifications and to re-align the distributable income received for human resources.

The position in the FEBE regarding the national averages of qualifications shows that the faculty class fees are much lower than the national average for similar qualifications. This has a big impact on the ability of the faculty to manage human resources in a sustainable way, as income generated is less that what other faculties of different universities generate. Figure 5.3 shows the class fees for undergraduate qualifications; again, significant discrepancies can be observed. The lowest class fees for an undergraduate degree in the Faculty of the Engineering and the Built Environment are R 37 000 per year; the highest are R62 000 per year for an undergraduate degree. Considering the universities (traditional and UoTs), a national average for an undergraduate degree was calculated to be R 49 000. In general, the class fees of the FEBE are much lower than the country average, namely R35 948 for an undergraduate degree.

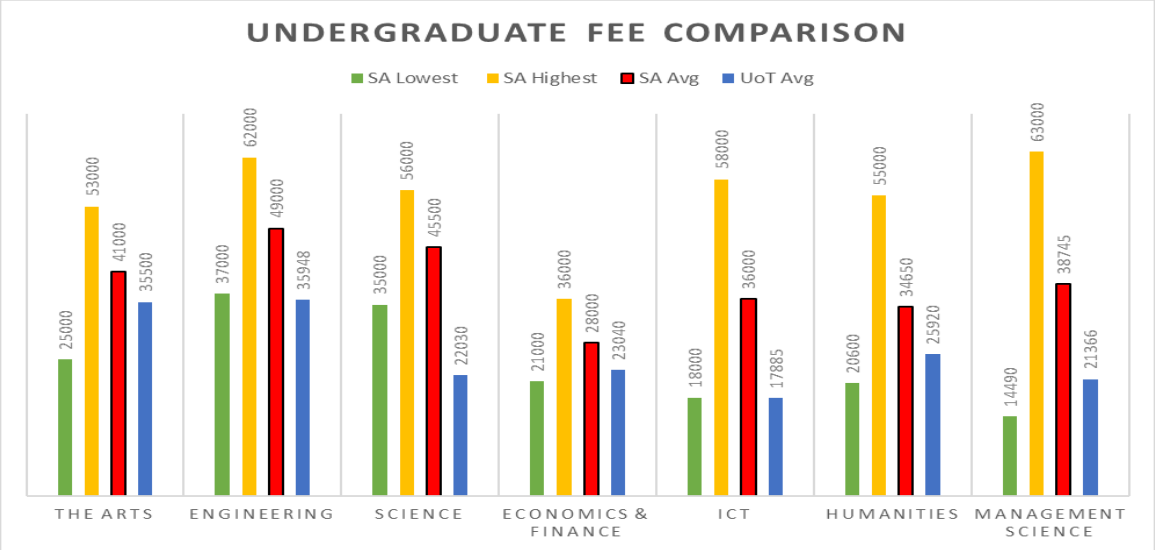

Figure 5. 3: Undergraduate fee comparison benchmarking (Industry survey: SA lowest/SA highest/SA average/UoT)

The same discrepancies can be observed when analysing the Post Graduate Diploma, Honours, and Baccalaureus Technologiae qualifications as indicated in Figure 5.4. The lowest class fee are R 10 000 per year, residing in the Faculty of the Arts, and the highest R64 000 per year, residing in the Faculty of Engineering. Considering all the universities (traditional and UoTs), the national average was calculated to be R 49 000. The postgraduate class fees of the FEBE are much lower than the country average of R31 173.

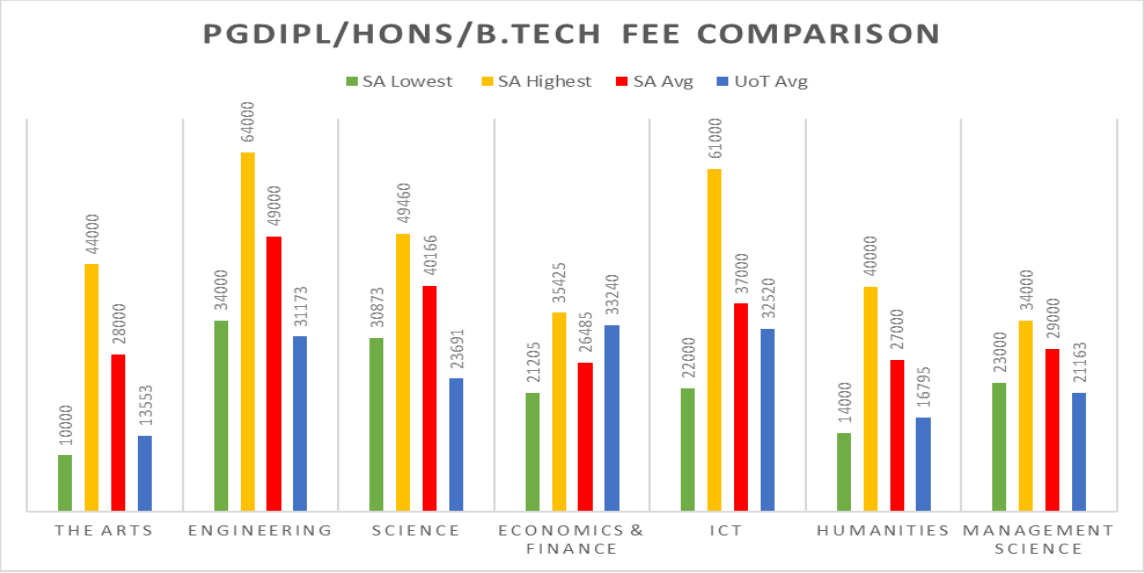

Figure 5.4: PG Diploma/Honours/ Baccalaureus Technologiae fee comparison benchmarking (Industry Survey: SA lowest/SA highest/SA average)

Even inside the FEBE, discrepancies can be observed. As indicated in Figure 5.1, the class fees in the faculty range from R 21 215 in the Building Science Department to R45 360 in the Electrical Department for a National Diploma. For the Baccalaureus Technologiae the class fees range from R 17 700 in the Geomatics Department to R43 800 in the Mechanical Engineering Department. This indicates a lack of consistency in allocating class fees for qualifications; there is a need to make it an even playing field through a credit based class fee structure.

The impact that the revised fee structure will have on the FEBE will be immense, as the fees will be aligned with national averages. This will lead to departments generating class fee income on an equal basis in reference to their student enrolment plan, and to each department being able to manage its human resource needs, as they will be able to determine what income their qualifications will generate. Applying a blanket approach according to a credit-based fee to qualifications in my opinion after consultation with relevant stakeholders will introduce a fair system.

5.4 RECOMMENDATIONS

After assessing the FEBE, it was confirmed that current infrastructure could not accommodate the required increase in student enrolment during the HEQSF phasing in period. Against this logistical limitation, a strategic management meeting held in April 2017 recommended that a revised fee structure for HEQSF aligned qualifications be approved for implementation 2019. This recommendation applies only to HEQSF aligned qualifications, not existing (phasing out) NATED qualifications.

The process followed was to obtain approval from all Faculty Committees for Teaching and Learning (FCTL), from all Faculties in the University, after which it had to be tabled at an Executive Management Committee (EMC) meeting. Approval at the EMC followed with approval by the University Senate, and lastly, the University Council that met on 7 December 2018 (Consult Addendum B: Extract from the minutes of Council).

5.4.1 Adopted Principles

After several in-depth discussions, analysis and a fee structure workshop involving key stakeholders from Support Management Systems, finances, executive deans and other stakeholders, a new fee structure for the UoT was proposed, based on the following principles:

- Class fees for a module or subject should be linked to the number of HEQSF credits.
- Proposed class fees for HEQSF aligned qualifications should not be lower than the cost for similar NATED qualification(s) currently offered.
- Proposed annual fees should be comparable with the industry average for similar qualifications or qualifications of similar duration/credits.
- Class fees should be structured to contribute towards the Executive Management Committee's (EMC) goal to allocate 62.5% of distributable income to salaries, with 60% of the 62.5% to the academic project.
- Class fees should be aligned with the DHET funding categories and targeted SLE: FTE ratios.

5.4.2 Proposed Fee Structure

The Prediction Model was developed by calculating the total income based on CESM categories, DHET funding, TIUs (TIUs), TOUs (TOUs), the Rand value of a Senior Lecturer Equivalent (SLE), the targeted number of FTEs (FTEs) per SLE per CESM category, UoT financial targets, and benchmarked data. The variables of the model are dynamic, implying that the model can be easily adapted for changes in DHET funding policy.

Table 5.2 shows the consensus reached for the credit based fee structure for the cost per year for all undergraduate qualifications (level 5 to 7 and L8); consensus was reached at the Academic Leadership Programme Workshop held on 26 September 2018 at Toppieshoek.

The Vice-Chancellor, Deputy Vice-Chancellors, Executive Deans from all faculties, professors of the university, strategic management and support directors, human resources directors and financial aid directors were all present at the workshop. Moreover, consensus was reached on the viability of the model and the predictions made (Consult Addendum B).

The fee structure for undergraduate programmes as shown in Table 5.2 is divided according to Qualification Types, Funding Groups, NQF Levels, NQF Credits, Cost per Credit Contact, Cost per Credit Distance, Qualification Cost, Distance Qualification Cost, Contact Qualification and Cost Contact per Annum. To illustrate the table a 360 credit NQF level six Diploma (full-time offering) in funding group three will cost R122 613. The yearly class fee will be R40 871, which relates to R341 per credit. Similarly, a 360 credit NQF level six Diploma (full-time offering) in funding group one will cost R100 976. The yearly class fee will be R33 659, which relates to R280 per credit.

According to the proposal, the fee-structures of research-based master's and doctoral degrees will remain unchanged. However, specialised taught master's degrees, such as the MBA, M. Arch (Professional), M. Eng. (Engineering Management) were allocated custom values based on industry average.

Table 5. 2: Proposed cost per credit for HEQSF aligned qualifications

Qualification Type	Funding Group	NQF Level	Offering Type	NQF Credits	Cost Per Credit Contact	Cost Per Credit Distance	Qualification Cost Distance	Qualification Cost Contact	Qualification Cost Contact per annum
Certificate	1	5	Structured	120	R280	R140	R 16 829	R33 659	R33 659
Higher Certificate	1	5	Structured	120	R280	R140	R 16 829	R33 659	R33 659
Advanced Certificate	1	6	Structured	120	R280	R140	R 16 829	R33 659	R33 659
Diploma	1	6	Structured	360	R280	R140	R 50 488	R100 976	R33 659
Advanced Diploma	1	7	Structured	120	R280	R140	R 16 829	R33 659	R33 659
Bachelor Degree –360	1	7	Structured	360	R280	R140	R 50 488	R100 976	R33 659
Prof. Bachelor Degree –360	1	7	Structured	360	R280	R140	R 50 488	R100 976	R33 659
Bachelor Degree – 480	1	8	Structured	480	R305	R152	R 73 171	R146 342	R36 586
Prof Bachelor Degree – 480	1	8	Structured	480	R305	R152	R 73 171	R146 342	R36 586
Master's Degree – Structured	1	9	Structured	180	R260	R130	R 23 400	R46 800	R46 800
Certificate	2	5	Structured	120	R301	R150	R 18 031	R36 063	R36 063
Higher Certificate	2	5	Structured	120	R301	R150	R 18 031	R36 063	R36 063
Advanced Certificate	2	6	Structured	120	R301	R150	R 18 031	R36 063	R36 063
Diploma	2	6	Structured	360	R301	R150	R 54 094	R108 188	R36 063
Advanced Diploma	2	7	Structured	120	R301	R150	R 18 031	R36 063	R36 063
Bachelor Degree – 360	2	7	Structured	360	R301	R150	R 54 094	R108 188	R36 063
Prof Bachelor Degree – 360	2	7	Structured	360	R301	R150	R 54 094	R108 188	R36 063
Bachelor Degree – 480	2	8	Structured	480	R327	R163	R 78 398	R156 795	R39 199
Prof Bachelor Degree – 480	2	8	Structured	480	R327	R163	R 78 398	R156 795	R39 199
Master's Degree –Structured	2	9	Structured	180	R275	R138	R 24 750	R49 500	R49 500
Certificate	3	5	Structured	120	R341	R170	R 20 436	R40 871	R40 871
Higher Certificate (120)	3	5	Structured	120	R341	R170	R 20 436	R40 871	R40 871
Higher Certificate (140)	3	5	Structured	140	R292	R146	R 20 440	R40 880	R40 880
Advanced Certificate	3	6	Structured	120	R341	R170	R 20 436	R40 871	R40 871
Diploma	3	6	Structured	360	R341	R170	R 61 307	R122 613	R40 871
Advanced Diploma	3	7	Structured	120	R341	R170	R 20 436	R40 871	R40 871
Bachelor Degree – 360	3	7	Structured	360	R341	R170	R 61 307	R122 613	R40 871
Prof Bachelor Degree -360	3	7	Structured	360	R341	R170	R 61 307	R122 613	R40 871
Prof Bachelor Degree – 3year	3	7	Structured	420	R292	R146	R 61 320	R122 640	R40 880
Bachelor Degree – 480	3	8	Structured	480	R370	R185	R 88 851	R177 702	R44 425
Prof Bachelor Degree – 480	3	8	Structured	480	R370	R185	R 88 851	R177 702	R44 425
Master's Degree – Structured	3	9	Structured	180	R300	R150	R 27 000	R54 000	R54 000

Qualification Type	Funding Group	NQF Level	Offering Type	NQF Credits	Cost Per Credit Contact	Cost Per Credit Distance	Qualification Cost Distance	Qualification Cost Contact	Qualification Cost Contact per annum
Certificate	4	5	Structured	120	R361	R180	R 21 638	R43 275	R43 275
Higher Certificate	4	5	Structured	120	R361	R180	R 21 638	R43 275	R43 275
Advanced Certificate	4	6	Structured	120	R361	R180	R 21 638	R43 275	R43 275
Diploma	4	6	Structured	360	R361	R180	R 64 913	R129 826	R43 275
Advanced Diploma	4	7	Structured	120	R361	R180	R 21 638	R43 275	R43 275
Bachelor Degree – 360	4	7	Structured	360	R361	R180	R 64 913	R129 826	R43 275
Prof Bachelor Degree –360	4	7	Structured	360	R361	R180	R 64 913	R129 826	R43 275
Bachelor Degree – 480	4	8	Structured	480	R392	R196	R 94 077	R188 155	R47 039
Prof Bachelor Degree – 480	4	8	Structured	480	R392	R196	R 94 077	R188 155	R47 039
Master's Degree – Structured	4	9	Structured	180	R317	R159	R 28 530	R57 060	R57 060
Specialised Qualifications									
MBA	2	9	Structured	180	R611	N/A	N/A	R109 980	R109 980
Diploma In Industrial Physics	3	6	Structured	400	R152	N/A	N/A	R60 800	R18 240
Bachelor Of Pharmacy	4	7	Structured	480	R413	N/A	N/A	R198 240	R49 560
Bachelor Of Environmental Health	4	7	Structured	500	R247	N/A	N/A	R123 500	R29 640

5.5 VALUE AND LIMITATIONS OF THE STUDY

This study was limited because it was based on past HEMIS data of a UoT. As this study primarily relied on this data, greater inferences cannot be made or generalised to other faculties of this university or other Universities of Technology. However, the prediction model can be applied to any faculty at any university, based on the HEMIS data specific to that faculty. This research is significant as its outcomes can be utilised as a tool to aid any university to structure its lecture-to-student ratios for the university to operate optimally. The prediction model can be used as a computerised *live* model and be updated on an annual basis to give a more accurate prediction of funding and human resource needs of individual faculties and universities as a whole.

5.6 SUGGESTIONS FOR FURTHER RESEARCH

The research was conducted with the mind-set of a bottom-up approach, taking all qualifications in the FEBE into consideration, linking them to the student enrolment plan of each department and cross-checking them with historical data of similar qualifications offered by the faculty. Funding from the DHET is incorporated in the model, along with external variables as discussed in previous chapters. However, a further research suggestion is a top to bottom approach to test the viability of the prediction model using the FTE: SLE ratios specified by the DHET against the income generated for levels of qualifications.

5.7 CONCLUDING REMARKS

This research identified a flaw in how class fees are determined, basing it on semester or year subjects' offerings, rather than credits of a qualification or subject/module. It is evident that, during the phasing in of the HEQSF qualifications, close attention needs to be paid to the student enrolment plan for the faculty as an income generator to ensure sustainable human resources. The research showed that if the faculty does not manage the process well, the process will impact human resources negatively in the sense that not enough funds will be generated and the needs of the FEBE will not be met.

This will negatively affect the ability of the FEBE to phase out the NATED151 programmes and phase in the HEQSF aligned qualifications.

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ADDENDA

Addendum A: Announcement of the minister of Higher Education pertaining to the phasing out of all qualifications that are not aligned with the HEQSF on 31 December 2019.

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PART 2 OF 2

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Annexure C: *Occupational health and safety audit report(s) and certificates*			
Annexure D: *Proof of accreditation with the QCTO and/or SETA*			
Annexure E: *Proof of DHET registration number for programmes registered on GEFETQSF*			
Annexure F: *Proof of accreditation by UMALUSI and proof of registration with the Provincial Department of Education for the operation of an Independent School*			
Annexure G *Proof of list of audited programmes and letter of verification by SAQA*			
Annexure H *Declaration on monitoring and evaluation*			
Annexure I *Declaration by students on enrolment on higher education programmes*			
Annexure J *Declaration on audited student data submitted to the HEQCIS and NLRD*			
Annexure (K)(1) *List of inter-institutional/partnership agreements.*			
Annexure (K)(2) *Agreement on joint-use of a facility*			
Annexure (K)(3) *Declaration on joint-use of a facility*			
Annexure (K)(4) *Occupational health and safety compliance certificate for a jointly used facility*			
Annexure (L) *Student prospectus, calendar or brochure*			
Annexure (M) *Policy on student enrolment including enrolment forms, student contracts, rules and regulations relating to student and staff Code of Conduct*			
Annexure (N) *Policy on institutional language*			
Annexure (O) *Policy on student fees and charges including procedure for refunding students in the case of cancellation or withdrawal of registration.*			
Annexure (P) *Policy on student financial aid and student support*			
Annexure (Q) *Policy and procedure for handling of staff and student complaints and grievances*			
Annexure (R) *Policy on health and wellness including HIV-AIDS*			
Annexure (S) *Policy on people living with a disability*			
Annexure (T) *Declaration on Non-Discrimination*			
Annexure (U) *Declaration on equality of qualifications*			
Annexure V (1): *Proof of recognition in the country of origin*			
Annexure V (2): *Proof of accreditation in the country of origin*			

NON-GOVERNMENTAL ORGANIZATION

NO. 44 26 JANUARY 2018

REGULATIONS FOR THE REGISTRATION OF PRIVATE HIGHER EDUCATION INSTITUTIONS, 2016

A GUIDE FOR COMPLETING THE APPLICATION FOR AMENDMENT AS A PRIVATE HIGHER EDUCATION INSTITUTION

(GUIDE APX-02)

The Department provides this guide to any institution that intends to amend its registration as a private higher education institution. This manual is a guideline to interpret the legal framework, which consists of the *Higher Education Act, 1997 (Act No. 101 of 1997)*, the *Regulations for the Registration of Private Higher Education Institutions, 2016* and the Annexures to the Regulations.

Since it is necessary to have the guides and the forms accessible, the Registrar of Private Higher Education Institutions has decided to re-publish in this format. The original publication in the Government Gazette is the formal publication. This publication is an exact copy of *Government Gazette No. 39880* dated 31 March 2016. Electronic versions of the Act, the Regulations and the Annexures are also available on the website of the Department of Higher Education and Training at address www.dhet.gov.za.

In utilizing this publication, it is important to note that it is only applicable to registered private higher education institution. It accompanies an application form titled *Application for Amendment as a Private Higher Education Institution (Form APX-02)*. For registered private higher education institutions that seek to submit annual reports similar publications are available on the website. For further assistance, contact the Directorate: Registration of Private Higher Education Institutions at the details provided below.

Postal Address:

Department of Higher Education and Training (DHET)
123 Francis Baard Street
Private Bag X174
Pretoria 0001

Telephone:	(012) 312 5614
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E-mail:	registrarphei@dhet.gov.za
Call Centre:	0800 87 22 22

TABLE OF CONTENTS PAGE

ACRONYMS USED IN THE GUIDE AND FORM

CHE	Council on Higher Education
CIPC	Companies and Intellectual Property Commission
FET	Further Education and Training
FTE	Full-time equivalent
GEFETQSF	General and Further Education and Training Qualifications Sub- Framework
HEQC	Higher Education Quality Committee
HEQCIS	Higher Education Quality Committee Information Systems
IFRS	International Financial Reporting Standards
IRBA	Independent Regulatory Board for Auditors

NLRD	National Learner's Records Database
NSC	National Senior Certificate
NQF	National Qualification Framework
OQSF	Occupation Qualifications Framework
QCTO	Quality Council for Trades and Occupations
SARS	South African Revenue Services
SETA	Sector Education and Training Authority
VAT	Value Added Tax

VISION, MISSION AND MANDATE OF THE DEPARTMENT OF HIGHER EDUCATION AND TRAINING

VISION

The vision of the Department of Higher Education and Training (DHET) is of a South Africa in which we have a differentiated and fully-inclusive post-school system that allows South Africans to access relevant post-school education and training in order to fulfil the economic and social goals of participation in an inclusive economy and society.

MISSION

The mission of the Department is to develop capable, well-educated and skilled citizens who are able to compete in a sustainable, diversified and knowledge-intensive international economy, which meets the development goals of South Africa.

MANDATE

The Department derives its mandate from section 29 of the Constitution of the Republic of South Africa, 1996 ("hereafter referred to as "the Constitution") read with schedule 4 which lists the rights of all South Africans with respect to education at all education levels within South Africa. In accordance with the section 29 of the Constitution, the Department thus endeavours to provide quality education to all South Africans at every level of the post-school system. With respect to private higher education institutions specifically, the Department is guided by section 29(3) of the Constitution which states that:

Everyone has the right to establish and maintain, at their own expense, independent institutions that:

(a) Do not discriminate on the basis of race;
(b) Are registered with the State; and
(c) Maintain standards that are not inferior to standards at comparable public educational institutions.

Private higher education thus has an important role to play in the mandate of the Department for delivering on the Constitutional right of South Africans to quality education that provides the intellectual and professional training required to meet the development needs of society and the economy.

THE LEGAL FRAMEWORK

In terms of the *National Qualifications Framework Act, 2008 (Act. No 67 of 2008* "the NQF Act"), the *National Qualifications Framework* (NQF), which is the system into which the South African qualifications and part qualifications are organized and recorded, is divided into three (3) sub-frameworks. The 3 sub-frameworks are: the *Higher Education Qualifications Sub-Framework* (HEQSF), the *General and Further Education and Training Qualifications Sub-Framework* (GEFETQSF) and the *Occupational Qualifications Sub-Framework* (OQSF). Each sub-framework is the responsibility of a Quality Council (QC). The three QCs are: the *Council on Higher Education* (CHE) which is responsible for the quality assurance of higher education qualifications which are on levels 5 – 10 of the NQF, *Umalusi* which is responsible for the quality assurance of college

programmes and qualifications which are on levels 1 – 4 of the NQF and the *Quality Council for Trades and Occupations* (QCTO) which is responsible for the quality assurance of qualifications that belong in the trades and occupations which are on levels 1- 8 of the NQF. These QCs are responsible for accreditation of qualifications falling within their sub-frameworks as well as accrediting private institutions that wish to offer their qualifications.

The *South African Qualifications Authority* (SAQA) is responsible for marinating the NQF. To enable the Registrar to register private institutions in compliance of section 29 of the Constitution of the Republic of South Africa, SAQA makes decisions as to which qualifications sub-framework a qualification belongs to so as to avoid a situation where private institutions may offer qualifications or part qualifications without registration of such qualifications on the NQF.

The QCTO may delegate its accreditation functions to a **"delegated accrediting authority"**, such as a *Sector Education and Training Authority* (SETA), a professional body or another entity but the final endorsement and certification will be issued by the QCTO as the responsible QC.

The *Higher Education Act, 1997 (Act No. 101 of 1997)*(hereafter referred to as "the Act") requires that private institutions be registered with the DHET in order to operate legally, over and above being accredited by the CHE.

The *Continuing Education and Training Act, 2006 (Act. No. 16 of 2006)* (hereafter referred to as "the CET Act") requires that private colleges be registered with the DHET in order to operate legally, over and above being accredited by Umalusi.

According to the *Skills Development Act, 1998 (Act No.97 of 1998)* (hereafter referred to as "the SD Act"), private providers that offer qualifications that fall on the sub-framework of the QCTO, which is the OQSF, that is, the sub-framework for trades and occupations must be accredited by the QCTO. For OQSF qualifications that fall on levels 1 to 6 of the NQF, private providers are required to register as private colleges. For OQSF qualifications that fall on levels 7 to 8 of the OQSF, private institutions are required to register as PHEIs. In the likely event that a private provider offers qualifications from the three sub-frameworks, it has to satisfy in respect to a specific qualification, the requirements of the QC that relate to any one of the three Acts: HE Act, CET Act and SD Act.

Therefore, accreditation of qualifications and the ability of the institution to deliver the qualifications for private higher institutions (PHEIs) and private colleges is a means towards registration and it does not represent or replace registration for them.

The National Qualifications Framework (NQF)

The following is a representation and explanation of the National Qualifications Framework (NQF).

NATIONAL QUALIFICATIONS FRAMEWORK				
LEVEL		SUB-FRAMEWORK AND QUALIFICATION TYPES		
10	H E Q S F	DOCTORAL DEGREE DOCTORAL DEGREE (PROFESSIONAL)		
9		MASTER'S DEGREE MASTER'S DEGREE (PROFESSIONAL)		
8		BACHELOR HONOURS DEGREE POSTGRADUATE DIPLOMA BACHELOR'S DEGREE (480 CREDITS)	OCCUPATIONAL CERTIFICATE (LEVEL 8)	O

7		BACHELOR'S DEGREE (360 CREDITS) ADVANCED DIPLOMA	OCCUPATIONAL CERTIFICATE (LEVEL 7)	Q S F
6		DIPLOMA ADVANCED CERTIFICATE	OCCUPATIONAL CERTIFICATE (LEVEL 6)	
5		HIGHER CERTIFICATE	OCCUPATIONAL CERTIFICATE (LEVEL 5)	
4	G E	NATIONAL CERTIFICATE	OCCUPATIONAL CERTIFICATE (LEVEL 4)	
3	N	INTERMEDIATE CERTIFICATE	OCCUPATIONAL CERTIFICATE (LEVEL 3)	
2	F E	ELEMENTARY CERTIFICATE	OCCUPATIONAL CERTIFICATE (LEVEL 2)	
1	T Q S F	GENERAL CERTIFICATE	OCCUPATIONAL CERTIFICATE (LEVEL 1)	

Taken from Government Gazette Volume 578, Number 36721, Pretoria, 2 August 2013 and adapted for the Register. The GENETQSF can be found on Page 23 of the Gazette. Qualification types beyond level 6 on the OQSF have not been determined pending further advice.

Key to sub-frameworks

Higher Education Qualifications Sub-framework (HEQSF)	General and Further Education and Training Qualifications Sub-framework (GENFETQSF)	Occupational Qualifications Sub-framework (OQSF)

The following must be noted:

a) A "Diploma" is pitched on Level 6 of the NQF and it carries either 360 credits or 480 credits.
b) A "Degree" that is pitched on Level 7 of the NQF carries 360 credits.
c) A "Degree" that is pitched on Level 8 of the NQF carries 480 credits.
d) An exception is the *Bachelor of Education* (BEd) degree which is pitched on Level 7 of the NQF with 480 credits.
e) Other exceptions will be brought to your notice as they arise.

The National Education Diploma (NATED) Commonly Referred to as N-Diplomas

a) The Department offers N-Diplomas on Levels 1 to 6 of the NQF through both public and private providers. For a provider to offer N-Diplomas on levels 1 to 6 of the NQF registration by the DHET as a private college is required.
b) The N1-N3 "Diplomas" must be accredited by Umalusi and the N4-N6 "Diplomas" must be accredited by the QCTO. The provider must then be registered as a private college with the DHET before the programmes can be offered.

SETA-accredited "Diploma" qualifications

A "Diploma" falls on the sub-framework of the HEQSF. However, some "Diplomas" that are accredited by *Sector Education and Training Authorities* (SETAs) will be phased out gradually. A

SETA is only a **"delegated accrediting authority"** of the QCTO. The accreditation of a "Diploma" qualification by a SETA will not qualify it for registration as a PHEI.

Transitional Arrangements

The following transitional arrangements need to be noted.

a) The SETA accredited "Diploma" will be phased out in the transitional period.
b) On 6 July 2016, Dr BE Nzimande, the Minister of Higher Education and Training announced in Government Gazette No. 40123 that 31 December 2019 is the last enrolment date for first time entering students into non-HEQSF aligned programmes. Therefore, after 31 December 2019, no PHEI may offer any qualification with a title stipulated in the HEQSF that is not aligned to the HEQSF, duly accredited by the CHE, and registered by the DHET and the SAQA.
c) PHEIs currently purporting to offer non-HEQSF aligned programmes need to plan their phase-out as no new enrolments will be permitted after 31 December 2019.
d) The Department and SAQA are in the process of regulating the use of nomenclatures for programmes that use the HESF nomenclatures but do not belong to the HEQSF.

The registration of private higher education institutions

The Department implements its registration and regulation functions for private higher education institutions in accordance with the requirements of the:

a) *Higher Education Act, 1997 (Act No. 101 of 1997)*(hereafter "the Act"); and
b) *Regulations for the Registration of Private Higher Education Institutions,* published in *Government Gazette No.39880* dated 31 March 2016 (hereafter referred to as "the Regulations"). The Regulations were promulgated on 31 March 2016, and came into effect on 1 April 2016 (Note: The *Regulations for the Registration of Private Higher Education Institutions, 2016* repeals the *Regulations for the Registration of Private Higher Education Institutions, 2002*).The Regulations are an elaboration of the provisions of the Act. They clarify the requirements of the Act.

The requirement to register as a private higher education institution only applies to private institutions offering learning programmes that result in the award of whole qualifications, that is, learning programmes that result in the award of higher certificates, diplomas or degrees as per the HEQSF.

The granting of registration, as contemplated in the Act, means that the Registrar grants an institution the legal authority to offer higher education programmes and award higher education qualifications. The purpose of registering private institutions offering higher education is to ensure that:

a) Private higher education institutions offer an acceptable quality of education;
b) Students receive higher education from institutions that have the resources, capacity and/or expertise to deliver quality programmes;
c) Students enrolled with private higher education institutions obtain qualifications that are aligned with the NQF; and
d) The education system continues on a path of transformation in accordance with government policy and regulation.

The registration process does not affect public higher education institutions. The regulatory framework sets criteria that define who is eligible for applying for registration and who qualifies for registration. It further outlines the responsibilities of an institution once registered. Registration can, therefore, be seen as a means of protecting the integrity of the higher education system, as well as protecting the interests of the public.

Chapter 7 of the Act deals specifically with private higher education institutions. The Regulations to which this guide and the application form are an attachment, provide the legal framework within which the Registrar of Private Higher Education Institutions is required to regulate the registration of private higher education institutions in terms of the Act.

APPLICATION TYPES

Regulations 3 and 4 stipulate the following:

Addendum B: *Extract from the minutes of the Council meeting held on 7 December 2018*

Tshwane University of Technology

EXTRACT OF THE MINUTES OF COUNCIL – 7 DECEMBER 2018

		PERSON(S) RESPONSIBLE	SUPPORTING DOCUMENTS
11.1	**REPORT OF THE EXECUTIVE COMMITTEE OF COUNCIL (EXCO)**	**Chair: EXCO**	**Refer to the Circulated document & Refer to the Agenda Docs 11 to 14**
	11.1.1 The Chairperson of the EXCO reported on the matters considered by the Committee. a. The Council noted that EXCO considered the FCC and ECC's recommendations on the matter between TUT and Mr G Fatagodien. b. The Council further noted the following: i. The EXCO did not support the FCC and ECC's recommendations that the University negotiate an out-of-court settlement in the matter and was of the view that fraud charges be instituted against all those involved. ii. The EXCO recommended that Executive Management proceed with the court case and all money's paid in an irregular manner be recovered. 11.1.2 Review of Investments. a. The Council noted that on 26 September 2018, the EXCO considered and approved (for immediate implementation) the recommendations of the Finance Committee on the review of the short-term, medium-term and long-term investments. b. The Council noted the EXCO's approval of the matter for immediate implementation. c. The Council noted the EXCO's recommendation on the ratification of the resolution. 11.1.3 Appointment of Transitional SRC. a. The Council noted that on 1 October 2018, the Council EXCO considered and approved the request for the appointment of a transitional SRC as provided for in the Constitution of the SRC. b. The Council noted the EXCO's approval of the matter for immediate implementation. c. The Council noted the EXCO's recommendation on the ratification of the resolution. **11.1.3 Fees Adjustments for 2019.** The Council noted the EXCO's recommendation the fees adjustment for 2019 as follows: a. Tuition Fees – 5,3%. b. Residence Fees (TUT owned) – Maximum of 7,3% 11.1.4 Report of the Forensic Investigation into the 2018/2019 SRC elections. a. The Council noted the EXCO's recommendation on the report of the forensic investigation into the 2018/2019 SRC elections.		

12.	**NEW MATTERS**		
12.1	**REVISED TUT FEE STRUCTURE FOR HEQFS ALIGNED PROGRAMMES**	**Vice-Chancellor**	**Refer to the Agenda Doc 38**
	1. The Council noted the V's presentation on the matter. 2. The Council further noted that the HEQFS aligned programmes would be costed based on the national benchmarks. 3. The Council further noted that the exercise was also informed by the move away from the SAPSE funding model into a new dispensation under SAQA. **Resolved that** 1. The revised TUT fee structure for HEQFS aligned programmes be approved.		
12.2	**COMPUTER FEE: FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT (FEBE)**	**Vice-Chancellor**	**Refer to the Agenda Doc 39**
	1. The Council noted the VC's presentation on the request to instate a non-compulsory faculty computer fee with effect from January 2019 to support students with bursaries and funding that included computing devices. **Resovled that** 1. The proposed computer fee for FEBE be approved.		

Prepared by Mr JM Nkambule (Council Secretariat – Office of the Registrar)